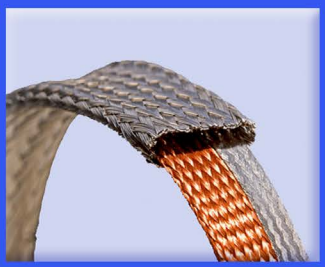
SDP

Sepehr Danesh Pooya



Earthing and Lightning Systems

www.sdp.ir

SDP offers a specialized and personal service for Earthing and Lightning Protection systems working on projects throughout **IRAN & the Middle EAST.**

We offer our clients a complete service ranging from:

- Assessments to determine if an Earthing and Lightning protection system is required.
- Production and Supply Materials of Earthing and Lightning protection system.
- Design, installation and on-site consultation for Earthing and Lightning protection system to ensure that they comply with **BS 6651** and **BS 7430**.
- We offer a full Maintenance Package off test and survey reports of existing systems, including video and still photography of damaged areas if required. Annual re-certification of existing lightning protection and earthing systems as required .
- Provide Marked up drawings/schematics providing details of the installed system .
- The exothermic welding equipment and materials

Headquarter: Unit 5, No. 95, Khajeh Abdollah Ansari St., Shariati Ave., Tehran –Iran
Phone: +98 21 2288 4125-6 Fax: +98 21 2286 5477
E-mail : info@sdp.ir
Website: www.sdp.ir

Earthing System Introduction

Purpose of the earthing in equipment is to keep the grounding potential of the equipment at the same level with the surrounding ground, and arrest generation of dangerous potential differences between different equipment or between the equipment and the ground.

Function of earthing is to:

- protect people against injury and death from high potentials
- protect equipment against damages
- protect equipment against operational breaks
- aid to prevent corrosion of metallic parts of an installation

For achieving these goals and a quality Grounding system, an earth connection should have:

- Low electrical resistance to earth
- Good corrosion resistance
- Ability to carry the required current repeatedly
- A reliable life of at least 30 years

The crucial factors that determine the resistance to earth of an electrode, which was mentioned as one of properties of good earth connection, are:

- Soil resistivity
- Electrode dimensions
- Area available
- Earth electrode materials

Soil Resistivity

Different soil composition gives different average resistivity

- **Moisture,** Increased moisture content of the ground can rapidly decrease its resistivity.
- **Chemical Composition,** Certain minerals and salts can affect soil resistivity. Their levels can vary with time due to rainfall of flowing water.

Although the addition of salts can lower soil resistivity, they are not recommended due to corrosion and leaching.

- **Temperature,** When the ground becomes frozen, its resistivity rises dramatically, if your soil temperature decreases from +20ºC to -5 ºC, the resistivity increases more than ten times

Electrode Dimension

The most important dimension to consider when designing an earth electrode is its length. The greater the length of an electrode the lower the density of the current in soil in the immediate vicinity of that electrode. **SDP** recommend the use of deep driven earth electrodes wherever conditions allow. Where rocks lie just below the surface and deep driving is not possible, parallel driven shorter rods, plates, mats or buried conductors, or a combination of these can be used.

Diameter of the rod has a less dramatic effect on lowering earth resistance. For instance you only lower the resistance value by 9.5 per cent by doubling the diameter. **SDP** use the most economical rod that soil conditions will allow you to drive. This rational is one of the ways to ensure that you don't waste money on over-dimensioned rods

Area Available

Often a single earth rod, strip or plate will not achieve the desired resistance alone .If a number of electrodes can be installed in parallel the combined resistance is then practically proportional to the reciprocal if the number employed. This is true so long as each electrode is situated outside the resistance area of any other. For rod electrodes this separation distance is considered to be equal to driven depth.

Earth Electrode Material

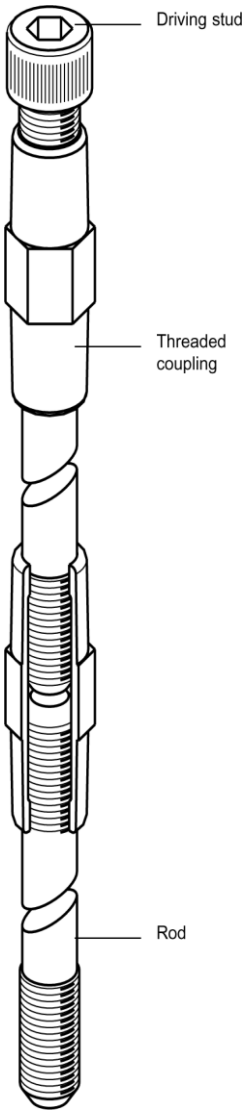
Quality earth rods are commonly made from either solid copper, stainless steel or copper bonded steel. SDP can supply all three types but the copper bonded steel cored rod is by far the most popular, due to its combination of strength, corrosion resistance, and comparatively low cost. Solid copper and stainless-steel rods offer a very high level of corrosion resistance at expense of lower strength and higher cost

EARTHING SYSTEM COMPONENTS

Earth Rods

SDP copper bond earth rods probably offer to the installer the best and most economical earth rods available. They are made by molecularly bonding 99.9% pure electrolytic copper onto a low carbon steel core of grade 080A20 of BS970. **SDP** rods are not of the sheathed type. They are highly resistance to corrosion, and because the steel used has a very high tensile strength, they can be driven by power hammers to great depths. Counter–bored coupling and taper lock coupling are made of high copper content alloy, commercial brass is not used, and this again ensures excellent corrosion resistance and high strength.

Threaded Copper Bond Rods & Accessories



Nominal Diameter	Length	Thread Diameter	Shank Diameter	Weight each	Part No.
1/2"	1200mm	9/16"	12.7mm	1.18 kg	SRB105
1/2"	1500mm	9/16"	12.7mm	1.55 kg	SRB110
1/2"	1800mm	9/16"	12.7mm	1.76 kg	SRB115
1/2"	2400mm	9/16"	12.7mm	2.36 kg	SRB125
5/8"	1200mm	5/8"	14.2mm	1.53 kg	SRB205-FU
5/8"	1500mm	5/8"	14.2mm	1.88 kg	SRB210
5/8"	1800mm	5/8"	14.2mm	2.29 kg	SRB215
5/8"	2100mm	5/8"	14.2mm	2.51 kg	SRB220-FU
5/8"	2400mm	5/8"	14.2mm	3.00 kg	SRB225
5/8"	3000mm	5/8"	14.2mm	3.79 kg	SRB235
3/4"	1200mm	3/4"	17.2mm	2.19 kg	SRB305
3/4"	1500mm	3/4"	17.2mm	2.73 kg	SRB310
3/4"	1800mm	3/4"	17.2mm	3.27 kg	SRB315
3/4"	2400mm	3/4"	17.2mm	4.35 kg	SRB325
3/4"	3000mm	3/4"	17.2mm	5.44 kg	SRB335

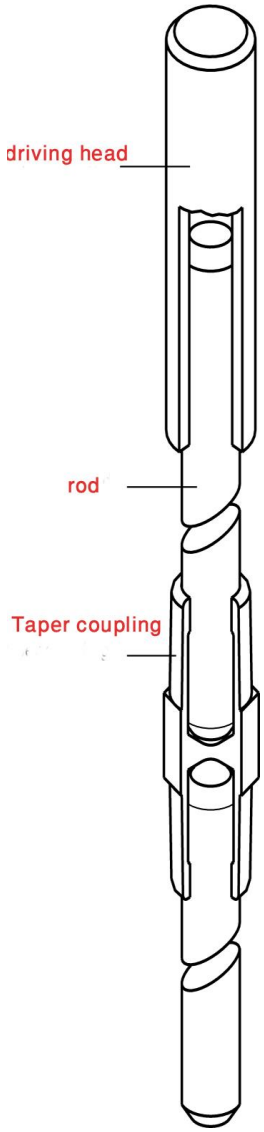
BS 7430, BS 6651, UL467

Fittings

Type	Weight each	Part No.
1/2" Coupling	0.09kg	SCG170
5/8" Coupling	0.08kg	SCG270
3/4" Coupling	0.13kg	SCG370
1/2" Driving stud	0.25kg	SST100
5/8" Driving stud	0.22kg	SST200
3/4" Driving stud	0.27kg	SST300

Coupling for Threaded Rod

Unthreaded Copper Bond Earth Rods



Unthreaded Rod Details

Diameter	Length	Weight each	Part No.
9.0 mm	1200mm	0.62kg	SRB005
12.7 mm	1200mm	1.18kg	SRB103
12.7 mm	1500mm	1.55kg	SRB107
12.7 mm	1800mm	1.76kg	SRB116
12.7 mm	2400mm	2.36kg	SRB126
14.2 mm	1200mm	1.53kg	SRB203
14.2 mm	1500mm	1.88kg	SRB213
14.2 mm	1800mm	2.29kg	SRB216
14.2 mm	2000mm	2.51kg	SRB217
14.2 mm	2100mm	2.68kg	SRB223
14.2 mm	2400mm	3.00kg	SRB226
14.2 mm	3000mm	3.79kg	SRB236
17.2 mm	1200mm	2.19kg	SRB306
17.2 mm	1500mm	2.73kg	SRB313
17.2 mm	1800mm	3.27kg	SRB316
17.2 mm	2000mm	3.64kg	SRB317
17.2 mm	2100mm	3.83kg	SRB323
17.2 mm	2400mm	4.35kg	SRB326
17.2 mm	3000mm	5.44kg	SRB336

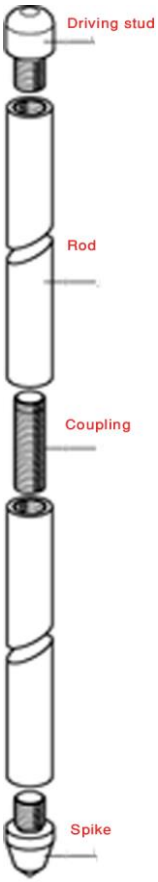
Fittings

Type	Weight each	Part No.
12.7mm Coupling	0.09kg	SCG177
14.2mm Coupling	0.08kg	SCG277
17.2mm Coupling	0.13kg	SCG377
12.7 Driving head	0.25kg	SST107
14.2 Driving head	0.22kg	SST207
17.2 Driving head	0.27kg	SST307

BS7430, BS6651, UL467

Solid Copper Rod

SDP solid copper earth rod offers greater resistance to corrosion. They are ideally used in application where soil conditions are very aggressive, such as solid with high salt content. Connections to rod can be by mechanical clamps or compression**.**

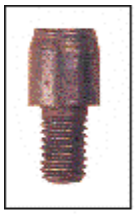


Rod Details

Diameter	Length	Weight each.	Part no.
16mm	1500mm	2.70 kg	SRC010
20mm	1500mm	4.20 kg	SRC015

Fittings

Type	eight each	Part No.
15mm Driving stud	0.02kg	SST010
20mm Driving stud	0.05kg	SST015
Coupling dowel for both sizes of above rods	0.02kg	SCG013
15mm Spike	0.02kg	SSP010
20mm Spike	0.04kg	SSP015


Driving Head

Coupling Dowel

Driving Tip

Solid Stainless-Steel Rod

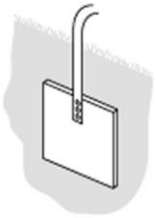
SDP stainless steel ground rods are used to overcome many of the problems caused by galvanic corrosion which can take place between dissimilar metals buried in close proximity. Other advantages of stainless-steel rod are that they are highly resistant to corrosion and are much more anodic than copper.

Stainless Steel Ground Rods Details

Rod Diameter	Length	Part Number
15 mm	1500 mm	SDP-SC-512
20 mm	1500 mm	SDP-ASC-520

Earth Plates

Earth plates can be used where earth rods are not suitable.



Size (mm)	Total surface area	Weight each	Part No.
660×660×3	0.89 m^2	11.6 kg	SPE005
660×600×5	0.89 m^2	19.4 kg	SPE015
1000×660×3	1.33 m^2	17.6 kg	SPE010
1000×660×5	1.33 m^2	29.3 kg	SPE020

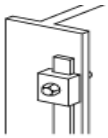
Size (mm)	Total surface area	Weight each	Part No.
600×600×3	0.89 m^2	4.4 kg	SPE105
660×660×5	0.89 m^2	7.3 kg	SPE115
1000×660×3	1.33 m^2	6.4 kg	SPE110
1000×660×5	1.33 m^2	10.7 kg	SPE120

Bonds and Clamps

Copper alloy clamps and bond are made from copper alloy body which gives strong resistances to corrosion. Following are the range of clamps we offer:

B-Bond

For bounding tape to steel structures



Conductor size	Bolt size	material	Weight each	Part no.
25×3 mm	M10	Brass	0.12 kg	BN105

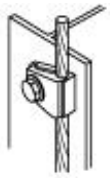
Flexible Copper Braid Bond

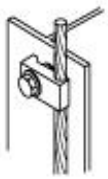
Overall braid Dimensions	Hole size	Hole Centers.	Weight each	Part No.
25×3 mm	11mm	200 mm	0.09 kg	SBN505
25×3 mm	11mm	400 mm	0.20 kg	SBN510

Flexible copper braid for bounding gates, doors, fences etc.

Tower Earth Clamps

For bounding copper cable or wire to steel structures

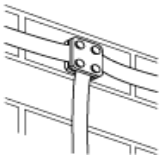
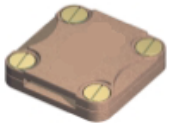




Conductor range (mm^2)	Channel Thickness (mm)	Bolt size	material	Weight each	Part No.
16-70	10	M10	Brass	0.13 kg	BN125*
70-120	10	M12	Brass	0.22 kg	BN130
25-50	10	M10	Brass	0.08 kg	BN300-FU
25-50	10	M10	Brass	0.05 kg	BN305*
120-185	10	M12	Brass	0.30 kg	BN320
185-240	10	M12	Brass	0.40 kg	BN325

Square Tape Clamp

For forming straight through, cross, or tee joints in tape and bar.

Conductor size	material	Weight each	Part No.
25×3 mm	Brass	0.22 kg	SCT105
30×3 mm	Brass	0.26 kg	SCT113
50×5 mm	Brass	0.28 kg	SCT115

U Bolt - Rod Clamp

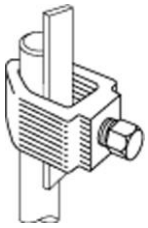
These are made from Copper with Gunmetal plate. They can be supplied for all rods from 16 to 25 mm and Copper Tape.

Normal Rod Diameter		Conductor range	Part No.
5/8"	16 mm	25-70 mm^2	AUU-16
3/4"	20 mm	50-120 mm^2	AUU-20
1"	25 mm	70-185 mm^2	AUU-25

Nominal Rod Diameter		Conductor range	Part No.
5/8"	16mm	16-70 mm^2	SCP105
3/4"	20mm	35-120 mm^2	SCP125
1"	25mm	70-185 mm^2	SCP130

Rod to Tape Clamp

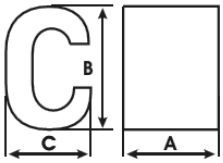
Suitable for use with 8mm Diameter solid circular copper conductor.



Nominal rod diameter		Tape Size	Part No.
5/8"	16mm	25×5 mm	SCP515*
3/4"	20mm	30×5 mm	SCP520*
1"	25mm	50×5 mm	SCP525

Connectors

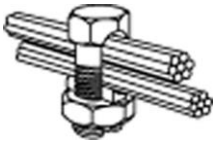
Copper or Thinned Copper 'C' type

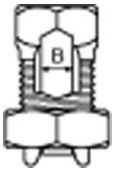


Reference Code	Dimension (mm)		
	A	B	C
ECO-CT-01	9	9.8	6.4
ECO-CT-02	12	12.6	8.4
ECO-CT-03	17	19.4	12.0
ECO-CT-04	17	19.8	13.0
ECO-CT-05	17	21.4	13.0
ECO-CT-06	21	26.4	15.4
ECO-CT-07	21	26.6	15.6
ECO-CT-08	21	26.4	17.5
ECO-CT-09	25	32.9	21.0
ECO-CT-10	26	38.0	21.0
ECO-CT-11	28	33.0	21.0
ECO-CT-12	28	34.0	21.0

Type 'H'-High Strength Split Bolt Connector

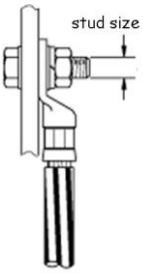
For copper connections. No special tools required





Conductor range, mm²				Dimensions		
Main Min	Main Max	Tap Min	Tap Max	B	Weight each	Part No.
4	10	2.5	10	4.1	0.02 kg	8SH
10	16	2.5	16	5.5	0.03 kg	4SH
16	25	4	25	6.9	0.004 kg	2SH
25	35	4	35	8.4	0.06kg	1SH

Compression Terminal



Cable	Stud size	Weight each	Part no.
16 mm^2	5 mm	0.01 kg	SFCT165
16 mm^2	6 mm	0.01 kg	SFCT166
25 mm^2	6 mm	0.01 kg	SFCT256
25 mm^2	8 mm	0.01 kg	SFCT2510
35 mm^2	6 mm	0.01 kg	SFCT356
35 mm^2	8 mm	0.01 kg	SFCT358
50 mm^2	10 mm	0.02 kg	SFCT5010
50 mm^2	12 mm	0.02 kg	SFCT5012
70 mm^2	10 mm	0.04 kg	SFCT7010
70 mm^2	12 mm	0.06 kg	SFCT7012
95 mm^2	10 mm	0.06 kg	SFCT9510
95 mm^2	12 mm	0.06 kg	SFCT9512

Earth Bars

Description	Length mm	Width mm	Height mm	Weight kg	Part No.
6 ways	550	90	96	2.8	SLK207-6
8 ways	650	90	96	3.2	SLK207-8
10 ways	800	90	96	3.8	SLK207-10
12 ways	900	90	96	4.2	SLK207-12
14 ways	1000	90	96	4.6	SLK207-14

Earth Bars with single disconnecting link

Description	Length mm	Width mm	Height mm	Weight kg	Part No.
6 ways	475	90	96	2.3	SLK243-6
8 ways	575	90	96	2.7	SLK243-8
10 ways	725	90	96	3.3	SLK243-10
12 ways	825	90	96	3.7	SLK243-12
14 ways	925	90	96	4.1	SLK243-14

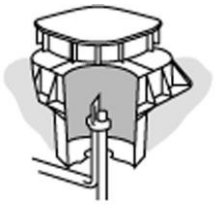
Earth bars with twin disconnecting

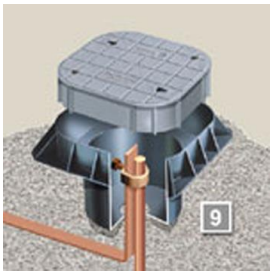
Description	Length mm	Width mm	Height mm	Weight kg	Part No.
6 ways	550	90	96	2.8	SLK207-6
8 ways	650	90	96	3.2	SLK207-8
10 ways	800	90	96	3.8	SLK207-10
12 ways	900	90	96	4.2	SLK207-12
14 ways	1000	90	96	4.6	SLK207-14

Inspection Pit

Inspection pits protect earth electrode connotation. SDP inspection pits are available in plastic which has 1.8 Kg each.

sp1050





Conductor

By far the largest and most important component of any earthling or structural lightening protection system is actual conductor. SDP offer comprehensive range of copper and aluminum conductor which are based upon the recommendation of BS 7430 with an initial conductor temperature of 30oC and maximum temperature of 250°C.

Bare Copper Tape

Conductor Size (mm)	Weight per meter (kg)	Standard Coil Size (m)	Part number
12.5×1.5	0.17	100	STC005
20×1.5	0.27	100	STC015
20×3	0.53	100	STC020
25×1.5	0.33	100	STC025
25×3	0.67	50	STC030
30×2	0.53	50	STC039
30×3	0.8	50	STC042
30×4	1.07	50	STC044
30×5	1.33	50	STC043
40×5	1.78	50	STC067
50×5	2.22	50	STC069
60×5	2.67	50	STC0082

High Conductivity Copper Tape to BS EN 1360

PVC Covered Copper Tape

Size (mm)	Weight /meter (kg)	Coil size (m)	Color Range				
			Black 18B29	Green*	Grey 00A07	Stone 08B23	White 10B15
12.5×1.5	0.21	100	STC100	-	-	-	-
25×3	0.77	50	STC0105-FU	STC110	STC115-FU	STC120-FU	STC125-FU
25×6	1.53	40	–	STC140-FU	-	-	–
50×6	2.95	20	–	STC145	-	-	–

Green and Yellow PVC Insulated Copper Tape

Conductor Size (mm)	Weight per meter (kg)	Standard Coil Size (m)	Part No.
25×3	0.79	50	STC111-FU

BS EN 13601(formerly BS 1432)

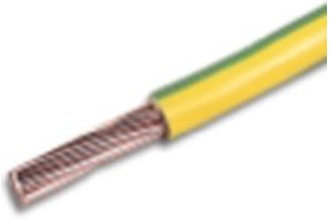
Thinned Copper Tape

Conductor Size (mm)	Weight per meter (kg)	Standard Coil Size (m)	Part no.
12.5×1.5	0.17	100	STC225-FU
25×3	0.67	50	STC230
25×6	1.33	40	STC240
30×2	0.53	50	STC239
31×3	0.83	50	STC245
38×5	1.69	30	STC260
50×6	2.68	20	STC280

Bare stranded Copper Conductor

Size (mm^2)	Stranding no./mm Ø	Weight per meter (kg)	Part No.
6	7/1.04	0.05	SCB006
16	7/1.7	0.15	SCB016
25	7/2.14	0.23	SCB025
35	7/2.52	0.32	SCB035
50	19/1.78	0.43	SCB050
70	7/3.55	0.64	SCB070
70	19/2.14	0.62	SCB070
95	19/2.52	0.84	SCB095
120	37/2.03	1.09	SCB120
150	37/2.25	1.33	SCB150-FU
185	37/2.52	1.67	SCB185
240	61/2.25	2.2	SCB240
300	61/2.52	2.76	SCB300-FU

PVC Covered Stranded Copper



Size (mm^2)	Stranding No./mm Ø	Weight per meter (kg)	Part no.
16	7/1.7	0.19	SCC016
25	7/2.14	0.29	SCC025
35	7/2.52	0.41	SCC035
50	19/1.78	0.53	SCC050
70	19/2.14	0.73	SCC070
95	19/2.52	1	SCC095
120	37/2.03	1.16	SCC120-FU
150	37/2.25	1.54	SCC150-FU
185	37/2.52	2.01	SCC185
240	61/2.25	2.49	SCC240
300	61/2.52	3.05	SCC300

Lightning Protection Systems

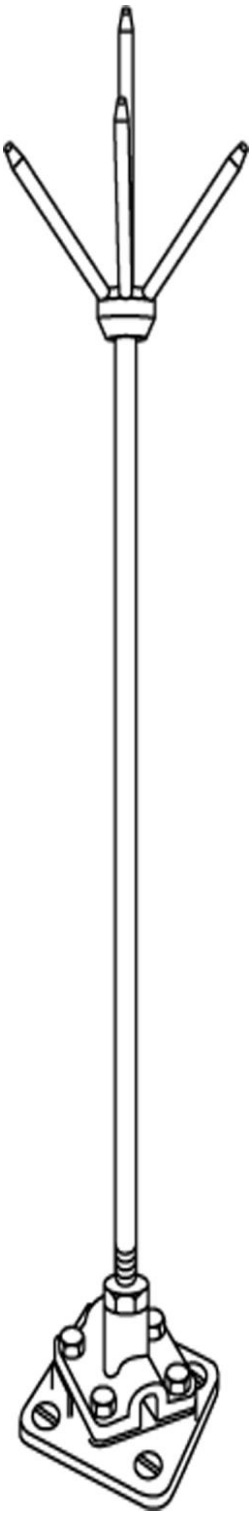
Lightning is a fast and instantaneous exchange of electric charges between Earth and cloud. The negative clouds are mainly stormy and are the base of lightning strikes. The lower part of the storm cloud is negatively charged when the cloud moves; it generates on the Earth a charge of equal value and opposite sign. When the accumulation of charge exceeds a critical potential (when the voltage gradient reaches a value of about 10 KV/cm) a channel of electrodes leaves the base of the cloud in the form of a faintly luminescent reject and progresses rapidly toward the earth.

Air Terminal Networks

The air terminal network is the point of connection for a lightning strike. It typically consists of a meshed conductor arrangement covering the roof of the structure.

Air Terminals

Use air terminals in the form of vertical air rods for the protection of prominent roof top features or equipment.



Multiple Point Rod
Electrolytic Copper Multiple Points is used with Elevation rod with 16 mm-5/8' and 20 mm-3/4' rod diameter

Arial Elevation Rod

Air Rod can be installed with or without Multiple Point.

Rod Dia.	Thread Dia	Length of Rod	Prod Code
16	5/8"	500	SAAE-15
16	5/8"	1000	SAAE-110
16	5/8"	2000	SAAE-120
20	3/4"	500	SAAE-25
20	3/4"	1000	SAAE-210
20	3/4"	2000	SAAE-220

Air Terminal Base

For ensuring that the vertical air rods are both solidity fixed to the fabric of structure and have a low resistance connection to the conductor network

Flat Saddle for supporting air rod on flat surfaces

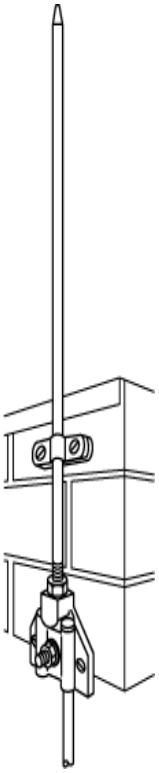
Air Rod Wall Base

SB-470 and SB-471 are used for supporting air rod on the wall and connecting rod to conductors

Conductor dia.	Thread dia.	Conductor material	Weight each	Vertically mounted	Horizontally mounted
8	10	Copper	0.30 kg	SSD307	SB-470
8	10	Aluminum	0.11 kg	SSD007	SB-471

SB-470

SB-471

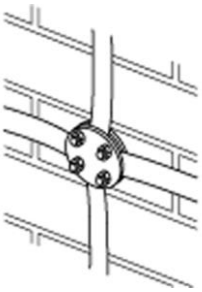


Conductor Fixing

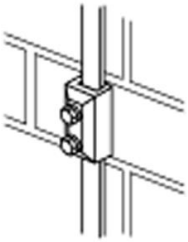
Select a component for interconnection of multiple conductors or for changes of direction. **SDP** jointing clamps provide a low resistance, corrosion resistance connection for connecting conductors.

Test Bond/Clamp

There are used for 4-way copper tape connections.



Maximum Conductor Size	Conductor material	Weight each	Part no.
26×12mm	Copper	0.629 kg	SCT4055



Maximum Conductor size	Conductor material	Weight each	Part no.
26×8mm	Copper	0.29kg	**SCN105**
26×8mm	Aluminum	0.12kg	**SCN005**

Tape Clip

For use with bare copper

Conductor size	Weight each	Part no.
20×3mm	0.02kg	SCP510
25×3mm	0.02kg	SCP515

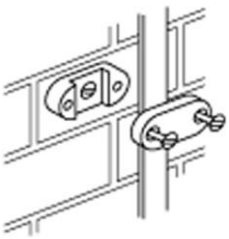
For use with bare aluminum

Conductor size	Weight each	Part no.
20×3mm	0.01kg	SCP405
25×3mm	0.05kg	SCP410

For use with PVC tapes

Conductor size	Weight each	Part no.
25×3mm	0.02kg	SCP517

Conductor Fixing



For use with bare copper

Conductor size	Weight each	Part no.
20×3mm	0.06kg	SCP205
25×3mm	0.07kg	SCP210
25×4mm	0.07kg	SCP216
25×6mm	0.08kg	SCP220
31×3mm	0.09kg	SCP230
31×6mm	0.10kg	SCP235
38×3mm	0.12kg	SCP240
38×5mm	0.14kg	SCP245
38×6mm	0.14kg	SCP250-FU
40×4mm	0.14kg	SCP241
40×6mm	0.15kg	SCP251
50×3mm	0.15kg	SCP255
50×4mm	0.15kg	SCP256
50×6mm	0.16kg	SCP260

For use with lead covered copper

Conductor Size	Weight Each	Part No.
20×3mm	0.02kg	SCP305

For use with bare aluminum

Conductor size	Weight each	Part no.
20×3mm	0.02kg	SCP105
25×3mm	0.03kg	SCP110
25×6mm	0.04kg	SCP120
50×6mm	0.05kg	SCP125

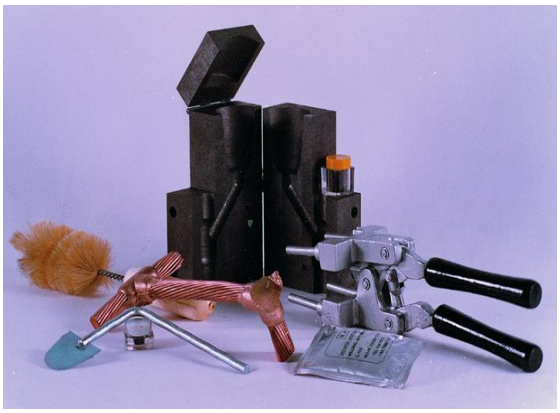
For use with PVC covered aluminum

Conductor Size	Weight each	Part No.
25×3mm	0.04kg	SCP115
50×6mm	0.06kg	SCP130

For use with PVC covered copper

Conductor size	Weight each	Part no.
25×3mm	0.10kg	**SCP215**
25×6mm	0.13kg	**SCP225**
50×6mm	0.26kg	**SCP265**

The Exothermic Welding Equipment



Very little time or skill is necessary for making reliable connections by using exothermic welding process. Being light, portable and requiring no outside power source, this method is ideal for making cable-to-pipe/structure connections in CP-works.

Weld Powder

Weld powder, a mixture of copper oxide and aluminum, packed in plastic tubes. Each tube contains a measured quantity of weld-metal powder, together with the correct amount of silver-colored starting powder. The powder supplied is sufficient to make the appropriate joint. Four types of weld powder are available, each suited for connecting different materials:

For copper to copper and copper to steel (except rails)

- For copper to cast iron
- For copper to steel pipe
- For copper to rail and steel to rail

Graphite Mould

The graphite mould comprises a crucible, a tap hole and a weld cavity. The exothermic reaction takes place in the crucible; the molten copper is directed by the tap pole into the weld cavity, which is designed to allow easy removal of the mould from the finished joint.
This design prolongs the mould s life to allow approximately 75 joints, on an average, depending upon the level of care in use.

Mould Holder

In most cases the graphite mould is split so it can be clamped around the conductors to be joined. The mould holder can secure different types of moulds and should be ordered separately according to the type and size of joint required.

Standard Tool Kit

The tool kit comprises:

File card brush for cleaning conductors
Flint gun for starting the reaction
Mould scraper for removing slag left in the crucible after a joint has been made
Mould brush for final cleaning of the crucible, tab hole and weld cavity after making the joint

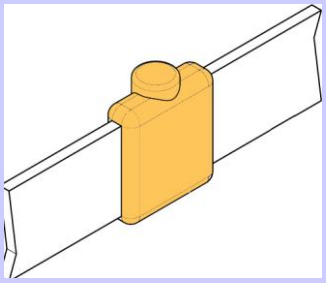
Cable Cleaner

Designed for cleaning circular conductors, i.e., rods and cables.

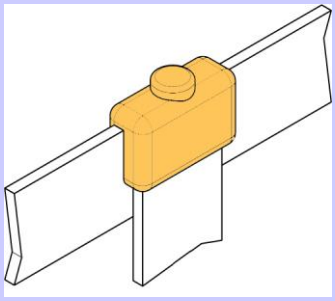
Thermit Welding Connection type

For more information about other available connection types and technical data please contact us.

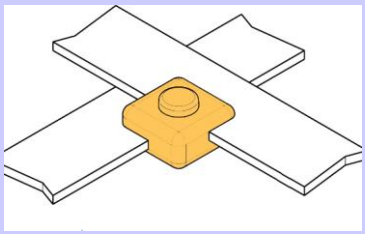
Bar to Bar



SBB-2

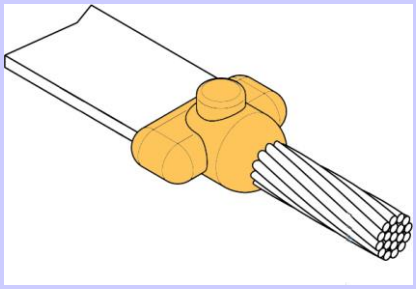


SBB-1

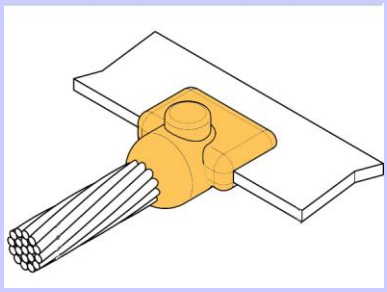


SBB-3

Cable to Bar



S-CB1



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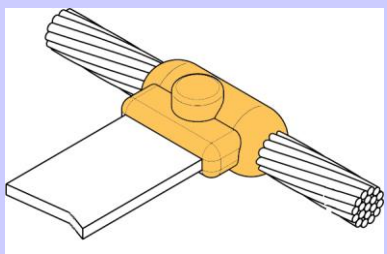
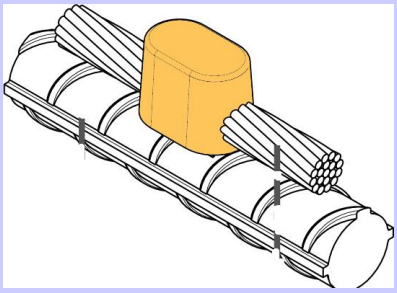
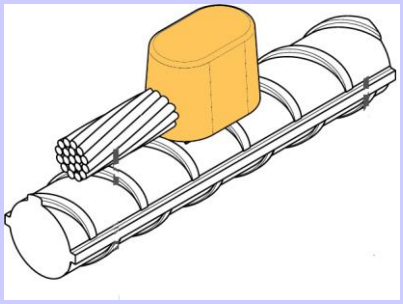


S-CB3

Cable to Reinforcing Bar



S-CR1



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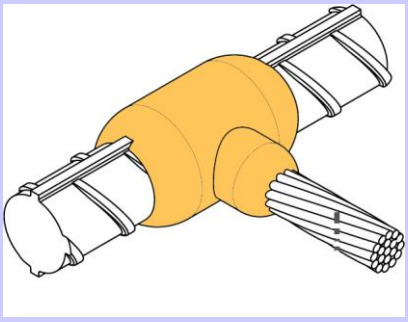

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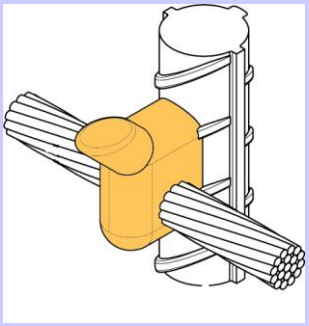
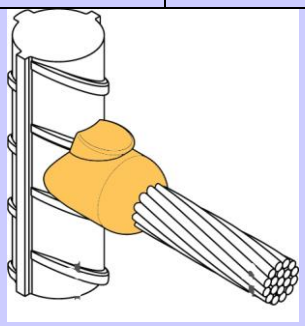
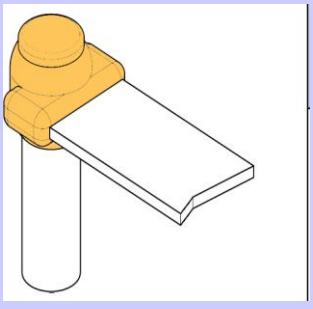


S-CR4

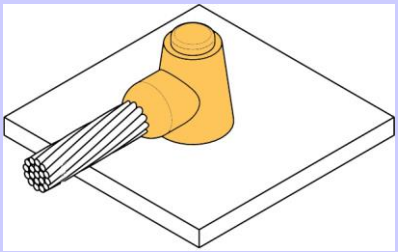


S-CR5

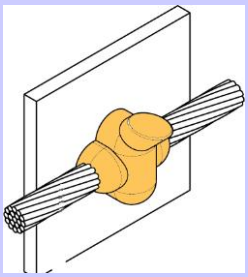
Bar to Earth Rod



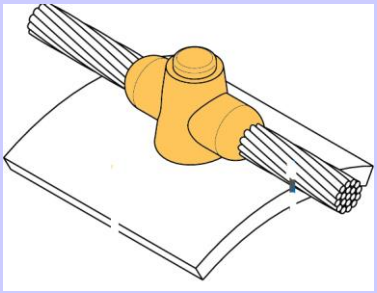
Cable to Steel Surface



S-CS1



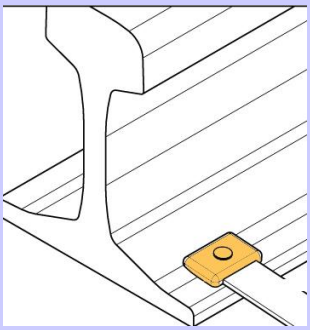
S-CS2



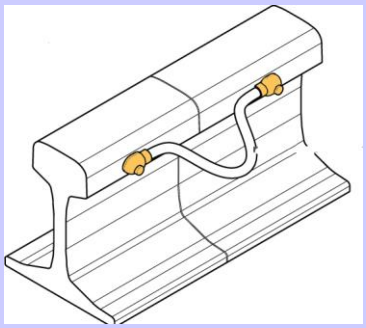
S-CS3

Other

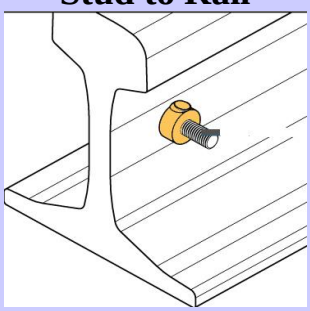
Bar to Rail



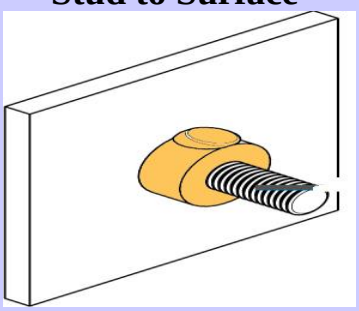
Cable to Rail



Stud to Rail



Stud to Surface



SDP

Sepehr Danesh Pooya

Web Site: www.sdp.ir
E-mail: info@sdp.ir

Sepehr Danesh Pooya Co.
Unit 5, No. 94, Khajeh Abdollah Ansari St.,
Shariati Ave., 1661665836, Tehran, IRAN
P.O. Box : 19395 - 4369
Tel: +98 2288 4125 - 6
Fax: +98 2286 5477

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