

# MATERIAL APPROVAL REQUEST

65 MW SANPABLO SOLAR POWER PROJECT  
ISABELA

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# 1. COMPRESSION CLAMPS, LUGS, NUT AND WASHER

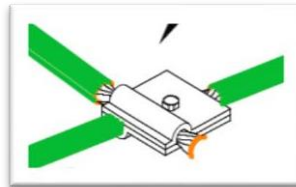
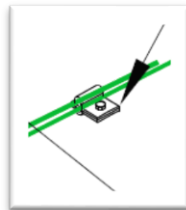
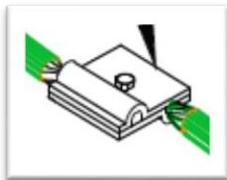


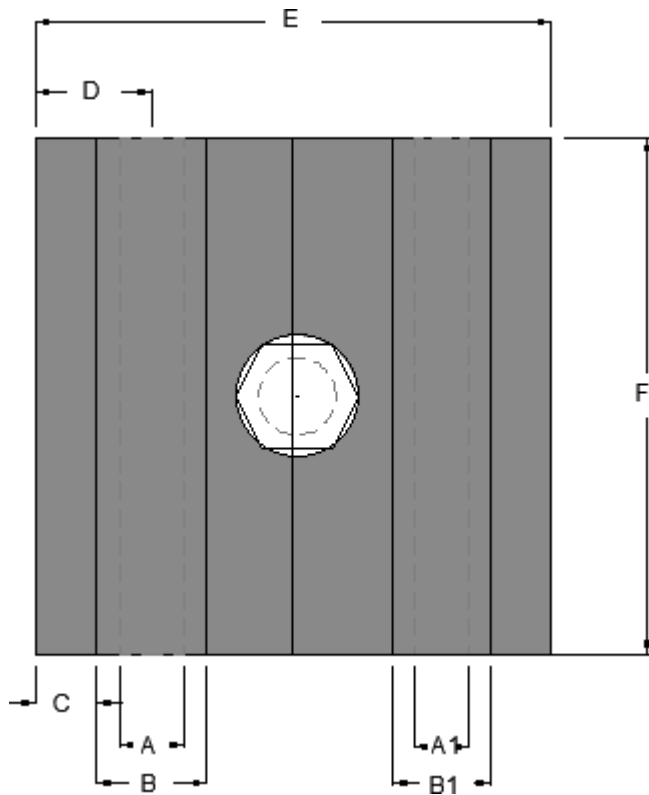
## Parallel Connector Clamp

Parallel Connector Clamp is made of steel in hot dipped galvanized finish. The material can connect two parallel conductors.

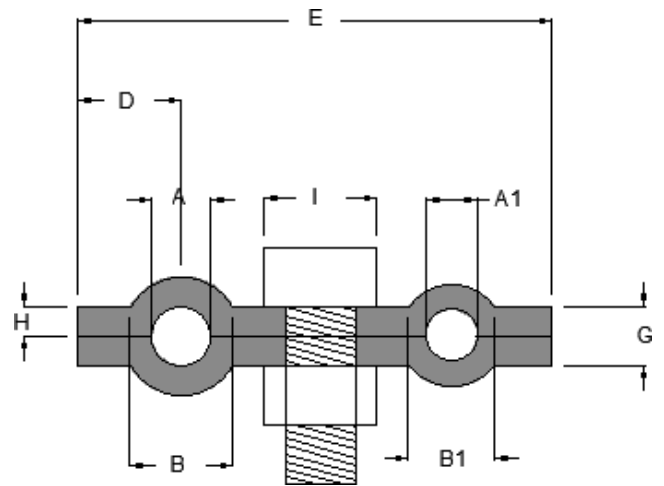
Product Code	Cable Size	Bolt Size	Weight
PCC-HDG-10-M10	8-10mm dia.	M10 x35mm	0.11kg

*\*HDG to HDG*





## COMPRESSION CLAMP CONNECTOR

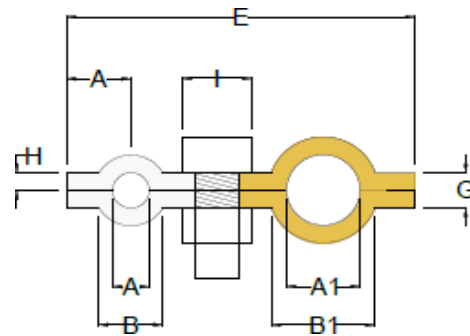
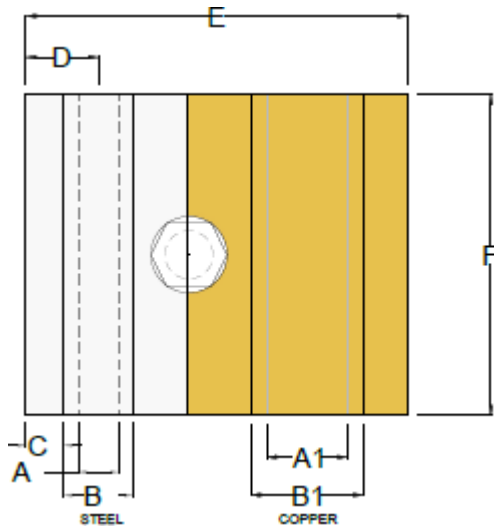


*Hot Dipped Galvanized Steel*

Conductor Size	A ∅ mm	A1 ∅ mm	B mm	B1 mm	C mm	D mm	E mm	F mm	G mm	H mm	I (Bolt Size) ∅ mm
78-60	10	8.8	17	15	10	18	80	80	40	5	19

## COMPRESSION CLAMP – BI-METALLIC CONNECTOR

- Bi-Metallic Clamps are used for joining aluminum and copper tapes/rods and providing a corrosion barrier between two metals.

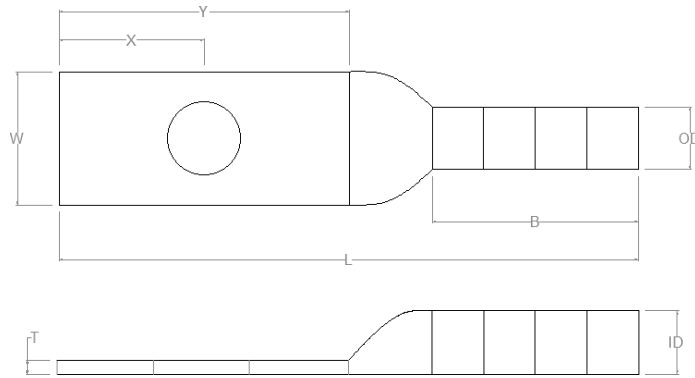


Conductor Size	A ∅ mm	A1 ∅ mm	B mm	B1 mm	C mm	D mm	E mm	F mm	G mm	H mm	I (Bolt Size) ∅ mm
78-60	10	20	17	28	10	18	90	80	10	5	19



## 1-HOLE GALVANIZE STEEL LUGS

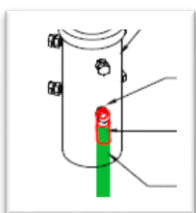
- Provides high strength and premium electrical properties
- Material – Steel & ETP Copper



1-Hole Galvanize Steel Lugs [Long Barrel]

Catalogue Code	Steel Conductor(mm <sup>2</sup> )	Stud Size	Dimensions							
			I.D	O.D	L	W	X	Y	T	B
CL-HDG-35-12	35	5/16"	7.9	10.7	57.7	16.8	8.1	19.3	2.5	29.4
CL-HDG-70-12	70	1/2"	11.4	14.7	79.2	21.6	12.7	28.7	3.3	38.1

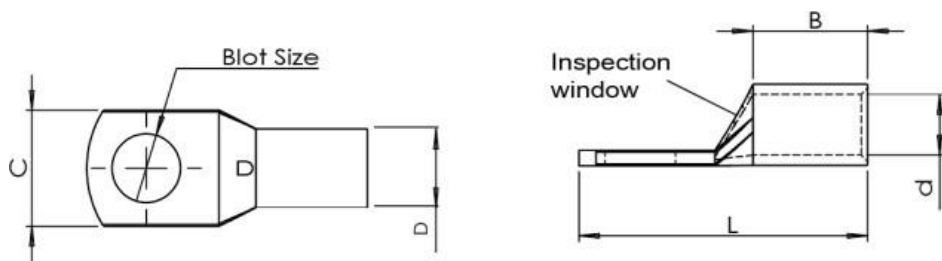
\*HDG cable to MS Screw pile



## COPPER LUGS – TIN PLATED 35mm<sup>2</sup>



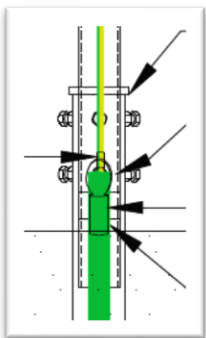
- Copper lugs are connecting devices used primarily in terminating wire conductors in installations and equipment.
- Manufactured from high conductivity copper which is tin plated to prevent corrosion.
- Easy to use in conjunction with mechanical or hydraulic crimping equipment.



1-Hole Tin Plated Copper lugs [Long Barrel]

Catalogue #	Dimensions (mm)					
	Bolt Size	Tang Width C	Barrel Length B	Overall Length L	Inner Diameter d	Outer Diameter D
CL-TP-35-12	M12	20.0	40.0	72.0	10.0	14

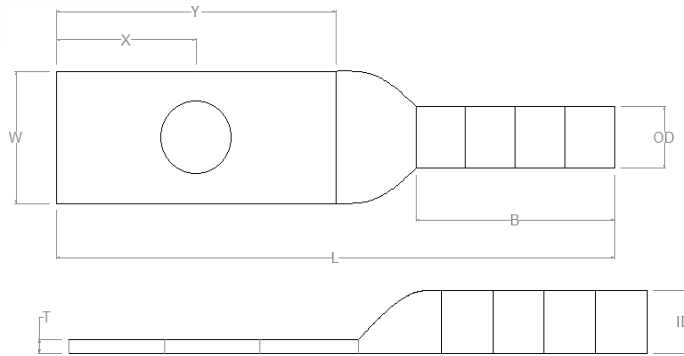
\*SCB to Screw Pile



## 1-HOLE COPPER LUGS

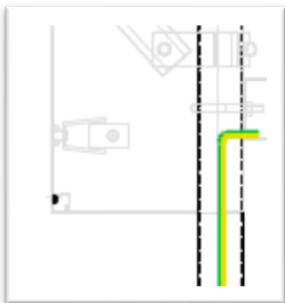


- Provides high strength and premium electrical properties
- Material – Steel & ETP Copper



Catalogue Code	Copper Conductor(mm <sup>2</sup> )	Stud Size	Dimensions							
			I.D	O.D	L	W	X	Y	T	B
CL-CU-35-10	35	5/16"	7.9	10.7	71.6	19.3	11.9	27.9	3.0	36.6

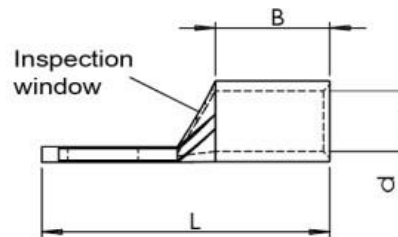
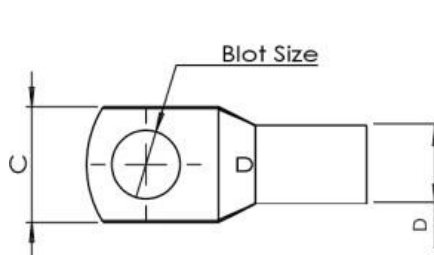
*\*SCB Busbar Lugs*





## COPPER LUGS – TIN PLATED 3.5mm<sup>2</sup>

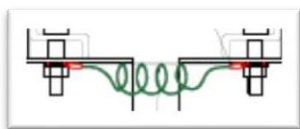
- Copper lugs are connecting devices used primarily in terminating wire conductors in installations and equipment.
- Manufactured from high conductivity copper which is tin plated to prevent corrosion.
- Easy to use in conjunction with mechanical or hydraulic crimping equipment.



1-Hole Tin Plated Copper lugs [Standard Barrel]

Catalogue #	Dimensions (mm)					
	Bolt Size	Tang Width C	Barrel Length B	Overall Length L	Inner Diameter d	Outer Diameter D
CL-TP-3.5	M8	16.8	7.0	20.0	3.1	4.8

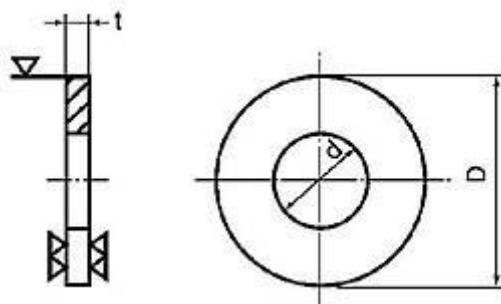
\*PV table to PV table





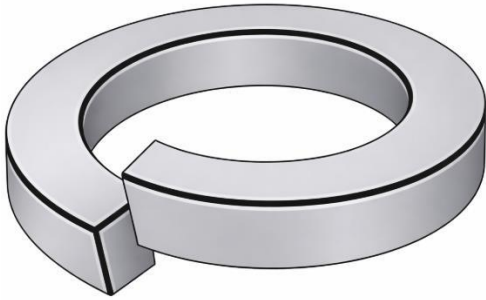
## FLAT WASHER

- Prevent damage to materials
- Used to improve air tightness to protect parts from damage.
- Developed specifications to allow a wider selection of outer diameters and thicknesses compared to conventional flat washers.

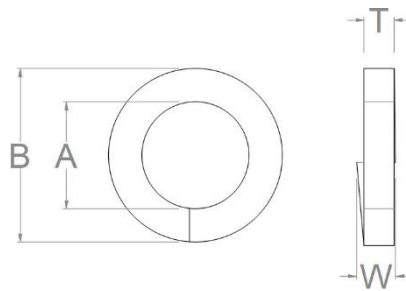


Catalogue #	Dimension (mm)			
	Nominal Size	Inner Diameter D	Outer Diameter D	Thickness t
FW8	M8	8.4	16	1.6
FW10	M10	10.5	20	2
FW12	M12	13	24	2.5

## LOCK WASHER

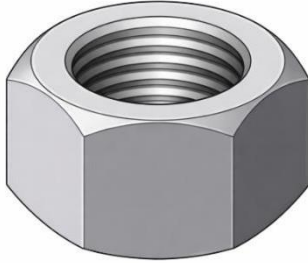


- Wide range of sizes and materials to suit various fastener diameters, performance properties, and application requirements.
- low-cost, easy to install, and suitable for frequent assembly and disassembly.



Catalogue #	Nominal Size	Inside Diameter (Min)	Inside Diameter (Max)	Outside Diameter (Max)	Section Thickness	Section Width
		A	A	B	T	W
LW8	M8	8.1	8.5	14.8	2	3
LW10	M10	10.5	10.7	18.1	2.4	3.4
LW12	M12	12.5	12.7	21.1	2.6	3.6

## NUT – STAINLESS STEEL



- Provides a secure and durable connection for various applications, including construction and industrial use.
- Excellent choice for strong and long-lasting fastening.

Catalogue #	Nut Size	Thread Pitch	Dimension(mm)				
			Width Across Flats		Width Across Corners		Height of the Nut
			Max.	Min.	Max.	Min.	Min.
SSN8	M8	1.25	13.00	12.73	14.38	6.80	6.44
SSN10	M10	1.5	17	16.73	15	8.40	6.5
SSN12	M12	1.75	18	17.73	10.80	10.37	20.03

## 2. CONDUCTOR (THW)

# (THW)Thermoplastic Heat And Moisture Resistant Wire G00V/ 75°C



- Lead Free, High Quality PVC Insulation

- 99.9% Pure Virgin Copper Conductor,  $\geq 100\%$  Conductivity

## CONSTRUCTION AND PROPERTIES:

- Annealed (Soft Drawn) Copper Wire Conventional Stranded Conductor for 2.0 mm<sup>2</sup> up to 30 mm<sup>2</sup> and Compact Stranded Conductor for sizes 38 mm<sup>2</sup> and up.
- Heat and Moisture Resistant, Flame Retardant, Lead-Free PVC Insulation, 75°C. For Wet and Dry location.
- Available in Black, White, Red, Blue, Yellow and Green.
- Hypertech also accept special colors upon request.

## REFERENCE STANDARD:

- PNS 260
- PNS 1207
- PNS 35
- ASTM B 496
- UL 83
- UL 1581, UL 2556

## APPLICATION:

- Non CT-Rated Building Wires for sizes 2.0 mm<sup>2</sup> up to 38 mm<sup>2</sup>.
- CT- Rated Cables with special PVC formulation for better flame-retardant characteristic for sizes 50 mm<sup>2</sup> and up

## Technical Specifications

SIZES	EQUIVALENT AWG SIZE	CONDUCTOR DIAMETER	NOM. INSULATION THICKNESS	OVERALL DIAMETER	APPROXIMATE CABLE WEIGHT	MIN. INSULATION RESISTANCE	ALLOWABLE AMPACITY
		mm	mm	mm	Kg/km	MΩ-km	Amps.
1.6 mm (SOLID)	14	1.6	0.80	3.20	26.620	130	20
2.0 mm (SOLID)	12	2.0	0.80	3.60	38.132	130	25
2.6 mm (SOLID)	10	2.6	0.80	4.20	59.590	100	35
2.0 mm <sup>2</sup>	14/7	1.80	0.80	3.40	28.101	130	20
3.5 mm <sup>2</sup>	12/7	2.40	0.80	4.00	44.775	130	25
5.5 mm <sup>2</sup>	10/7	3.00	0.80	4.60	65.588	100	35
8.0 mm <sup>2</sup>	8/7	3.60	1.20	6.00	100.743	100	50
14.0 mm <sup>2</sup>	6/7	4.80	1.60	8.00	179.100	80	65
22.0 mm <sup>2</sup>	4/7	6.00	1.60	9.20	262.351	80	85
30.0 mm <sup>2</sup>	2/7	6.90	1.60	10.10	335.655	60	100
38.0 mm <sup>2</sup>	1/19	7.22	2.00	11.22	427.690	60	115
50.0 mm <sup>2</sup>	1/0	8.14	2.00	12.14	527.364	60	140
60.0 mm <sup>2</sup>	2/0	9.03	2.00	13.03	637.505	60	155
80.0 mm <sup>2</sup>	3/0	10.43	2.00	14.43	823.448	60	190
100.0 mm <sup>2</sup>	4/0	11.70	2.00	15.70	1,032.372	60	220
125.0 mm <sup>2</sup>	250 MCM	13.29	2.40	18.09	1,330.235	50	255
150.0 mm <sup>2</sup>	300 MCM	14.59	2.40	19.39	1,575.648	50	285
175.0 mm <sup>2</sup>	350 MCM	15.70	2.40	20.50	1,800.783	50	305
200.0 mm <sup>2</sup>	400 MCM	16.43	2.40	21.30	1,981.964	50	325
250.0 mm <sup>2</sup>	500 MCM	18.69	2.40	23.49	2,528.672	50	375

### NOTE:

- Allowable Ampacities based on PEC Part 1: 2017 edition, table 3.10.2.6(B)(16) of Insulated Conductors Rated Up to and Including 2000 Volts, 60°C Through 90°C,
- Not More Than Three Current-Carrying Conductors in Raceway, Cable or Earth (Directly Buried), Based on Ambient Temperature of 30°C

### 3. CONCRETE EARTH PIT, GROUNDING ROD, GROUND CLAMP, ENHANCEMENT COMPOUND, EXOTHERMIC POWDER

## CONCRETE EARTH PIT - ENI



This facilitates periodic inspection of the connection for connection for corrosion and regular maintenance, to ensure the safety of personnel and equipment from earth fault currents and the high currents injected into the earth by lightning protection system

### DIMENSION

Length: 325 mm  
Width: 325mm  
Depth: 190 mm

## COPPER COATED EARTH RODS



Copper coated earth rods offer installers the most economical method of achieving a low earth resistance. Each rod has a high tensile strength, low carbon steel core 99.95% pure copper is applied electrolytically and forms a metallurgical bond between the steel core and the copper. This combination makes the rod ideal for deep driving whilst also provides lasting resistance to corrosion. The threads are formed by a cold rolling process which ensures strength and maintains the molecularly bonded copper covering along the full length of the threads. Cold-rolled threads are stronger than cut-threads. The standard copper thickness is 0.254mm greater copper thicknesses are also available.

Material: Copper bonded

Nominal Size	L mm	Thread Size (UNC-2A)	Shank D mm	Unit Weight Kg	Pack Quantity	Part Number
5/8"	1200	5/8"	14.2	1.49	5	TBB 112
5/8"	1500	5/8"	14.2	1.90	5	TBB 115
5/8"	1800	5/8"	14.2	2.25	5	TBB 118
5/8"	2400	5/8"	14.2	3.00	5	TBB 124
5/8"	3000	5/8"	14.2	3.76	5	TBB 130
3/4"	1200	3/4"	17.2	2.20	5	TBB 212
3/4"	1500	3/4"	17.2	2.75	5	TBB 215
3/4"	1800	3/4"	17.2	3.30	5	TBB 218
3/4"	2400	3/4"	17.2	4.40	5	TBB 224
3/4"	3000	3/4"	17.2	5.51	5	TBB 230
1"	1200	1"	23.1	3.90	5	TBB 312
1"	1500	1"	23.1	4.97	5	TBB 315
1"	1800	1"	23.1	5.89	5	TBB 318
1"	2400	1"	23.1	7.86	5	TBB 324
1"	3000	1"	23.1	9.85	5	TBB 330

## EARTH ROD TO CABLE 'G' CLAMPS

These clamps are used for joining earth rods to different sizes of stranded copper conductor. The clamps have a high resistance to corrosion and are mechanically strong to ensure a lasting connection.

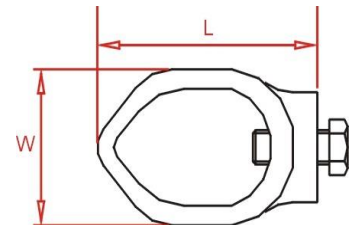
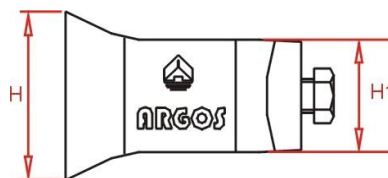
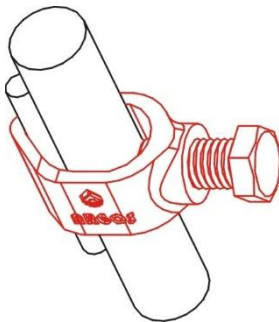
Material : gunmetal with M10 x 25mm phosphor bronze set screw. Brass with M10 x 25mm phosphor bronze set screw M10 x 25mm.

Suitable for use with 8mm solid circular copper conductor 8mm



Nominal rod diameter		Max. conductor	Unit Weight	Part Number
mm	(")	mm <sup>2</sup>	Kg	
Φ 9.5	Φ 3/8	6-35	0.03	ARVDJ 9535
Φ 12.7	Φ 1/2	16-50	0.05	ARVDJ 1250
Φ 16	Φ 5/8	5.2-33.6	0.06	ARVDJ 1633
Φ 16	Φ 5/8	16-70	0.06	ARVDJ 1670
Φ 20	Φ 3/4	5.2-33.6	0.06	ARVDJ 2033
Φ 20	Φ 3/4	35-95	0.06	ARVDJ 2095
Φ 25	Φ 1	70-150	0.14	ARVDJ 25150

Minimum order quantity is required, please contact us for details.



## WELD POWDERS



The starting powder is separately packed. Weld powder is not explosive shock sensitive or subject to spontaneous ignition. Tube package and bag package is optional

Description	Box Quantity	Part Number
25g Weld Powder	20	025
32g Weld Powder	20	032
45g Weld Powder	20	045
65g Weld Powder	20	065
90g Weld Powder	10	090
<b>115g Weld Powder</b>	<b>10</b>	<b>115</b>
150g Weld Powder	10	150
200g Weld Powder	10	200
250g Weld Powder	10	250

## ARGOS EARTHING ENHANCING COUMPOUNDS (ARGOS EEC)

Earth conductive material ARGOS EEC is a superior conductive material that solves you toughest earthing problems. ARGOS EEC is a low resistance, non corrosive, bentonite and graphite powder improves earthing effectiveness, especially in area of poor conductivity. The resistivity of ARGOS EEC is less than  $0.5\Omega \cdot m$  , pH 10.7 – 11.3. ARGOS EEC contsins graphite powder, bentonite , Portland cement.

ARGOS EEC improves earthing effectiveness, regardless of soil conditions. It is the ideal material to use in areas of poor conductivity such as rocky ground mountain tops and sandy soil.



### Features:

- 1 Resistivity less than  $0.5\Omega \cdot m$  , pH 10.7 – 11.3
- 2 Performs in all soil conditions
- 3 Permanent effectiveness
- 4 Can be installed using for earth rod backfill methods

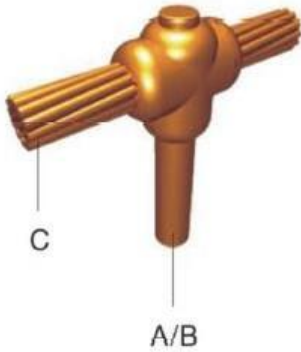
Type	Resistivity	PH VALUE	WITHSTAND CURRENT	RATED WITHSTAND CURRENT	CORROSION TEST	Unit Weight Kg	Pack Quality	Part Number
DM-JZD	$\leq 1.5\Omega \cdot m$	10.5-11.3	R 6%	$\Delta R \leq 6\%$	0.006mm/a	25	1	ARJ 202

## CC1 Cable to Cable



A mm <sup>2</sup>	Weld Powder	Mold	Handle Clamp
16	45	CC1-4-16	60101
25	45	CC1-4-25	60101
35	45	CC1-4-35	60101
50	65	CC1-4-50	60101
60	65	CC1-4-60	60101
70	90	CC1-4-70	60101
95	90	CC1-4-95	60101
120	115	CC1-4-120	60101
150	115	CC1-4-150	60101
185	150	CC1-4-180	60101
240	200	CC1-4-240	60101
300	200	CC1-4-300	60101
400	300	CC1-4-400	60101

## CR2 Cable to Earth Rod



A mm	B inches	C mm <sup>2</sup>	Weld Powder	Mold	Handle Clamp
14.2	5/8"	16	90	CR2-4-14216	60102
14.2	5/8"	25	90	CR2-4-14225	60102
14.2	5/8"	35	90	CR2-4-14235	60102
14.2	5/8"	50	90	CR2-4-14250	60102
14.2	5/8"	70	115	CR2-4-14270	60102
14.2	5/8"	95	150	CR2-4-14295	60102
14.2	5/8"	100	150	CR2-4-142100	60102
14.2	5/8"	120	150	CR2-4-142120	60102
14.2	5/8"	150	200	CR2-4-142150	60102
14.2	5/8"	185	200	CR2-4-142185	60102
14.2	5/8"	240	200	CR2-4-142240	60102
14.2	5/8"	300	250	CR2-4-142300	60102
17.2	3/4 "	16	90	CR2-4-17216	60102
17.2	3/4 "	25	90	CR2-4-17225	60102
17.2	3/4 "	35	90	CR2-4-17235	60102
17.2	3/4 "	50	115	CR2-4-17250	60102
17.2	3/4 "	70	150	CR2-4-17270	60102
17.2	3/4 "	95	150	CR2-4-17295	60102
17.2	3/4 "	100	150	CR2-4-172100	60102
17.2	3/4 "	120	150	CR2-4-172120	60102
17.2	3/4 "	150	200	CR2-4-172150	60102
17.2	3/4 "	185	200	CR2-4-172185	60102
17.2	3/4 "	240	250	CR2-4-172240	60102
17.2	3/4 "	300	300	CR2-4-172300	60102