BAHRA
EARTHING SYSTEMS

EARTHING&LIGHTNING
PROTECTION SYSTEM

EARTHING & LIGHTNING PROTECTION SYSTEM

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EARTHING
GENERAL INTRODUCTION

An earthing system is a need in any electrical system to protect from the adverse effects of lightning, Leakage currents, insulation failures, short circuiting and other faults. A reliable earthing system with short, direct and low resistive path ensures protecting people, equipment, structure and environment by dissipating fault currents that are of high magnitude and impulsive rise times.

Earthing systems are designed as per the requirement of electrical systems and applications, though the principle remains the same, conductors, devices, type of connections varies for different applications such as power stations, overhead transmission systems, consumer power networks.

EARTHING
GENERAL INTRODUCTION

An Efficient Earthing System Protects From

- Injuries and fatalities to people.
- Damages to the structure and environment.
- Failures in the power system.
- Interferences and noises in electronic systems
- Shutdowns and long downtimes, etc.,

EARTHING
GENERAL INTRODUCTION

Definitions

- **Earth**

Earth is an equipotential conductive mass, conventionally assumed that its potential is Zero (Negligible).

- **Earthing**

Earthing or Grounding is connecting an electrical network, equipment or structure to earth incidentally or intentionally, directly or through a conducting medium.

- **Conductors**

An electrical conductor is a medium in which electrical charge flows, usually electrons when there is a potential difference.

- **Leakage current**

Current that could flow from any conductive part or the surface of non-conductive parts to ground if a conductive path is available.

- **Short Circuit**

A short circuit is simply a low resistance connection between the two conductors supplying electrical power to any circuit, this results in excessive current flow in the power source through the 'short,' and may even cause the power source to be destroyed.

- **Impedance**

The effective resistance of an electric circuit or component to alternating current, arising from the combined effects of ohmic resistance and reactance. Resistivity of soil, reactance of conductor and connection forms the impedance of an earthing network.

Key Factors Driving the Efficiency

The effectiveness of the earthing system relies on various factors including but not limited to Soil resistivity, type and shape of conductors, type of electrodes and efficiency of connections. The system design and selection of components are essential in achieving the shortest, direct and low impedance path to dissipate the energy to the ground.

Our Solution

Bahra Earthing Systems offers a comprehensive solution with design, technical support at the site for Soil Resistivity testing and selection of components that suits for the applications. The earthing components are designed and engineered to withstand harsh environmental conditions and fault conditions in the electrical networks and are tested to the stringent BS, IEC and UL standards.

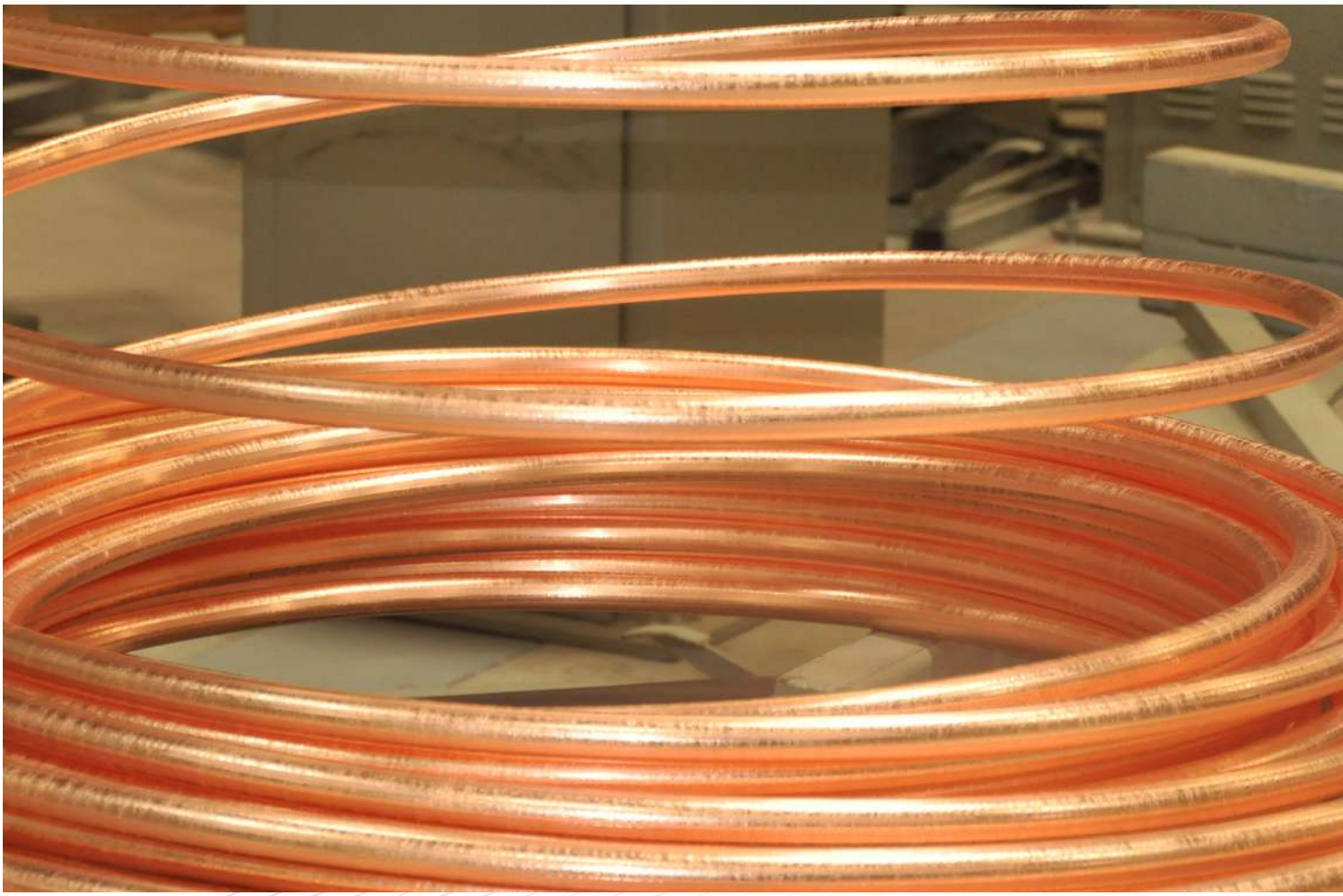
Copper Bonded Earth Rods:

Threaded Rods:

It is important that the earth electrode should be corrosion resistant and less reactive to the conductors used ensuring longer life and low maintenance. Bahra Threaded Copper bonded earth rods are made by molecularly bonding 99.9% pure electrolytic copper on a high tensile steel rod.

The copper bonded rod features high tensile strength comparing to solid copper earth rods and can be deep driven to the ground with less wear to the rods. Even at severe conditions the bonded copper does not crack or tear, the adhesion of copper is ensured by a thin layer of nickel beneath the copper.

The threads are formed by a cold rolling process which ensures strength and eliminating the risk of chipping of threads while driving the rod deep into the ground. Threading is done after the copper coating as per the standard requirements, and this also ensures thread diameter of the rods to match couplers and other accessories. Cold Rolled threads are better than the cut threads as stress is evenly distributed in the cold rolled threading process.



EARTH ELECTRODES

Copper Bonded Earth Rod:

All Bahra copper bonded rods are coated with a minimum thickness of 10 mils or 254 microns as per the UL standards. (1 mil = 0.001 inch/ 25.4 microns).

Part No	Length	Thread Diameter	Rod Diameter
RT001	1200 mm	1/2"	12.7 mm
RT002	1500 mm	1/2"	12.7 mm
RT003	1800 mm	1/2"	12.7 mm
RT004	2400 mm	1/2"	12.7 mm
RT005	3000 mm	1/2"	12.7 mm
RT011	1200 mm	5/8"	14.2 mm
RT012	1500 mm	5/8"	14.2 mm
RT013	1800 mm	5/8"	14.2 mm
RT014	2400 mm	5/8"	14.2 mm
RT015	3000 mm	5/8"	14.2 mm
RT021	1200 mm	3/4"	17.2 mm
RT022	1500 mm	3/4"	17.2 mm
RT023	1800 mm	3/4"	17.2 mm
RT024	2400 mm	3/4"	17.2 mm
RT025	3000 mm	3/4"	17.2 mm

Complies BS EN 50164, UL 467, IEC 62561.

Accessories:

Couplers:

Earth Rod Couplers are designed for coupling two or more threaded copper bonded earth rods or to couple with a driving stud during installation. They ensure continual contact between the rods and are used to aid deep rod driving.

Part no.	Type
CT12	1/2" Coupling
CT58	5/8 " Coupling
CT34	3/4 " Coupling

Driving stud:

Driving Studs made from high tensile steel are designed for driving threaded copper bonded rods by hand tools or power hammer. These reusable studs are fixed on the top of the rod with the help of the coupler.

Part no.	Type
DT12	1/2" Driving Stud
DT58	5/8 " Driving Stud
DT34	3/4 " Driving Stud

Complies BS EN 50164, IEC 62561, UL467

Solid Copper and Stainless Steel Earth Rods:

Solid Copper Earth Rod:

Bahra Solid copper rods are highly conductive, hard drawn from 99.99% pure copper cathodes. They are ideally used in conditions where soils are with high salt and moisture content.

Tin plating is also done to reduce the risk of oxidation and to increase the life of the rod. Physical connection to the rod can be done by mechanical clamps, compression or BahraWeld exothermic welding system.

Part No.	Diameter	Length
RT121I	15 mm	1200 mm
RT122I	15 mm	1500 mm
RT123I	15 mm	1800 mm
RT124I	15 mm	2400 mm
RT125I	15 mm	3000 mm
RT171I	20 mm	1200 mm
RT172I	20 mm	1500 mm
RT173I	20 mm	1800 mm
RT174I	20 mm	2400 mm
RT175I	20 mm	3000 mm

Complies BS EN 50164, IEC 62561, UL467

Solid Copper Earth Electrodes Externally threaded:

Part No	Length	Thread Diameter	Rod Diameter
RTE121E	1200mm	5/8"	14.2mm
RTE122E	1500mm	5/8"	14.2mm
RTE123E	1800mm	5/8"	14.2mm
RTE124E	2400mm	5/8"	14.2mm
RTE125E	3000mm	3/4"	14.2mm
RTE171E	1200mm	3/4"	17.2mm
RTE172E	1500mm	3/4"	17.2mm
RTE173E	1800mm	3/4"	17.2mm
RTE174E	2400mm	3/4"	17.2mm
RTE175E	3000mm	3/4"	17.2mm

Stainless Steel Earth Rod:
Stainless steel rods are used to overcome galvanic corrosion which can be caused by dissimilar metals or components having different electronegativity buried on adjacent sides.

Bahra recommends stainless steel rods with high resistance to corrosion and anodic to solid copper rods which likely react hostile with the buried metals.

Part No.	Diameter	Length
RT211	16 mm	1200 mm
RT212	16 mm	1500 mm
RT215	16 mm	3000 mm
RT222	20 mm	1500 mm
RT225	20 mm	3000 mm

Accessories for Internal Threaded Rods:

Driving stud:
Reusable, High tensile strength, Common for copper/ SS rods.

Part No.	Type
DT34I	15 mm & 20 mm hardened steel driving stud

Coupling dowel:
Brass/ Optional phosphor bronze/ Steel

Part No.	Type
CD01I	Coupling dowel for 15 mm and 20 mm copper rod
CD02I	Coupling dowel for 16 mm and 20 mm stainless steel rod

Steel spike:
Made from High Tensile strength steel, Common for copper/ SS rods.

Part No.	Type
DS34I	15 mm & 20 mm hardened steel spike

Concrete Inspection Pit:

Bahra concrete earth inspection pits are tested as per IEC 62561-5 withstanding 3500 kg load tests, Stainless Steel 304 hooks by default in all the concrete inspection pits ensure less corrosion, durability and low maintenance.

Part No	Description	Weight per Unit	Dimension
PTC01	Concrete inspection pit	32 Kg	320x320x190mm

Complies BS EN 50164-5 & IEC 62561-5

Accessories:

5 Hole and 7 Hole Earth Bar:

Part No	Description
EB005	5 holes earth bar
EB007	7 holes earth bar

Complies BS EN 50164-5 & IEC 62561-5

Inspection Pit:

Polymer Inspection Pit:

Polymer inspection pits are highly recommended for areas where higher loads are standard, with a load rating up to 5000 kg polymer lids are recommended, and for load ratings up to 1000 kg, these polymer pits can be used with concrete lids.

Part No	Description
PTP01	polymer inspection pit with grey polymer lid
PTP02	polymer inspection pit with black polymer lid
PTP03	polymer inspection pit with a concrete lid

Earth Rod Seal for Light Weight Inspection Pit:

When Earth pits are installed under the water level, Earth Rod Seal acts as a barrier from water entry into the earth pits

Testing Standard: BS 62561-5

Part No	Description	Earth Rod Size Ranges
ERS01	Single Flange Earth Rod Seal	5/8"- 3/4"
ERS02	Double Flange Earth Rod Seal	5/8"- 3/4"

Material: High Grade PVC

Earth Rod Alternatives:

Solid Copper Earth Plate:

Solid Copper Earth plates fulfil the earthing requirements where driving earth rods are not ideal due to hard rocks or high resistive soils.

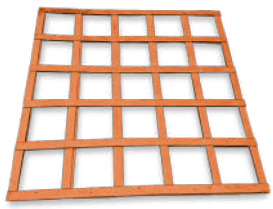
Part No	Size	Total Surface Area	Weight per Unit
RAP15600	600 x 600 x 1.5 mm	0.72 m2	5.00 Kg
RAP15900	900 x 900 x 1.5 mm	1.63 m2	11.21 Kg
RAP03600	600 x 600 x 3 mm	0.73 m2	9.74 Kg
RAP04700	700 x 700 x 4mm	0.99 m2	17.46 Kg
RAP03900	900 x 900 x 3 mm	1.63 m2	21.74 Kg

Stainless Steel Earth Plate:

Part No	Size	Total Surface Area	Weight per Unit
RAPS15600	600 x 600 x 1.5 mm	0.72 sq. mm	5.00 Kg
RAPS15900	900 x 900 x 1.5 mm	1.63 sq. mm	11.21 Kg
RAPS03600	600 x 600 x 3 mm	0.73 sq. mm	9.74 Kg
RAPS03900	900 x 900 x 3 mm	1.63 sq. mm	21.74 Kg

Copper Earth Lattice/ Mesh/ Mat:

Copper earth lattice/Mesh/Mat are manufactured from high conductivity copper tapes as per IEC 62561-1, it is recommended in areas where step & touch potential hazards are high.



Part No	Size	Total Surface Area	Weight per Unit
RAL6006003	600 x 600 x 3 mm	0.31 m2	3.98 Kg
RAL9009003	900 x 900 x 3 mm	0.65 m2	7.20 Kg

Stainless Steel Earth Lattice:

Part No	Size	Total Surface Area	Weight per Unit
RALS6006003	600 x 600 x 3 mm	0.31 sq. mm	3.98 Kg
RALS9009003	900 x 900 x x3 mm	0.65 sq. mm	7.20 Kg

Backfill Compounds:

BahraCEM – Conductance Enhancement Mix:

For earthing systems to be effective, it is important that the electrical path for dissipation is with lower resistance. BahraCEM is advanced enhancement compound which have very high effect by reducing the resistivity less than 0.5 ohm. It comes with optionally premixed cement forming high strength electrically conductive concrete to last life time with no required maintenance.

Part No	Description	Weight per Unit
BCEM-01	BCEM	25 Kg
BCEM-02	BCEM (supplied with cement)	25 Kg

Bahra Bentonite Moisture-Retaining Clay:

Bentonite is a natural mineral mined from the earth, and it is an economical backfill compound for earth rods. The property of bentonite to absorb water more than ten times of its volume and to retain it for a longer time helps in maintaining lower soil resistivity. Bahra bentonites are first-grade bentonites developed for earthing applications.

Part No	Description	Weight per Unit
BENTP	Bentonite Powder	22.5 Kg / 50 Lbs

Accessories

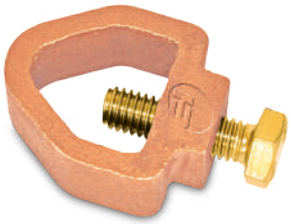
All earthing accessories or mechanical connection components are made from a special copper alloy that features high mechanical strength and high conductivity. For some parts considering their applications, forging process is used to increase the mechanical strength assuring extra heavy duty performance. Fasteners used in all the fittings are only made from solid copper alloys (Special Grade Brass / Phosphor Bronze / pure copper) and are not made from commercial copper/brass plated steel.

BS EN 50164, IEC 62561 & UL 467 are the primary standards corresponding to accessories, and test reports can be provided on special request.

Rods And Rebar Clamps:

Rod to Tape Clamp(Type A):

Part No	Max. Rod diameter	Max. conductor
CRTA02	16 mm	30 x 2 mm
CRTA02	20 mm	30 x 2 mm
CRTA03	16 mm	40 x 12 mm
CRTA04	16 mm	51 x 8 mm
CRTA05	20 mm	51 x 12 mm
CRTA06	12.7 mm	26 x 20 mm
CRTA06	16 mm	26 x 18 mm
CRTA06	25 mm	26 x 10 mm



Rod To Conductor Clamp (Type G):

Part No	Rod diameter	Max. conductor
CRCG02	12.5 mm	16-50 mm2
CRCG03	16 mm	5.2-33.6 mm2
CRCG04	16 mm	16-70 mm2
CRCG06	20 mm	35-95 mm2
CRCG07	25 mm	70-150 mm2

BS EN 50164, IEC 62561.

U Bolt Clamps:
The U Bolt clamps can be used for Flat Tapes, Cables, Earth Rods and Rebars.

U Bolt Rod Clamp (Type E): (Single plated Horizontal type)

Part No	Rod / rebar diameter		Hole centres
CRTE01	5/8"	16 mm	37 mm
CRTE02	3/4"	20 mm	37 mm
CRTE03	1"	25 mm	37 mm
CRTE04	11/2"	38 mm	54 mm
CRTE05	2"	50 mm	64 mm

U Bolt Rod to Tape Clamp (Type E): (Double plated vertical type)

Part No	Rod/Rebar Diameter	Hole Centers	Copper Tape Size
CRTU02	14-25 mm	37 mm	25x3 mm
CRTU03	14-25 mm	37 mm	50x6 mm
CRTU04	25-38 mm	54 mm	25x3 mm
CRTU05	50 mm	64 mm	25x3 mm
CRTU07	14-25 mm	37 mm	30x4 mm

These Clamps are to ensure the connection between rebar or earth rods with copper tapes (vertical connection).

"U" Bolt Rod to Cable Clamp (type GUV): (Double Plated Vertical Type)

Part No	Rod / rebar diameter	Conductor range
CRCU01	14-25 mm	16-70 mm2
CRCU02	14-25 mm	50-150 mm2
CRCU03	14-25 mm	150-500 mm2

Complies with IEC 62561

'U' Bolt Rod to 3 parallel Cable Clamp (Type V): (Double Plated Vertical Type)

Part No	Rod / rebar diameter	Conductor range
CRCU01-3R	14-25 mm	16-70 mm2
CRCU02-3R	14-25 mm	50-150 mm2
CRCU03-3R	14-25 mm	150-500 mm2

These clamps are to ensure the connection between rebar or earth rod with cables (Vertical Connection).

Rod To Cable Lug Clamp (Type B):

Part No	Rod diameter		Rod type	Bold size
CRCB01	3/8″	9.5 mm	Copper bond	M8
CRCB02	5/8″	16 mm	Copper bond	M10
CRCB03	5/8″	15 mm	Solid copper	M10
CRCB04	3/4″	20 mm	Copper bond	M10
CRCB05	3/4″	20 mm	Solid copper	M10

Rebar lamp:

Part No	Conductor diameter	Rebar diamater	Conductor material
CRCR01	8 mm	8-18 mm	Copper
CRCR02	8 mm	18-38 mm	Copper

Tower Earth Clamp:

Tower earth clamps are served as a bond to copper cable or wire or steel structure.

Part No	Conductor range	Channel thickness	Bolt size	Conductor material
CTE01	16-70 mm2	10 mm	M10	Copper
CTE02	70-120 mm2	10 mm	M12	Copper
CTE03	25-50 mm2	10 mm	M10	Copper
CTE04	25-50 mm2	10 mm	M10	Aluminium
CTE05	120-185 mm2	10 mm	M12	Copper
CTE06	185-240 mm2	10 mm	M12	Copper

Pipe Clamp :

Pipe clamps are used over metal pipes to connect to earthing conductors.

Part No	Pipe diameter		Conductor range
CPC1325	1/2″ – 1″	13-25 mm	25-95 mm2
CPC3250	11/4 ″– 2″	32-50 mm	25-95 mm2
CPC6590	21/2 ″– 31/2 ″	65-90 mm	25-95 mm2
CPC100125	4″ - 5″	100-125 mm	25-95 mm2
CPC150	6″	150 mm	25-95 mm2
CPC200	8″	200 mm	25-95 mm2
CPC250	10″	250 mm	25-95 mm2
CPC300	12″	300 mm	25-95 mm2

Earth Points :

Earth points are used when a steel rebar needs to be grounded or connected to the down conductor. They are used with U-bolt clamps that are connected to the rebar with a conductor. Another end of the conductor is exothermically welded to an earth point which is connected to a tape or down conductor.

Earth points are also available with standard, and customised pre-welded tails (Bahra Green Yellow PVC earthing cable).

Single Hole Earth Point

Part No	Hole size	Length
EP1N08	M8 x 15 mm	80 mm
EP1N10	M10 x 15 mm	80 mm
EP1N12	M12 x 15 mm	80 mm
EP1N16	M16 x 15 mm	80 mm

Single Hole Earth Point with Single Pre-Welded Tail

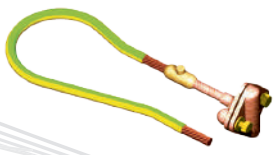
Part No	Description
EP1T08	EP1N08 earth point with pre-welded 500mm earth cable
EP1T10	EP1N10 earth point with pre-welded 500mm earth cable
EP1T12	EP1N12 earth point with pre-welded 500mm earth cable
EP1T16	EP1N16 earth point with pre-welded 500mm earth cable

Two Hole Earth Point

Part No	Hole size	Length
EP2N01	M8 x 12 mm	80 mm
	for connection of 25 mm x 3 mm copper tape or 70 mm2 stranded copper cable.	
EP2N02	M12 x 15 mm	80 mm
	for connection of 25 mm x 3 mm copper tape or 8 mm2 diameter solid circular copper.	

Two Hole Earth Point with Single Pre-Welded Tail

Part No	Description
EP2T01	EP2N01 earth point with pre-welded 500mm earth cable
EP2T02	EP2N02 earth point with pre-welded 500mm earth cable

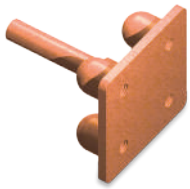


Two Hole Earth Point with Double Pre-Welded Tail

Part No	Description
EP22T01	EP2T01 earth point with pre-welded 2x500mm earth cable
EP22T02	EP2T02 earth point with pre-welded 2x500mm earth cable

Four Hole Earth Point

Part No	Hole size	Length
EP4U01	M8 x 14 mm	75 mm



Four Hole Earth Point with Single Pre-Welded Tail

Part No	Description
EP4T01	EP4U01 earth point with pre-welded 500mm earth cable
EP4T012	Earth Point with Pre-welded 1000mm earth cable

Four Hole Earth Point with Double Pre-Welded Tail

Part No	Description
EP42T01	EP4U01 earth point with pre-welded 2x500mm earth cable

Type H High Strength Splitbolt Connector :

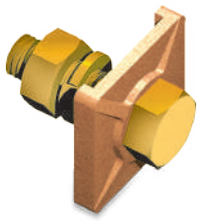
Part No	Conductor range				Dimension
	Min		Max		
	Min	Max	Min	Max	
CSB01	4 mm2	10 mm2	2.5 mm2	10 mm2	4.1 mm
CSB02	10 mm2	16 mm2	2.5 mm2	16 mm2	5.5 mm
CSB03	16 mm2	25 mm2	4 mm2	25 mm2	6.9 mm
CSB04	25 mm2	35 mm2	4 mm2	35 mm2	8.4 mm
CSB05	35 mm2	50 mm2	4 mm2	50 mm2	9.7 mm
CSB06	35 mm2	70 mm2	4 mm2	70 mm2	11.2 mm
CSB07	50 mm2	95 mm2	4 mm2	95 mm2	13.6 mm
CSB08	50 mm2	120 mm2	6 mm2	120 mm2	14.7 mm
CSB09	95 mm2	185 mm2	6 mm2	185 mm2	18.2 mm

Bonds:

B Bond:

A bonding tool to connect tape to steel structure.

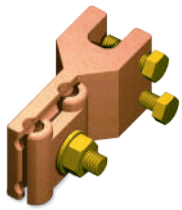
Part No	Maximum Tape width	Bolt size	Conductor material
CBB01	26 mm	M10	Copper
CBB02	26 mm	M10	Aluminium
CBB03	31 mm	M10	Copper



Metalwork Bond:

Bonds steel structures up to 12.8 mm.

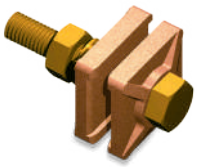
Part No	Maximum Tape width	Bolt size	Conductor material
CMB01	26 mm	M10	Copper
CMB02	26 mm	M10	Aluminium
CMB03	31 mm	M10	Copper



RWP Bond:

A bonding tool to bond tape to rainwater pipes, handrails, etc.

Part No	Maximum tape width	Bolt size	Conductor material
CRB01	26 mm	M10	Copper
CRB02	26 mm	M10	Aluminium



Watermain Bond:

A bonding tool to bond tape to rainwater pipes, handrails, etc.

Part No	Maximum tape width	Conductor material	Weight per unit
CWB01	26 mm	Copper	0.26 Kg

Pipe Bond:

A bonding tool to bond duct and large diameter pipes.

Part No	Conductor diameter	Pipe diameter	Conductor material	Weight per unit
CWP01	8 mm	50-200 mm	Copper	0.46 Kg
CWP02	8 mm	50-200 mm	Aluminium	0.25 Kg

Static Discharging Receptacles:

A static discharging point for aircrafts stations Fuel stations, etc. in open areas.

Testing Standard: BS 7430

Part No	Material Used
SDR01	Copper

Flexible Braids

These items are used for bonding metallic items such as metal doors, fences, hand rails, etc.

Standards: BS EN 50164-2: 2009 & BS 7430

Flat:

Part No Copper	Part No Tinned	Size W x H	Length	Hole dia
FFB01	FFT01	10 x 2 mm	100 mm	6 mm
FFB02	FFT02	10 x 2 mm	200 mm	6 mm
FFB03	FFT03	10 x 2 mm	300 mm	6 mm
FFB04	FFT04	12 x 2 mm	100 mm	6 mm
FFB05	FFT05	12 x 2 mm	200 mm	6 mm
FFB06	FFT06	12 x 2 mm	300 mm	6 mm
FFB07	FFT07	19 x 2.5 mm	100 mm	10 mm
FFB08	FFT08	19 x 2.5 mm	200 mm	10 mm
FFB09	FFT09	19 x 2.5 mm	300 mm	10 mm
FFB10	FFT10	25 x 3 mm	100 mm	10 mm
FFB11	FFT11	25 x 3 mm	200 mm	10 mm
FFB12	FFT12	25 x 3 mm	400 mm	10 mm
FFB13	FFT13	25 x 3 mm	200 mm	11 mm
FFB14	FFT14	25 x 3 mm	300 mm	11 mm
FFB15	FFT15	25 x 3 mm	400 mm	11 mm
FFB16	FFT16	30 x 4.5 mm	200 mm	10 mm
FFB17	FFT17	30 x 4.5 mm	400 mm	10 mm
FFB18	FFT18	32 x 5 mm	200 mm	10 mm
FFB19	FFT19	32 x 5 mm	400 mm	10 mm

Flexible Braids

These items are used for bonding metallic items such as metal doors, fences, hand rails, etc.

Standards: BS EN 50164-2: 2009 & BS 7430
Circular:

Part No	Cross Section	Length	Hole dia
CFB01	4	100 mm	6 mm
CFB02	4	200 mm	6 mm
CFB03	4	300 mm	6 mm
CFB04	6	100 mm	6 mm
CFB05	6	200 mm	6 mm
CFB06	6	300 mm	6 mm
CFB07	10	100 mm	6 mm
CFB08	10	200 mm	6 mm
CFB09	10	300 mm	6 mm
CFB10	16	100 mm	6 mm
CFB11	16	200 mm	6 mm
CFB12	16	300 mm	6 mm
CFB13	16	100 mm	10 mm
CFB14	16	200 mm	10 mm
CFB15	16	300 mm	10 mm
CFB16	25	200 mm	10 mm
CFB17	25	400 mm	10 mm
CFB18	35	200 mm	10 mm
CFB19	35	400 mm	10 mm
CFB20	50	200 mm	10 mm
CFB21	50	400 mm	10 mm
CFB22	70	200 mm	10 mm
CFB23	70	400 mm	10 mm

For Tinned Flat Flexile braid, replace third digit “B” with “T”

Earth Bar:

Various type of Earth Bars are available in our product range. There are shown in below.

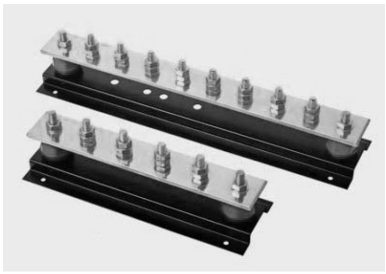
Earth Bar without Disconnecting Link :

Copper Earth Bar:

Part No	Description	Length
EBC06	6 way	400mm
EBC08	8 way	500mm
EBC10	10 way	650mm
EBC12	12 way	750mm
EBC14	14 way	850mm
EBC16	16 way	950mm
EBC18	18 way	1050mm
EBC20	20 way	1200mm
EBC22	22 way	1300mm
EBC24	24 way	1400mm
EBC26	26 way	1500mm
EBC28	28 way	1650mm
EBC30	30 way	1750mm

Tinned Copper Earth Bar:

Part No	Description	Length
EBT06	6 way	400mm
EBT08	8 way	500mm
EBT10	10 way	650mm
EBT12	12 way	750mm
EBT14	14 way	850mm
EBT16	16 way	950mm
EBT18	18 way	1050mm
EBT20	20 way	1200mm
EBT22	22 way	1300mm
EBT24	24 way	1400mm
EBT26	26 way	1500mm
EBT28	28 way	1650mm
EBT30	30 way	1750mm



Standard Width x Height : 90 mm x 96 mm
Busbar Dimensions: 50 x 6mm
Complies with IEC 62561, UL 467

Earth Bar:

Earth Bar with Single Disconnecting Link:

Copper Earth Bar:

Part No	Description	Length
EBCS06	6 way	475 mm
EBCS08	8 way	575 mm
EBCS10	10 way	725 mm
EBCS12	12 way	825 mm
EBCS14	14 way	925 mm
EBCS16	16 way	1025 mm
EBCS18	18 way	1125 mm
EBCS20	20 way	1275 mm
EBCS22	22 way	1375 mm
EBCS24	24 way	1475 mm
EBCS26	26 way	1575 mm
EBCS28	28 way	1725 mm
EBCS30	30 way	1825 mm

Tinned Copper Earth Bar:

Part No	Description	Length
EBTS06	6 way	475 mm
EBTS08	8 way	575 mm
EBTS10	10 way	725 mm
EBTS12	12 way	825 mm
EBTS14	14 way	925 mm
EBTS16	16 way	1025 mm
EBTS18	18 way	1125 mm
EBTS20	20 way	1275 mm
EBTS22	22 way	1375 mm
EBTS24	24 way	1475 mm
EBTS26	26 way	1575 mm
EBTS28	28 way	1725 mm
EBTS30	30 way	1825 mm

Standard Width x Height : 90 mm x 96 mm
Busbar Dimensions: 50 x 6mm
Complies with IEC 62561, UL 467

Earth Bar With Twin Disconnecting Link:

Copper Earth Bar

Part No	Description	Length
EBCT06	6 way	550 mm
EBCT08	8 way	650 mm
EBCT10	10 way	800 mm
EBCT12	12 way	900 mm
EBCT14	14 way	1000 mm
EBCT16	16 way	1100 mm
EBCT18	18 way	1200 mm
EBCT20	20 way	1350 mm
EBCT22	22 way	1450 mm
EBCT24	24 way	1550 mm
EBCT26	26 way	1650 mm
EBCT28	28 way	1800 mm
EBCT30	30 way	1900 mm

Tinned Copper Earth Bar

Part No	Description	Length
EBTT06	6 way	550 mm
EBTT08	8 way	650 mm
EBTT10	10 way	800 mm
EBTT12	12 way	900 mm
EBTT14	14 way	1000 mm
EBTT16	16 way	1100 mm
EBTT18	18 way	1200 mm
EBTT20	20 way	1350 mm
EBTT22	22 way	1450 mm
EBTT24	24 way	1550 mm
EBTT26	26 way	1650 mm
EBTT28	28 way	1800 mm
EBTT30	30 way	1900 mm

Standard Width x Height : 90 mm x 96 mm
Busbar Dimensions: 50 x 6mm
Complies with IEC 62561, UL 467

Earth Bar Accessories :

Disconnecting Links

Part No	Description	Length	Width	Height
EBCAD	Disconnecting Link	125 mm	90 mm	90 mm
EBTAD	Tinned Disconnecting Link	125 mm	90 mm	90 mm

Complies with IEC 62561, UL 467

Telecomm Earth Bar

It serves as a common grounding point for Extra Low Voltage system.

Part No	Description	Length	Width
EBELV01	Sub ELV Earth Bar	305 mm	51 mm
EBELV02	Main ELV Earth Bar	305 mm	102mm

*And Available Customized Earthbars
Complies with IEC 62561, UL 467

Earth Insulator

Part No	Length	Outer dia	Inner Dia
EI01	51 mm	32 mm	27 mm

Earth Boss

Manufactured to provide a secure earth connection point on a steel structure. Use denso tape and wrap the connection.

Part No	Length	Dia
EBOX01	25 mm	25 mm
EBOX02	30 mm	30 mm
EBOX03	30 mm	40 mm
EBOX04	30 mm	50 mm
EBOX05	40 mm	30 mm
EBOX06	40 mm	40 mm
EBOX07	40 mm	50 mm
EBOX08	50 mm	30 mm
EBOX09	50 mm	40 mm
EBOX10	50 mm	50 mm

For Steel, Use replace the third digit “X” with “S” For Stainless Steel, Use replace the third digit “X” with “U”

C Shaped Connector:

C shape connectors are specially designed to connect the two parallel cables.

Copper :

Part No	Conductor range (Main)	Conductor range (Tap)
CC101510	10 mm2	1.5-10 mm2
CC161516	16 mm2	1.5-16 mm2
CC16251510	25-16 mm2	10-1.5 mm2
CC251625	25 mm2	25-16 mm2
CC351516	35 mm2	16-1.5 mm2
CC352535	35 mm2	35-25 mm2
CC50425	50 mm2	25-4 mm2
CC503550	50 mm2	50-35 mm2
CC701525	70 mm2	25-1.5 mm2
CC5070435	70-50 mm2	35-4 mm2
CC50703570	70-50 mm2	70-35 mm2
CC95435	95 mm2	35-4 mm2
CC953570	95 mm2	70-35 mm2
CC957095	95 mm2	95-70 mm2
CC12025120	120 mm2	120-25 mm2
CC15025120	150 mm2	120-25 mm2
CC15070150	150 mm2	150-70 mm2
CC1851695	185 mm2	95-16 mm2
CC120185	185-120 mm2	185-120 mm2
CC15024095120	240-150 mm2	120-95 mm2
CC240150	150-240 mm2	150-240 mm2
CC240185	185-240 mm2	185-240 mm2
CC240240	240-240 mm2	240-240 mm2
CC300120	120-300 mm2	120-300 mm2
CC300300	300-300 mm2	300-300 mm2

Note: For Tinned Items the code shall be started with "CT".


LIGHTNING
PROTECTION

Lightning is a natural phenomenon that occurs during an electrical storm. This electrostatic discharge occurs inside the clouds or between two clouds or between cloud and ground. In all the cases due to enormous potential in the clouds, the atoms in that regions are ionised piloting a strike with light in the form of plasma and sound in the form of thunder. The rise time of the negative lightning current is typically 1-10 microseconds to reach the peak with amperes ranging from 30 kA to 120 kA.

Lightning protection systems act as a Faraday Cage for structures which protect the building and its contents from external electric fields by transferring that energy around the cage instead of passing through the structures. The ultimate aim of lightning protection system is to offers a low resistance path to the ground where the enormous energy is safely dispersed without affecting the structure.

A conventional lightning protection system includes Air terminals, conductors and ground electrodes to offer a low resistance path to the earth as current has a tendency to flow through low resistance path. Proper grounding is essential for efficiently and safely dispersing enormous energy from the lightning strike.

Our Offerings

Bahra offers a comprehensive solution for lightning protection that includes,

- Soil Resistivity Testing
- Risk Assessment as per BS EN/IEC 62305
- Design
- Product supplies

Soil Resistivity Testing:

It is important to understand the soil resistivity before designing a lightning protection system as the ground resistance or impedance is one of the key factors in risk assessment and design. Our expert engineers with periodically calibrated instruments conduct soil resistivity tests at the site and offer solutions based on the report.

LIGHTNING
GENERAL INTRODUCTION

Risk Assessment:

Our team of experts will make a complete risk assessment for projects as per IEC 62305 with the site survey or project reports. Information on geographical location, soil resistivity, structure dimensions, the frequency of thunderstorms, wind speed, people population, etc., are critical for assessing the risks and selecting the right level of protection.

Design:

Upon selecting the level of protection, a detailed design for the project can be offered with bill of materials, recommended practices, and installation guidelines. It ensures optimum level of safety and protection for the people, equipment and structures.

Product Supplies:
Bahra manufactures conductors and components for Earthing and lightning protection in its state of the art manufacturing facilities.

Raw Materials & Manufacturing
Copper & Aluminium plays a significant role in earthing and lightning protection as all the conductors and accessories are either made from Copper, Aluminium and its alloys. Bahra manufactures all its conductors from 99.99% pure copper/aluminium cathodes. Accessories are made from copper and aluminium alloys ensuring higher mechanical strength and conductivity. Most of the accessories are made from bronze by the casting process and a few are made by the forging process for applications that need higher mechanical strength.

Approvals & Testing
- Bahra conductors and accessories are tested as per BS EN 50164 and IEC 62561.
- Earth rods and accessories are tested as per Ul 467.

Product Portfolio
Our wide range of conductors and accessories ensures that every project need is fulfilled to achieve the complete earthing and lightning protection. This catalog lists all the standard products, In addition to this Bahra offers customized products designed for particular applications.

Conductors:

Bare Copper Tape:

Bare copper soft drawn tapes are the most commonly used down conductors in the Middle East for lightning protection. Bahra copper tapes are soft drawn from 99.99% pure copper cathodes ensuring higher conductivity. These tapes are radially edged making it easier to install and are tested as per IEC 62561, BS EN 50164 & UL 96 with harsh atmospheric conditions and impulse current of 100000 Amperes.

Part No.	Conductor size (X x Y)	Weight per metre	Standard coil size
BCT12.51.5100	12.5 x 1.5 mm	0.17 Kg	100 m
BCT12.503100	12.5 x 3 mm	0.33 Kg	100 m
BCT201.5100	20 x 1.5 mm	0.27 Kg	100 m
BCT200350	20 x 3 mm	0.53 Kg	50 m
BCT2003100	20 x 3 mm	0.53 Kg	100 m
BCT251.5100	25 x 1.5 mm	0.33 Kg	100 m
BCT250250	25 x 2 mm	0.49 Kg	50 m
BCT250325	25 x 3 mm	0.67 Kg	25 m
BCT250350	25 x 3 mm	0.67 Kg	50 m
BCT1-1/4-25	1″x 1/4 ″	0.67 Kg	25 m
BCT250450	25 x 4 mm	0.89 Kg	50 m
BCT250640	25 x 6 mm	1.33 Kg	40 m
BCT1-1/4-40	1″x 1/4 ″	1.33 Kg	40 m
BCT300250	30 x 2 mm	0.53 Kg	50 m
BCT300350	30 x 3 mm	0.83 Kg	50 m
BCT300440	30 x 4 mm	1.07 Kg	40 m
BCT300540	30 x 5 mm	1.33 Kg	40 m
BCT310350	31 x 3 mm	0.83 Kg	50 m
BCT31.50440	31.5 x 4 mm	1.13 Kg	40 m
BCT310630	31 x 6 mm	1.65 Kg	30 m
BCT380350	38 x 3 mm	1.01 Kg	50 m
BCT380530	38 x 5 mm	1.69 Kg	30 m
BCT380625	38 x 6 mm	2.02 Kg	25 m
BCT400340	40 x 3 mm	1.06 Kg	40 m
BCT400430	40 x 4 mm	1.42 Kg	30 m
BCT400525	40 x 5 mm	1.78 Kg	25 m
BCT400625	40 x 6 mm	2.16 Kg	25 m
BCT406.325	40 x 6.3 mm	2.24 Kg	25 m
BCT500340	50 x 3 mm	1.33 Kg	40 m
BCT500430	50 x 4 mm	1.78 Kg	30 m
BCT500520	50 x 5 mm	2.22 Kg	20 m
BCT500620	50 x 6 mm	2.68 Kg	20 m
BCT506.320	50 x 6.3 mm	2.80 Kg	20 m
BCT500720	50 x 7 mm	3.08 Kg	20 m

Bare Aluminium Tape:

Bahra bare aluminium tapes are alternatives to copper tapes.

Part No.	Conductor size (X x Y)	Standard coil size
BAT12.51.5100	12.5 x 1.5 mm	100 m
BAT12.503100	12.5 x 3 mm	100 m
BAT201.5100	20 x 1.5 mm	100 m
BAT200350	20 x 3 mm	50 m
BAT2003100	20 x 3 mm	100 m
BAT251.5100	25 x 1.5 mm	100 m
BAT250250	25 x 2 mm	50 m
BAT250325	25 x 3 mm	25 m
BAT250350	25 x 3 mm	50 m
BAT1-1/4-25	1" x 1/4 "	25 m
BAT250450	25 x 4 mm	50 m
BAT250640	25 x 6 mm	40 m
BAT1-1/4-40	1" x 1/4 "	40 m
BAT300250	30 x 2 mm	50 m
BAT300350	30 x 3 mm	50 m
BAT300440	30 x 4 mm	40 m
BAT300540	30 x 5 mm	40 m
BAT310350	31 x 3 mm	50 m
BAT31.50440	31.5 x 4 mm	40 m
BAT310630	31 x 6 mm	30 m
BAT380350	38 x 3 mm	50 m
BAT380530	38 x 5 mm	30 m
BAT380625	38 x 6 mm	25 m
BAT400340	40 x 3 mm	40 m
BAT400430	40 x 4 mm	30 m
BAT400525	40 x 5 mm	25 m
BAT400625	40 x 6 mm	25 m
BAT406.325	40 x 6.3 mm	25 m
BAT500340	50 x 3 mm	40 m
BAT500430	50 x 4 mm	30 m
BAT500520	50 x 5 mm	20 m
BAT500620	50 x 6 mm	20 m
BAT506.320	50 x 6.3 mm	20 m
BAT500720	50 x 7 mm	20 m

Complies BS EN 755-5

Tinned Copper Tape:

Bahra tinned copper tapes are made from state of the art continuous tin plating facility. Tin plating prevents from oxidization and is recommended to avoid copper thefts. Below weights for tin plated tapes are with a +2% tolerance.

Complied with IEC 62561 & BS EN 50164 and UL 96

Part No.	Conductor Size (X x Y)	Weight per metre	Standard coil size
TCT12.51.5100	12.5 x 1.5 mm	0.17 Kg	100 m
TCT12.503100	12.5 x 3 mm	0.33 Kg	100 m
TCT201.5100	20 x 1.5 mm	0.27 Kg	100 m
TCT200350	20 x 3 mm	0.53 Kg	50 m
TCT2003100	20 x 3 mm	0.53 Kg	100 m
TCT251.5100	25 x 1.5 mm	0.33 Kg	100 m
TCT250250	25 x 2 mm	0.49 Kg	50 m
TCT250325	25 x 3 mm	0.67 Kg	25 m
TCT250350	25 x 3 mm	0.67 Kg	50 m
TCT1-1/4-25	1" x 1/4 "	0.67 Kg	25 m
TCT250450	25 x 4 mm	0.89 Kg	50 m
TCT250640	25 x 6 mm	1.33 Kg	40 m
TCT1-1/4-40	1" x 1/4 "	1.33 Kg	40 m
TCT300250	30 x 2 mm	0.53 Kg	50 m
TCT300350	30 x 3 mm	0.83 Kg	50 m
TCT300440	30 x 4 mm	1.07 Kg	40 m
TCT300540	30 x 5 mm	1.33 Kg	40 m
TCT310350	31 x 3 mm	0.83 Kg	50 m
TCT31.50440	31.5 x 4 mm	1.13 Kg	40 m
TCT310630	31 x 6 mm	1.65 Kg	30 m
TCT380350	38 x 3 mm	1.01 Kg	50 m
TCT380530	38 x 5 mm	1.69 Kg	30 m
TCT380625	38 x 6 mm	2.02 Kg	25 m
TCT400340	40 x 3 mm	1.06 Kg	40 m
TCT400430	40 x 4 mm	1.42 Kg	30 m
TCT400525	40 x 5 mm	1.78 Kg	25 m
TCT400625	40 x 6 mm	2.16 Kg	25 m
TCT406.325	40 x 6.3 mm	2.24 Kg	25 m
TCT500340	50 x 3 mm	1.33 Kg	40 m
TCT500430	50 x 4 mm	1.78 Kg	30 m
TCT500520	50 x 5 mm	2.22 Kg	20 m
TCT500620	50 x 6 mm	2.68 Kg	20 m
TCT506.320	50 x 6.3 mm	2.80 Kg	20 m
TCT500720	50 x 7 mm	3.08 Kg	20 m

Bare Copper Conductor:

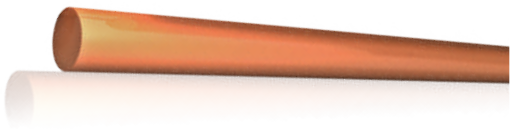
	Conductor				Packaging	
Item Numbers	Cross Sectional Area Nominal mm²	Number and Nominal Diameter of Wires mm	Overall Diameter Approx mm	Max. DC Resistance at 20°C ohm/km	Net Weight Approx kg/km	Standard Package m+/-5%
14110020	2.5 rm	7x0.66	2.0	7.4100	21	2000
14110030	4 rm	7x0.84	2.5	4.6100	34	2000
14110040	6 rm	7x1.02	3.1	3.0800	51	2000
14110050	10 rm	7x1.33	4.0	1.8300	86	2000
14110060	16 rm	7x1.68	5.1	1.1500	137	2000
14110070	25 rm	7x2.11	6.4	0.7270	217	2000
14110080	35 rm	7x2.48	7.5	0.5240	312	2000
14110090	50 rm	19x1.75	8.8	0.3870	408	1000
14110100	70 rm	19x2.11	10.6	0.2680	589	1000
14110110	95 rm	19x2.48	12.4	0.1930	818	1000
14110120	120 rm	37x2.00	14.0	0.1530	1032	1000
14110130	150 rm	37x2.22	15.5	0.1240	1273	1000
14110140	185 rm	37x2.48	17.4	0.0991	1593	1000
14110150	240 rm	61x2.22	20.3	0.0754	2094	1000
14110160	300 rm	61x2.48	22.9	0.0601	2650	1000
14110170	400 rm	61x2.81	25.7	0.0470	3400	500
14110180	500 rm	61x3.18	28.8	0.0366	4314	500
14110190	630 rmc	61x3.75	30.5	0.0283	5650	500

Copper grade "CU-ETP1" with nominal comductivity (IACS) 101% complying with EN 1977:1998. Fusing temperature not be less than 1083°C.

Bare Solid Circular:

Bare solid circular used on lightning protection applications.

Part No.	Conductor material	Diameter (A)	Cross-sectional area	Standard coil size
BCSR008	Copper	8 mm	50.27 mm2	50 m
BASR008	Aluminium	8 mm	50.27 mm2	50 m



Tinned Soft Drawn Stranded Copper Cable:

Tin plated conductors are highly resistant to oxidation recommended for harsh environments.

Part No.	Cross-sectional area	Stranding No./mm Ø	Weight per metre
BCST020	20 mm2	19/2.14	0.62 Kg

Bare Busbar:

The multipurpose bare Busbars are used as Earth Bar/ Ground Busbar for connecting equipment's ground terminals / Telecommunication grounding etc., For Busbars with insulation base and with connection terminals refer to Earth Bars section.

Part No.	Conductor Size (X x Y)	Weight per metre	Length per Bar
BCB01	12.5 x 1.5 mm	0.17 Kg	4 m
BCB02	12.5 x 3 mm	0.33 Kg	4 m
BCB03	20 x 1.5 mm	0.27 Kg	4 m
BCB04	20 x 3 mm	0.53 Kg	4 m
BCB05	20 x 3 mm	0.53 Kg	4 m
BCB06	25 x 1.5 mm	0.33 Kg	4 m
BCB07	25 x 2 mm	0.49 Kg	4 m
BCB08	25 x 3 mm	0.67 Kg	4 m
BCB09	25 x 3 mm	0.67 Kg	4 m
BCB10	1"x 1/4 "	0.67 Kg	4 m
BCB11	25 x 4 mm	0.89 Kg	4 m
BCB12	25 x 6 mm	1.33 Kg	4 m
BCB13	1"x 1/4 "	1.33 Kg	4 m
BCB14	30 x 2 mm	0.53 Kg	4 m
BCB15	30 x 3 mm	0.83 Kg	4 m
BCB16	30 x 4 mm	1.07 Kg	4 m
BCB17	30 x 5 mm	1.33 Kg	4 m
BCB18	31 x 3 mm	0.83 Kg	4 m
BCB19	31.5 x 4 mm	1.13 Kg	4 m
BCB20	31 x 6 mm	1.65 Kg	4 m
BCB21	38 x 3 mm	1.01 Kg	4 m
BCB22	38 x 5 mm	1.69 Kg	4 m
BCB23	38 x 6 mm	2.02 Kg	4 m
BCB24	40 x 3 mm	1.06 Kg	4 m
BCB25	40 x 4 mm	1.42 Kg	4 m
BCB26	40 x 5 mm	1.78 Kg	4 m
BCB27	40 x 6 mm	2.16 Kg	4 m
BCB28	40 x 6.3 mm	2.24 Kg	4 m
BCB29	50 x 3 mm	1.33 Kg	4 m
BCB30	50 x 4 mm	1.78 Kg	4 m
BCB31	50 x 5 mm	2.22 Kg	4 m
BCB32	50 x 6 mm	2.68 Kg	4 m
BCB33	50 x 6.3 mm	2.80 Kg	4 m
BCB34	50 x 7 mm	3.08 Kg	4 m

Tinned Busbar:

Part No.	Conductor Size (X x Y)	Weight per metre	Length per Bar
TCB01	12.5 x 1.5 mm	0.17 Kg	4 m
TCB02	12.5 x 3 mm	0.33 Kg	4 m
TCB03	20 x 1.5 mm	0.27 Kg	4 m
TCB04	20 x 3 mm	0.53 Kg	4 m
TCB05	20 x 3 mm	0.53 Kg	4 m
TCB06	25 x 1.5 mm	0.33 Kg	4 m
TCB07	25 x 2 mm	0.49 Kg	4 m
TCB08	25 x 3 mm	0.67 Kg	4 m
TCB09	25 x 3 mm	0.67 Kg	4 m
TCB10	1" x 1/4 "	0.67 Kg	4 m
TCB11	25 x 4 mm	0.89 Kg	4 m
TCB12	25 x 6 mm	1.33 Kg	4 m
TCB13	1" x 1/4 "	1.33 Kg	4 m
TCB14	30 x 2 mm	0.53 Kg	4 m
TCB15	30 x 3 mm	0.83 Kg	4 m
TCB16	30 x 4 mm	1.07 Kg	4 m
TCB17	30 x 5 mm	1.33 Kg	4 m
TCB18	31 x 3 mm	0.83 Kg	4 m
TCB19	31.5 x 4 mm	1.13 Kg	4 m
TCB20	31 x 6 mm	1.65 Kg	4 m
TCB21	38 x 3 mm	1.01 Kg	4 m
TCB22	38 x 5 mm	1.69 Kg	4 m
TCB23	38 x 6 mm	2.02 Kg	4 m
TCB24	40 x 3 mm	1.06 Kg	4 m
TCB25	40 x 4 mm	1.42 Kg	4 m
TCB26	40 x 5 mm	1.78 Kg	4 m
TCB27	40 x 6 mm	2.16 Kg	4 m
TCB28	40 x 6.3 mm	2.24 Kg	4 m
TCB29	50 x 3 mm	1.33 Kg	4 m
TCB30	50 x 4 mm	1.78 Kg	4 m
TCB31	50 x 5 mm	2.22 Kg	4 m
TCB32	50 x 6 mm	2.68 Kg	4 m
TCB33	50 x 6.3 mm	2.80 Kg	4 m
TCB34	50 x 7 mm	3.08 Kg	4 m

Coated Copper Tapes:

Lead Covered Copper Tapes

Lead covered copper tapes are widely used in power stations, all lead covered copper tapes are made with a lead thickness of 2.1 mm.
Order with part numbers replaced with first digit "X" by color code.

Pvc Covered Copper Tape:

In modern structures, Bahra PVC covered tapes maintains the aesthetics of the building, with the wide color range available in PVC coating it becomes much easier to match the building color.
The thickness of PVC is minimum 1.2 to 1.5 mm on each side over the tape, and Green Yellow PVC covered tapes are available for easier identification of earthing or down conductors.

Color Codes:

Y- Green Yellow
G- Green
N-Black
W-White
R-Red
B-Blue
E-Grey
L-Lead covered
T-Tin plated

Pvc Covered Copper Tape:

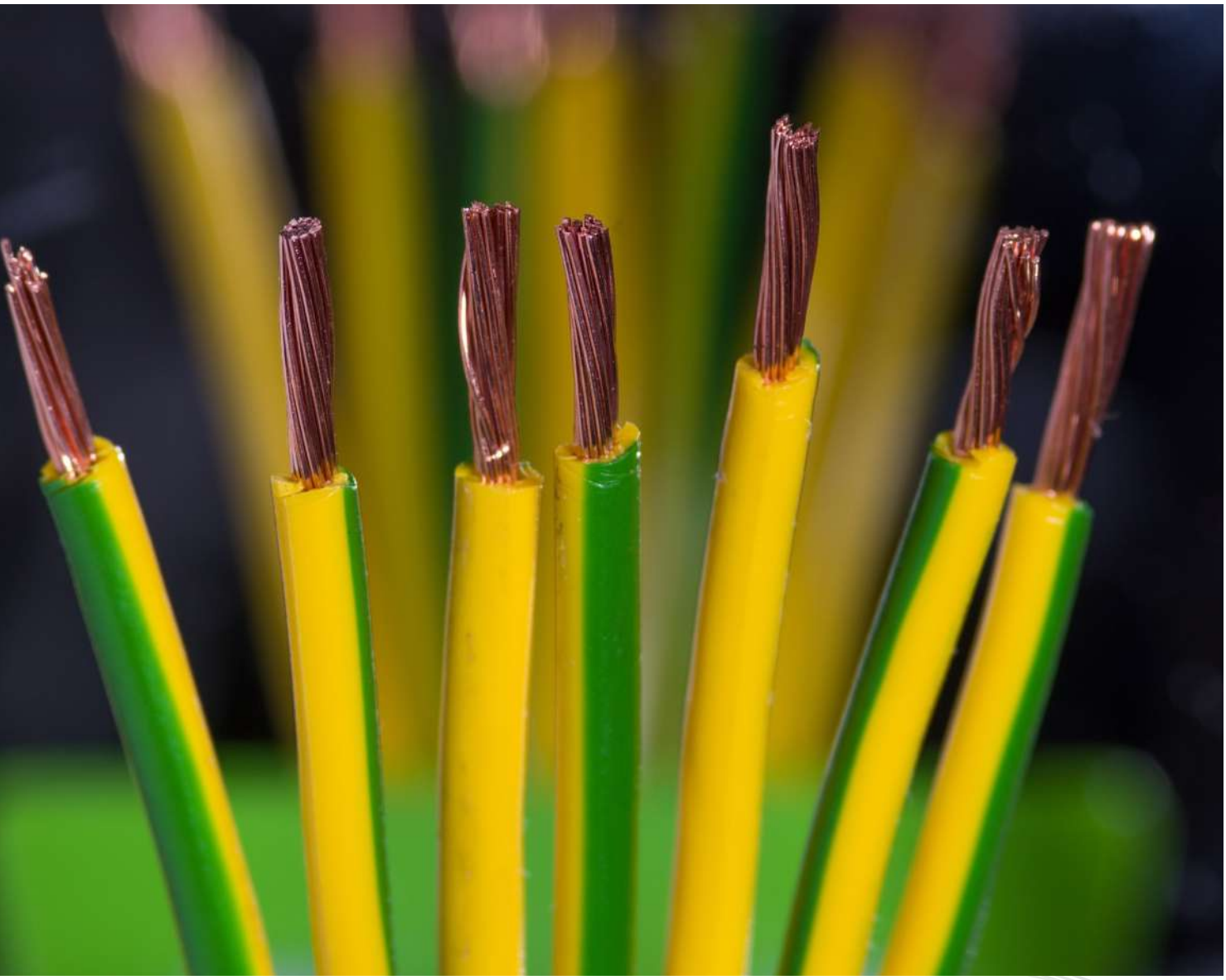
Part No.	Conductor Size (X x Y)	Standard coil size
XCT12.51.5100	12.5 x 1.5 mm	100 m
XCT12.503100	12.5 x 3 mm	100 m
XCT201.5100	20 x 1.5 mm	100 m
XCT200350	20 x 3 mm	50 m
XCT2003100	20 x 3 mm	100 m
XCT251.5100	25 x 1.5 mm	100 m
XCT250250	25 x 2 mm	50 m
XCT250325	25 x 3 mm	25 m
XCT250350	25 x 3 mm	50 m
XCT1-1/4-25	1" x 1/4 "	25 m
XCT250450	25 x 4 mm	50 m
XCT250640	25 x 6 mm	40 m
XCT1-1/4-40	1" x 1/4 "	40 m
XCT300250	30 x 2 mm	50 m
XCT300350	30 x 3 mm	50 m
XCT300440	30 x 4 mm	40 m
XCT300540	30 x 5 mm	40 m
XCT310350	31 x 3 mm	50 m
XCT31.50440	31.5 x 4 mm	40 m
XCT310630	31 x 6 mm	30 m
XCT380350	38 x 3 mm	50 m
XCT380530	38 x 5 mm	30 m
XCT380625	38 x 6 mm	25 m
XCT400340	40 x 3 mm	40 m
XCT400430	40 x 4 mm	30 m
XCT400525	40 x 5 mm	25 m
XCT400625	40 x 6 mm	25 m
XCT406.325	40 x 6.3 mm	25 m
XCT500340	50 x 3 mm	40 m
XCT500430	50 x 4 mm	30 m
XCT500520	50 x 5 mm	20 m
XCT500620	50 x 6 mm	20 m
XCT506.320	50 x 6.3 mm	20 m
XCT500720	50 x 7 mm	20 m

Pvc Covered Copper Solid Circular:

Offered from the portfolio of Bahra Cables, wires and conductors specially made for earthing and lightning protection applications.

Part No.	Diameter (A)	Cross-sectional area	Weight per metre	Standard coil size	Colour range
XCSS08	Copper	8 mm	50.27 mm2	0.49 Kg	50 m

Available in all the color mentioned above codes.



Conventional Air Termination Systems:

Air Rods :

Air rods on the roof are selected and positioned based on the design and class of protection required, a group of air rods make the air termination network for the lightning protection system. Hard drawn externally threaded rods with knurling to fix multi points. (multi points are supplied as separate accessories).

Part No.	Rod length	Rod diameter	Thread size	Conductor material
AR01	500 mm	15 mm	M16	Copper
AR01A	600 mm	15 mm	M16	Copper
AR02	1000 mm	15 mm	M16	Copper
AR03	1500 mm	15 mm	M16	Copper
AR04	2000 mm	15 mm	M16	Copper

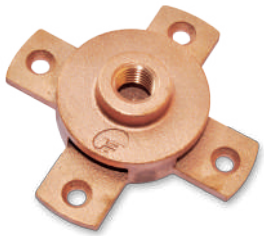
Complies with IEC 62561, UL 467

Accessories:

Air Rod Base:

Air rod bases are mechanical connectors between air rods and Copper/ Aluminium tapes on flat roof surfaces.

Part No.	Rod diameter	Thread size	Maximum conductor width
CAB01	15 mm	M16	25 mm
CAB02	15 mm	M16	50 mm



Complies with IEC 62561, UL 467

Multiple Points:

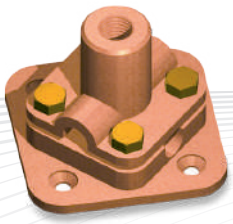
Multi points are packed as a kit of 3 rods and a multipoint base. Additional fasteners are not required ergonomically fixes on the knurling of air rods.

Part No.	Rod diameter	Conductor material
ARM01	15 mm	Copper

Flat Conductor Saddle:

Flat conductor saddles are used for connecting air rods with stranded conductors.

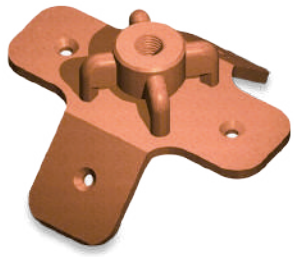
Part No.	Conductor size	Rod diameter	Thread size	Conductor material
CAF01	50 mm	15 mm	M16	Copper
CAF02	70 mm	15 mm	M16	Copper
CAF03	95 mm	15 mm	M16	Copper
CAT04	120 mm	15 mm	M16	Copper



Air Terminal

Ridge Saddle:

Suitable to install on ridges or uneven surfaces where standard air rod bases are not feasible to fix.



Part No.	Rod diameter	Thread size	Maximum conductor width	Conductor material
CAR01	15 mm	M16	31x6 mm	Copper
CAR02	15 mm	M16	55x10 mm	Copper

Rod to Conductor Coupling:

Air rods when mounted on vertical planes with CARB01
Down conductors such as tapes or stranded conductors can be connected with a rod to conductor couplings.

For Connecting Stranded Conductor:

Part No.	Conductor size	Rod diameter	Thread size	Rod material
CAS01	50-70 mm2	15 mm	M16	Copper
CAS02	95-120 mm2	15 mm	M16	Copper

For Connecting Copper Tapes:

Part No.	Conductor size	Rod diameter	Thread size	Rod material
CAT01	25 x 3 mm	15 mm	M16	Copper

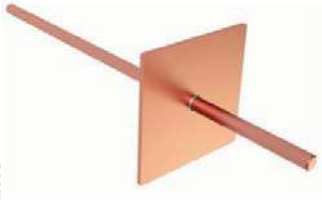
Rod Brackets:

Suitable for applications where air rods need to be mounted on vertical planes.

Part No.	Rod diameter	Rod material
CARB01	15 mm	Copper

Puddle Flanges:

Puddle flanges are highly suitable in conditions to provide continuous connection where down conductor should pass through the waterproof roof layer.



Part No	Material Used
PF01	Copper
PF02	Aluminum

Strike Pads:

An innovative solution to replace air terminal rods at situations such as complex roof structure, roof car park buildings, etc.

Part No	Description	Material Used
SP01	Copper Strike Pad	Copper
SP02	Aluminum Strike Pad	Aluminum
ST01	Stem for Strike Pad	Copper

Free Standing Air Terminal Rods:

Free standing Air Terminal Rods are perfect solution to achieve greater height and where no penetration of the roof structure is allowed.
These air terminal rods are designed to withstand the wind speed up to 190 kmh.

FSAT01

FSAT03

FSAT07

FSAT05

Part No	Height	Base	Description
FSAT01	3	Square support frame	4 Nos Square Concrete Base
FSAT02	4	Square support frame	4 Nos Square Concrete Base
FSAT03	5	Tripod Support Frame	3 Nos Circular Concrete Base
FSAT04	6	Tripod Support Frame	3 Nos Circular Concrete Base
FSAT05	7	Tripod Support Frame	6 Nos Circular Concrete Base
FSAT06	8	Tripod Support Frame	6 Nos Circular Concrete Base
FSAT07	9	H Shaped Support Frame	10 Nos Circular Concrete Base
FSAT08	10	H Shaped Support Frame	10 Nos Circular Concrete Base

Supporting Accessories:

Part No	Description
SUP01	Square Support Frame
SUP02	Tripod Support Frame
SUP03	H Shaped Support Frame

Bases:

Part No	Description
CB01	Square Concrete Base
CB02	Circular Concrete Base

DC Tape Clip:

DC tape clip mechanically fixes the tapes on to a wall, supplied with countersunk screws.

For Bare Copper Tapes:

Part No.	Conductor Size
CDC01	20 x 3 mm
CDC02	25 x 3 mm
CDC03	25 x 6 mm
CDC04	30 x 5 mm
CDC05	38 x 5 mm
CDC06	40 x 4 mm
CDC07	40 x 6 mm
CDC08	50 x 4 mm
CDC09	50 x 6 mm

Note: Tinned item product codes ending with "T"

Complies with IEC 62561, UL 467

For use with PVC Covered Copper:

The sizes mentioned as conductor size are only the bare conductor, The PVC extra thickness of 3 mm on the width and 3 mm on thickness is not added in the conductor size.

Part No.	Conductor Size
CDP02	25 x 3 mm
CDP03	25 x 6 mm
CDP09	50 x 6 mm

For use with Lead Covered Copper:

Part No.	Conductor Size
CDL02	25 x 3 mm

For use with Bare Aluminium:

Part No.	Conductor Size
CDA01	20 x 3 mm
CDA09	50 x 6 mm

For use with PVC Covered Aluminum:

Part No.	Conductor Size
CDM01	25 x 3 mm
CDM02	50 x 6 mm

Tape Clip:

Made from 99.99% pure copper, used for fixing tapes on flat surfaces or the walls. Additional screws are required for fixing.

Part No.	Conductor Size
CTC01	20 x 3 mm
CTC02	25 x 3 mm
CTC09	50 x 6mm

Note: Tinned item product codes ending with "T"

One Hole Clip:

Made from 99.99% pure copper, used for fixing conductors on flat surfaces or the walls. An additional screw is required for fixing.

Part No.	Conductor	Conductor material
CHC01	8 mm dia	Copper
CHC02	10 mm dia	Copper
CHC03	50 mm2	Copper
CHC04	70 mm2	Copper
CHC05	95 mm2	Copper
CHC06	120 mm2	Copper
CHC07	150 mm2	Copper

Note: Tinned item product codes ending with "T"
For PVC Cables product code ending with "P"

Cable Saddle:

Part No.	Conductor	Conductor material
CCS01	8 mm dia	Copper
CCS02	10 mm dia	Copper
CCS03	50 mm2	Copper
CCS04	70 mm2	Copper
CCS05	95 mm2	Copper
CCS06	120 mm2	Copper
CCS07	150 mm2	Copper

Note: Tinned item product codes ending with "T"
For PVC Cables product code ending with "P"

Non-metallic DC Tape Clip:

Made from heavy duty PVC compound. A screw is needed for fixing the base, no additional screws required for closing the clip.

For Bare Copper Tape:

Part No.	Conductor Size
CXDC02	25 x 3 mm
CXDC03	25 x 6 mm
CXDC09	50 x 6 mm

For PVC Covered Copper Tape:

Part No.	Conductor Size
CXDP02	25 x 3 mm
CXDP03	25 x 6 mm
CXDP09	50 x 6 mm

Available in different color variants,
Order with part numbers replaced with the second digit "X" by color code.
Color codes:
G- Green, N-Black, W-White, R-Red, B-Blue, E-Grey, O-Brown

Adhesive Non-Metallic DC Tape Clips:

It serves a perfect solution to hold the copper tapes in surfaces which cannot be penetrated by a screw. Manufactured from high grade plastic which can withstand hot and cold weather.

For Bare Copper Tape:

Part No	Tape Size
CXNM01	25x3 mm
CXNM11	25x6 mm
CXNM21	50x6 mm

For PVC Covered Copper Tape:

Part No	Tape Size
CXNP01	25x3 mm
CXNP11	25x6 mm
CXNP21	50x6 mm

Available in different color variants,
Order with part numbers replaced with the second digit "X" by color code.
Color codes:
G- Green, N-Black, W-White, R-Red, B-Blue, E-Grey, O-Brown

Weldable DC Tape Clips:

These items are designed to use on PVC roofing membrane.

For Bare Copper Tape:

Part No	Tape Size
CXW01	25x3 mm
CXW02	25x6 mm
CXW03	50x6 mm

For PVC Covered Copper Tape:

Part No	Tape Size
CXWP01	25x3 mm
CXWP02	25x6 mm
CXWP03	50x6 mm

Available in different color variants,
Order with part numbers replaced with the second digit "X" by color code.
Color codes:
G- Green, N-Black, W-White, R-Red, B-Blue, E-Grey, O-Brown

Oblong Test Clamp:

Used as test clamp by overlapping copper tapes while using copper tape as down conductors.

Part No	Tape Size
OTC-01	25 x 3 mm
OTC-02	30 x 6 mm
OTC-03	40 x 4 mm
OTC-04	50 x 6 mm

Bi Metallic Connectors:

BI metallic Connectors are used to join either aluminum & copper tapes or aluminum & copper conductors without affecting the conductivity.

Part No	Tape Size / conductor Size
BMT01	25 x 3 mm
BMC01	8 mm

Square Tape Clamp:

Clamps are supplied with countersunk screws, Additional screws are required for fixing the bases for all square clamps.

Part No.	Conductor	Conductor material
CSTT02	25 x 3 mm	Copper
CSTT03	25 x 6 mm	Copper
CSTT09	50 x 6 mm	Copper

Complies with IEC 62561, UL 467

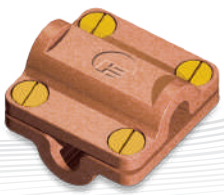
Tape to Conductor Square Clamp:

These clamps are suitable for making connection between copper tapes and copper conductors.

Part No.	Conductor size	Conductor material
CSTC01	25 x 3 mm to 50 mm2	Copper
CSTC02	25 x 3 mm to 70 mm2	Copper
CSTC03	25 x 3 mm to 95 mm2	Copper
CSTC04	25 x 3 mm to 120 mm2	Copper
CSTC05	25 x 3 mm to 150 mm2	Copper

Cable to Cable Square Clamp:

Part No.	Conductor size	Conductor material
CSCC01	50 mm2	Copper
CSCC02	70 mm2	Copper
CSCC03	95 mm2	Copper
CSCC04	120 mm2	Copper
CSCC05	150 mm2	Copper



Note: Tinned item product codes ending with "T"

Inter Face Test Clamp:

These clamps provide the connection between copper tapes and copper conductors in the lightning protection system.

Part No	Tape Size	Conductor Size
CITC01	25x3 mm	8 sq mm
CITC02	25x3 mm	10 sq mm
CITC03	25x3 mm	16 sq mm

Conductor Test Clamp:

These clamps are serves as a test clamp for the copper cable down conductors in the lightning Protection System.

Part No	Conductor Size
CCTC01	50 sq mm
CCTC02	70 sq mm
CCTC03	95 sq mm

Universal Cable Clamp:

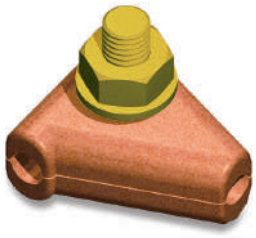
These clamps are serves as a Cable connector and Test clamp as per below range in Lightning Protection System

Part No	Conductor Size
UC050	50 sq mm
UC070	70 sq mm
UC095	95 sq mm
UC120	120 sq mm
UC150	150 sq mm

Cable to Cable T Clamp:

These clamps will provide T shape connection between below range of cables

Part No.	Conductor size	Conductor material
CICC01	50 mm2	Copper
CICC02	70 mm2	Copper
CICC03	95 mm2	Copper
CICC04	120 mm2	Copper
CICC05	150 mm2	Copper



Denso Tape:

A tape used for wrapping to obtain waterproof property in joints.

Part No	Tape Size
TD005	50mm x 10 m


BAHRAWELD

BahraWeld

BahraWeld is an exothermic welding system that does not require an external source for heating. Exothermic welding is preferred where highly conductive, strong connections are required, these connections are permanent and do not loosen over time and withstands under repeated fault conditions.

Major three parts that comprise this welding system are

Molds

Molds are made from optimum density graphite that lasts for 50 to 80 welds. The density of graphite and design of mold is selected based on various factors,

- Life of molds to withstand repetitive opening, closing, firing and cleaning cycles for 50-80 connections. (Higher the density of graphite, higher is the life)

- Time for weld/dissipation. (Lower the density of graphite, faster is the heat dissipation)

- Type of connection, size and complexity of connections, etc.,

In addition to the standard molds listed in this catalog, BahraWELD offers a wide range of customized molds for power stations, railways and other unique applications.

Weld Metal

Weld metals are available in the form of powders and tablets. Weld metals are made from copper and aluminium oxides. The content of metal varies based on the size and type of the joint required. Ignition/ Starting powder is an explosive which initiates the combustion process of weld metal.

Tools

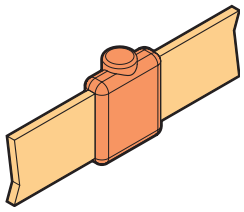
- PPEs such as gloves, goggles are mandatory for the BahraWELD process.

- Handle clamps are required for opening & closing and to hold the graphite molds during the welding process.

- Flint guns or electronic ignition tools are required for initiating the welding process.

- Scraper, Brush and other cleaning tools are needed to clean the molds, conductors and joints.

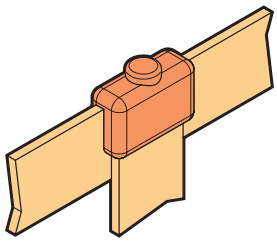
Bar to Bar BB1



A mm x mm	Weld Metal	Mold	Handle
20 x 3	45W10	BB1-M4-203	HK4
25 x 3	65W10	BB1-M4-253	HK4
25 x 4	90W10	BB1-M4-254	HK4
25 x 6	150W10	BB1-M4-256	HK4
30 x 2	65W10	BB1-M4-302	HK4
30 x 3	90W10	BB1-M4-303	HK4
30 x 4	115W10	BB1-M4-304	HK4
30 x 5	115W10	BB1-M4-305	HK4
31 x 3	90W10	BB1-M4-313	HK4
31 x 6	150W10	BB1-M4-316	HK4
38 x 3	115W10	BB1-M4-383	HK4
38 x 5	150W10	BB1-M4-385	HK4
38 x 6	200W10	BB1-M4-386	HK4
40 x 3	115W10	BB1-M4-403	HK4
40 x 4	150W10	BB1-M4-404	HK4
40 x 5	150W10	BB1-M4-405	HK4
40 x 6	200W10	BB1-M4-406	HK4
50 x 3	150W10	BB1-M4-503	HK4
50 x 4	200W10	BB1-M4-504	HK4
50 x 5	200W10	BB1-M4-505	HK4
50 x 6	250W10	BB1-M4-506	HK4

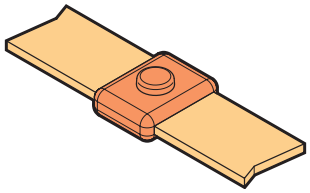
Bar to Bar BB3

A mm x mm	B mm x mm	Weld Metal	Mold	Handle
20 x 3	20 x 3	65W10	BB3-M4-203203	HK4
25 x 3	25 x 3	65W10	BB3-M4-253253	HK4
25 x 4	25 x 4	90W10	BB3-M4-254254	HK4
25 x 6	25 x 6	150W10	BB3-M4-256256	HK4
30 x 2	30 x 2	65W10	BB3-M4-302302	HK4
30 x 3	30 x 3	90W10	BB3-M4-303303	HK4
30 x 4	30 x 4	115W10	BB3-M4-304304	HK4
30 x 5	30 x 5	115W10	BB3-M4-305305	HK4
31 x 3	31 x 3	115W10	BB3-M4-313313	HK4
31 x 6	31 x 6	200W10	BB3-M4-316316	HK4
38 x 3	38 x 3	115W10	BB3-M4-383383	HK4
38 x 5	38 x 5	150W10	BB3-M4-385385	HK4
38 x 6	38 x 6	200W10	BB3-M4-386386	HK4
40 x 3	40 x 3	115W10	BB3-M4-403403	HK4
40 x 4	40 x 4	150W10	BB3-M4-404404	HK4
40 x 5	40 x 5	150W10	BB3-M4-405405	HK4
40 x 6	40 x 6	200W10	BB3-M4-406406	HK4
50 x 3	50 x 3	200W10	BB3-M4-503503	HK4
50 x 4	50 x 4	200W10	BB3-M4-504504	HK4
50 x 5	50 x 5	200W10	BB3-M4-505505	HK4
50 x 6	50 x 6	250W10	BB3-M4-506506	HK4

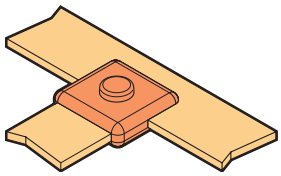


Bar to Bar BB7

A mm x mm	Weld Metal	Mold	Handle
20 x 3	45W10	BB7-M4-203	HK4
25 x 3	65W10	BB7-M4-253	HK4
25 x 4	90W10	BB7-M4-254	HK4
25 x 6	150W10	BB7-M4-256	HK4
30 x 2	65W10	BB7-M4-302	HK4
30 x 3	65W10	BB7-M4-303	HK4
30 x 4	90W10	BB7-M4-304	HK4
30 x 5	115W10	BB7-M4-305	HK4
31 x 3	65W10	BB7-M4-313	HK4
31 x 6	150W10	BB7-M4-316	HK4
38 x 3	90W10	BB7-M4-383	HK4
38 x 5	150W10	BB7-M4-385	HK4
38 x 6	200W10	BB7-M4-386	HK4
40 x 3	90W10	BB7-M4-403	HK4
40 x 4	115W10	BB7-M4-404	HK4
40 x 5	150W10	BB7-M4-405	HK4
40 x 6	200W10	BB7-M4-406	HK4
50 x 3	150W10	BB7-M5-503	HK5
50 x 4	200W10	BB7-M5-504	HK5
50 x 5	200W10	BB7-M5-505	HK5
50 x 6	250W10	BB7-M5-506	HK5



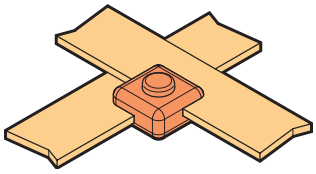
Bar to Bar BB14



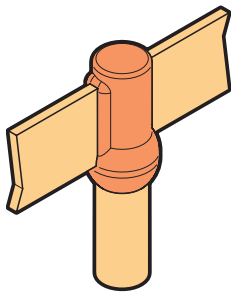
A mm x mm	B mm x mm	Weld Metal	Mold	Handle
20 x 3	20 x 3	45W10	BB14-M4-203203	HK4
25 x 3	25 x 3	65W10	BB14-M4-253253	HK4
25 x 4	25 x 4	90W10	BB14-M4-254254	HK4
25 x 6	25 x 6	115W10	BB14-M4-256256	HK4
30 x 2	30 x 2	65W10	BB14-M4-302302	HK4
30 x 3	30 x 3	65W10	BB14-M4-303303	HK4
30 x 4	30 x 4	90W10	BB14-M4-304304	HK4
30 x 5	30 x 5	115W10	BB14-M4-305305	HK4
31 x 3	31 x 3	90W10	BB14-M4-313313	HK4
31 x 6	31 x 6	150W10	BB14-M4-316316	HK4
38 x 3	38 x 3	90W10	BB14-M4-383383	HK4
38 x 5	38 x 5	150W10	BB14-M4-385385	HK4
38 x 6	38 x 6	200W10	BB14-M4-386386	HK4
40 x 3	40 x 3	90W10	BB14-M4-403403	HK4
40 x 4	40 x 4	115W10	BB14-M4-404404	HK4
40 x 5	40 x 5	150W10	BB14-M4-405405	HK4
40 x 6	40 x 6	200W10	BB14-M4-406406	HK4
50 x 3	50 x 3	150W10	BB14-M5-503503	HK5
50 x 4	50 x 4	200W10	BB14-M5-504504	HK5
50 x 5	50 x 5	200W10	BB14-M5-505505	HK5
50 x 6	50 x 6	250W10	BB14-M5-506506	HK5

Bar to Bar BB41

A mm x mm	B mm x mm	Weld Metal	Mold	Handle
20 x 3	20 x 3	65W10	BB41-M4-203203	HK4
25 x 3	25 x 3	65W10	BB41-M4-253253	HK4
25 x 4	25 x 4	90W10	BB41-M4-254254	HK4
25 x 6	25 x 6	115W10	BB41-M4-256256	HK4
30 x 2	30 x 2	65W10	BB41-M4-302302	HK4
30 x 3	30 x 3	115W10	BB41-M4-303303	HK4
30 x 4	30 x 4	115W10	BB41-M4-304304	HK4
30 x 5	30 x 5	115W10	BB41-M4-305305	HK4
31 x 3	31 x 3	115W10	BB41-M4-313313	HK4
31 x 6	31 x 6	115W10	BB41-M4-316316	HK4
38 x 3	38 x 3	150W10	BB41-M4-383383	HK4
38 x 5	38 x 5	150W10	BB41-M4-385385	HK4
38 x 6	38 x 6	200W10	BB41-M4-386386	HK4
40 x 3	40 x 3	200W10	BB41-M4-403403	HK4
40 x 4	40 x 4	200W10	BB41-M4-404404	HK4
40 x 5	40 x 5	200W10	BB41-M4-405405	HK4
40 x 6	40 x 6	200W10	BB41-M4-406406	HK4
50 x 3	50 x 3	200W10	BB41-M5-503503	HK5
50 x 4	50 x 4	200W10	BB41-M5-504504	HK5
50 x 5	50 x 5	200W10	BB41-M5-505505	HK5
50 x 6	50 x 6	200W10	BB41-M5-506506	HK5



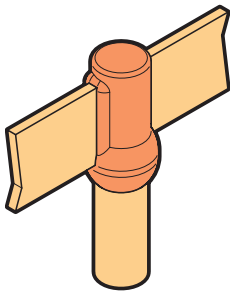
Bar to Earth Rod BR2 - Part1



A mm Ø	B inches Ø	C mm x mm	Weld Metal	Mold	Handle
12.7	1/2"	20 x 3	90W10	BR2-M4-127203	HK4
12.7	1/2"	25 x 3	90W10	BR2-M4-127253	HK4
12.7	1/2"	25 x 4	90W10	BR2-M4-127254	HK4
12.7	1/2"	30 x 2	90W10	BR2-M4-127302	HK4
12.7	1/2"	30 x 3	90W10	BR2-M4-127303	HK4
12.7	1/2"	31 x 3	90W10	BR2-M4-127313	HK4
12.7	1/2"	38 x 3	90W10	BR2-M4-127383	HK4
12.7	1/2"	40 x 3	90W10	BR2-M4-127403	HK4
12.7	1/2"	50 x 3	115W10	BR2-M4-127503	HK4
14.2	5/8"	20 x 3	90W10	BR2-M4-142203	HK4
14.2	5/8"	25 x 3	90W10	BR2-M4-142253	HK4
14.2	5/8"	25 x 4	115W10	BR2-M4-142254	HK4
14.2	5/8"	25 x 6	150W10	BR2-M4-142256	HK4
14.2	5/8"	30 x 2	90W10	BR2-M4-142302	HK4
14.2	5/8"	30 x 3	115W10	BR2-M4-142303	HK4
14.2	5/8"	30 x 4	150W10	BR2-M4-142304	HK4
14.2	5/8"	30 x 5	150W10	BR2-M4-142305	HK4
14.2	5/8"	31 x 3	115W10	BR2-M4-142313	HK4
14.2	5/8"	31 x 6	150W10	BR2-M4-142316	HK4
14.2	5/8"	38 x 3	150W10	BR2-M4-142383	HK4
14.2	5/8"	38 x 5	150W10	BR2-M4-142385	HK4
14.2	5/8"	38 x 6	200W10	BR2-M4-142386	HK4
14.2	5/8"	40 x 3	150W10	BR2-M4-142403	HK4
14.2	5/8"	40 x 4	150W10	BR2-M4-142404	HK4
14.2	5/8"	40 x 5	150W10	BR2-M4-142405	HK4
14.2	5/8"	40 x 6	200W10	BR2-M4-142406	HK4
14.2	5/8"	50 x 3	200W10	BR2-M4-142503	HK4
14.2	5/8"	50 x 4	200W10	BR2-M4-142504	HK4
14.2	5/8"	50 x 5	200W10	BR2-M4-142505	HK4
14.2	5/8"	50 x 6	250W10	BR2-M4-142506	HK4
17.2	3/4"	20 x 3	150W10	BR2-M4-172203	HK4
17.2	3/4"	25 x 3	150W10	BR2-M4-172253	HK4
17.2	3/4"	25 x 4	200W10	BR2-M4-172254	HK4
17.2	3/4"	25 x 6	200W10	BR2-M4-172256	HK4
17.2	3/4"	30 x 2	150W10	BR2-M4-172302	HK4
17.2	3/4"	30 x 3	150W10	BR2-M4-172303	HK4

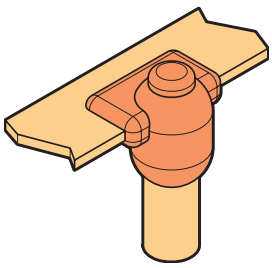
Bar to Earth Rod BR2 - Part2

A mm Ø	B inches Ø	C mm x mm	Weld Metal	Mold	Handle
17.2	3/4"	30 x 4	250W10	BR2-M4-172304	HK4
17.2	3/4"	30 x 5	200W10	BR2-M4-172305	HK4
17.2	3/4"	31 x 3	200W10	BR2-M4-172313	HK4
17.2	3/4"	31 x 6	250W10	BR2-M4-172316	HK4
17.2	3/4"	38 x 3	200W10	BR2-M4-172383	HK4
17.2	3/4"	38 x 5	200W10	BR2-M4-172385	HK4
17.2	3/4"	38 x 6	250W10	BR2-M4-172386	HK4
17.2	3/4"	40 x 3	200W10	BR2-M4-172403	HK4
17.2	3/4"	40 x 4	200W10	BR2-M4-172404	HK4
17.2	3/4"	40 x 5	200W10	BR2-M4-172405	HK4
17.2	3/4"	40 x 6	250W10	BR2-M4-172406	HK4
17.2	3/4"	50 x 3	2 x 150W10	BR2-M5-172503	HK5
17.2	3/4"	50 x 4	2 x 150W10	BR2-M5-172504	HK5
17.2	3/4"	50 x 5	2 x 150W10	BR2-M5-172505	HK5
17.2	3/4"	50 x 6	2 x 150W10	BR2-M5-172506	HK5



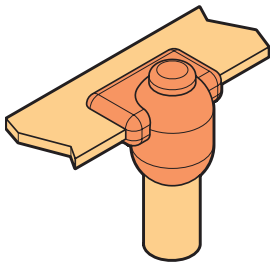
Bar to Earth Rod BR7 - Part1

A mm Ø	B inches Ø	C mm x mm	Weld Metal	Mold	Handle
12.7	1/2"	20 x 3	90W10	BR7-M4-127203	HK4
12.7	1/2"	25 x 3	90W10	BR7-M4-127253	HK4
12.7	1/2"	25 x 4	90W10	BR7-M4-127254	HK4
12.7	1/2"	30 x 2	90W10	BR7-M4-127302	HK4
12.7	1/2"	30 x 3	90W10	BR7-M4-127303	HK4
12.7	1/2"	31 x 3	90W10	BR7-M4-127313	HK4
12.7	1/2"	38 x 3	90W10	BR7-M4-127383	HK4
12.7	1/2"	40 x 3	90W10	BR7-M4-127403	HK4
12.7	1/2"	50 x 3	115W10	BR7-M4-127503	HK4
12.7	1/2"	50 x 6	115W10	BR7-M4-127503	HK4
14.2	5/8"	20 x 3	90W10	BR7-M4-142203	HK4
14.2	5/8"	25 x 3	90W10	BR7-M4-142253	HK4
14.2	5/8"	25 x 4	115W10	BR7-M4-142254	HK4
14.2	5/8"	25 x 6	115W10	BR7-M4-142256	HK4
14.2	5/8"	30 x 2	115W10	BR7-M4-142302	HK4



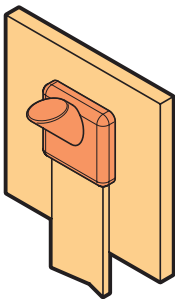
Bar to Earth Rod BR7 - Part2

A mm Ø	B inches Ø	C mm x mm	Weld Metal	Mold	Handle
14.2	5/8"	30 x 3	115W10	BR7-M4-142303	HK4
14.2	5/8"	30 x 4	150W10	BR7-M4-142304	HK4
14.2	5/8"	30 x 5	150W10	BR7-M4-142305	HK4
14.2	5/8"	31 x 3	115W10	BR7-M4-142313	HK4
14.2	5/8"	31 x 6	150W10	BR7-M4-142316	HK4
14.2	5/8"	38 x 3	1115W10	BR7-M4-142383	HK4
14.2	5/8"	38 x 5	150W10	BR7-M4-142385	HK4
14.2	5/8"	38 x 6	200W10	BR7-M4-142386	HK4
14.2	5/8"	40 x 3	115W10	BR7-M4-142403	HK4
14.2	5/8"	40 x 4	150W10	BR7-M4-142404	HK4
14.2	5/8"	40 x 5	150W10	BR7-M4-142405	HK4
14.2	5/8"	40 x 6	200W10	BR7-M4-142406	HK4
14.2	5/8"	50 x 3	150W10	BR7-M4-142503	HK4
14.2	5/8"	50 x 4	200W10	BR7-M4-142504	HK4
14.2	5/8"	50 x 5	200W10	BR7-M4-142505	HK4
14.2	5/8"	50 x 6	200W10	BR7-M4-142506	HK4
17.2	3/4"	20 x 3	115W10	BR7-M4-172203	HK4
17.2	3/4"	25 x 3	150W10	BR7-M4-172253	HK4
17.2	3/4"	25 x 4	150W10	BR7-M4-172254	HK4
17.2	3/4"	25 x 6	200W10	BR7-M4-172256	HK4
17.2	3/4"	30 x 2	150W10	BR7-M4-172302	HK4
17.2	3/4"	30 x 3	150W10	BR7-M4-172303	HK4
17.2	3/4"	30 x 4	250W10	BR7-M4-172304	HK4
17.2	3/4"	30 x 5	200W10	BR7-M4-172305	HK4
17.2	3/4"	31 x 3	200W10	BR7-M4-172313	HK4
17.2	3/4"	31 x 6	200W10	BR7-M4-172316	HK4
17.2	3/4"	38 x 3	200W10	BR7-M4-172383	HK4
17.2	3/4"	38 x 5	200W10	BR7-M4-172385	HK4
17.2	3/4"	38 x 6	250W10	BR7-M4-172386	HK4
17.2	3/4"	40 x 3	200W10	BR7-M4-172403	HK4
17.2	3/4"	40 x 4	200W10	BR7-M4-172404	HK4
17.2	3/4"	40 x 5	200W10	BR7-M4-172405	HK4
17.2	3/4"	40 x 6	250W10	BR7-M4-172406	HK4
17.2	3/4"	50 x 3	250W10	BR7-M4-172503	HK5
17.2	3/4"	50 x 4	250W10	BR7-M4-172504	HK5
17.2	3/4"	50 x 5	2 x 150W10	BR7-M4-172505	HK5
17.2	3/4"	50 x 6	2 x 150W10	BR7-M4-172506	HK5



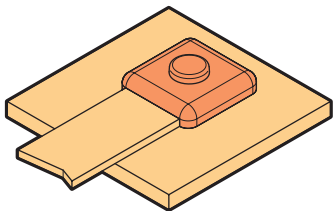
Bar to Steel Surface BS1

A mm x mm	Weld Metal	Mold	Handle
20 x 3	65W10	BS1-M4-203	HK4
25 x 3	90W10	BS1-M4-253	HK4
25 x 4	90W10	BS1-M4-254	HK4
25 x 6	150W10	BS1-M4-256	HK4
30 x 2	90W10	BS1-M4-302	HK4
30 x 3	90W10	BS1-M4-303	HK4
30 x 4	115W10	BS1-M4-304	HK4
30 x 5	150W10	BS1-M4-305	HK4
31 x 3	90W10	BS1-M4-313	HK4
31 x 6	200W10	BS1-M4-316	HK4
38 x 3	150W10	BS1-M4-383	HK4
38 x 5	200W10	BS1-M4-385	HK4
38 x 6	250W10	BS1-M4-386	HK4
40 x 3	150W10	BS1-M4-403	HK4
40 x 4	200W10	BS1-M4-404	HK4
40 x 5	200W10	BS1-M4-405	HK4
40 x 6	250W10	BS1-M4-406	HK4
50 x 3	200W10	BS1-M4-503	HK4
50 x 4	250W10	BS1-M4-504	HK4
50 x 5	250W10	BS1-M4-505	HK4
50 x 6	2 x 150W10	BS1-M5-506	HK5



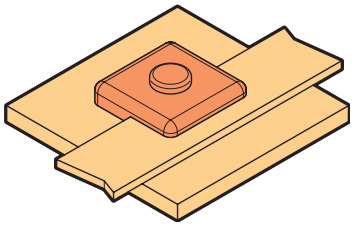
Bar to Steel Surface BS2

A mm x mm	Weld Metal	Mold	Handle
20 x 3	90W10	BS2-M4-203	HK4
25 x 3	90W10	BS2-M4-253	HK4
25 x 4	90W10	BS2-M4-254	HK4
25 x 6	150W10	BS2-M4-256	HK4
30 x 2	115W10	BS2-M4-302	HK4
30 x 3	115W10	BS2-M4-303	HK4
30 x 4	150W10	BS2-M4-304	HK4
30 x 5	200W10	BS2-M4-305	HK4
31 x 3	115W10	BS2-M4-313	HK4
31 x 6	200W10	BS2-M4-316	HK4
38 x 3	150W10	BS2-M4-383	HK4
38 x 5	200W10	BS2-M4-385	HK4
38 x 6	200W10	BS2-M4-386	HK4
40 x 3	115W10	BS2-M4-403	HK4
40 x 4	200W10	BS2-M4-404	HK4
40 x 5	200W10	BS2-M4-405	HK4
40 x 6	250W10	BS2-M4-406	HK4
50 x 3	200W10	BS2-M4-503	HK4
50 x 4	2 x 150W10	BS2-M5-504	HK5
50 x 5	2 x 150W10	BS2-M5-505	HK5
50 x 6	2 x 150W10	BS2-M5-506	HK5

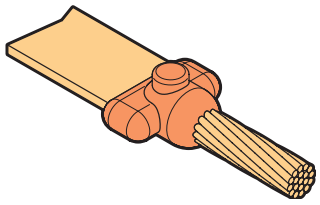


Bar to Steel Surface BS3

A mm x mm	Weld Metal	Mold	Handle
20 x 3	65W10	BS1-M4-203	HK4
25 x 3	90W10	BS3-M4-253	HK4
25 x 4	115W10	BS3-M4-254	HK4
25 x 6	115W10	BS3-M4-256	HK4
30 x 2	150W10	BS3-M4-302	HK4
30 x 3	115W10	BS3-M4-303	HK4
30 x 4	115W10	BS3-M4-304	HK4
30 x 5	150W10	BS3-M4-305	HK4
31 x 3	115W10	BS3-M4-313	HK4
31 x 6	200W10	BS3-M4-316	HK4
38 x 3	150W10	BS3-M4-383	HK4
38 x 5	200W10	BS3-M4-385	HK4
38 x 6	250W10	BS3-M4-386	HK4
40 x 3	150W10	BS3-M4-403	HK4
40 x 4	200W10	BS3-M4-404	HK4
40 x 5	250W10	BS3-M4-405	HK4
40 x 6	250W10	BS3-M4-406	HK4
50 x 3	250W10	BS3-M4-503	HK4
50 x 4	250W10	BS3-M4-504	HK4
50 x 5	250W10	BS3-M4-505	HK4
50 x 6	250W10	BS3-M4-506	HK4



Cable to Bar CB1

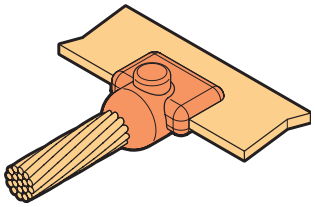


A mm2	B mm x mm	Weld Metal	Mold	Handle
16*	20 x 3	45W10	CB1-M4-16203	HK4
16*	25 x 3	45W10	CB1-M4-16253	HK4
25	20 x 3	32W10	CB1-M4-25203	HK4
25	25 x 3	45W10	CB1-M4-25253	HK4
35	20 x 3	45W10	CB1-M4-35203	HK4
35	25 x 3	45W10	CB1-M4-35253	HK4
50	20 x 3	45W10	CB1-M4-50203	HK4
50	25 x 3	65W10	CB1-M4-50253	HK4
8 mm Ø	20 x 3	45W10	CB1-M4-8SC203	HK4
8 mm Ø	25 x 3	65W10	CB1-M4-8SC253	HK4
70	25 x 3	65W10	CB1-M4-70253	HK4
70	25 x 4	65W10	CB1-M4-70254	HK4
70	25 x 6	65W10	CB1-M4-70256	HK4
10 mm Ø	25 x 3	65W10	CB1-M4-10SC253	HK4
10 mm Ø	25 x 4	65W10	CB1-M4-10SC254	HK4
10 mm Ø	25 x 6	65W10	CB1-M4-10SC256	HK4
95	25 x 4	90W10	CB1-M4-95253	HK4
95	25 x 3	90W10	CB1-M4-95256	HK4
120	25 x 3	90W10	CB1-M4-120253	HK4
120	30 x 5	115W10	CB1-M4-120305	HK4
150	25 x 3	115W10	CB1-M4-150253	HK4
150	30 x 5	115W10	CB1-M4-150305	HK4
150	40 x 5	150W10	CB1-M4-150405	HK4
185	31 x 6	150W10	CB1-M4-185316	HK4
185	40 x 5	150W10	CB1-M4-185405	HK4
185	50 x 5	200W10	CB1-M5-240505	HK5
240	50 x 5	200W10	CB1-M5-240505	HK5
240	50 x 6	2 x 150W10	CB1-M5-240506	HK5
300	50 x 6	2 x 150W10	CB1-M5-300506	HK5

*-1 x S103

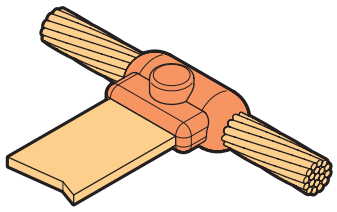
Cable to Bar CB4

A mm2	B mm x mm	Weld Metal	Mold	Handle
16*	20 x 3	45W10	CB4-M4-16203	HK4
16*	25 x 3	45W10	CB4-M4-16253	HK4
25	20 x 3	45W10	CB4-M4-25203	HK4
25	25 x 3	45W10	CB4-M4-25253	HK4
35	20 x 3	45W10	CB4-M4-35203	HK4
35	25 x 3	45W10	CB4-M4-35253	HK4
50	20 x 3	45W10	CB4-M4-50203	HK4
50	25 x 3	45W10	CB4-M4-50253	HK4
8 mm Ø	20 x 3	45W10	CB4-M4-8SC203	HK4
8 mm Ø	25 x 3	45W10	CB4-M4-8SC253	HK4
70	25 x 3	65W10	CB4-M4-70253	HK4
70	25 x 4	65W10	CB4-M4-70254	HK4
70	25 x 6	90W10	CB4-M4-70256	HK4
10 mm Ø	25 x 3	65W10	CB4-M4-10SC253	HK4
10 mm Ø	25 x 4	65W10	CB4-M4-10SC254	HK4
10 mm Ø	25 x 6	90W10	CB4-M4-10SC256	HK4
95	25 x 4	90W10	CB4-M4-95254	HK4
95	25 x 6	115W10	CB4-M4-95256	HK4
120	25 x 6	115W10	CB4-M4-120256	HK4
120	30 x 5	115W10	CB4-M4-120305	HK4
150	25 x 6	115W10	CB4-M4-150256	HK4
150	30 x 5	115W10	CB4-M4-150305	HK4
150	40 x 5	115W10	CB4-M4-150405	HK4
185	31 x 6	150W10	CB4-M4-185316	HK4
185	40 x 5	150W10	CB4-M4-185405	HK4
185	50 x 5	150W10	CB4-M4-240505	HK4
240	50 x 5	200W10	CB4-M4-240505	HK4
240	50 x 6	250W10	CB4-M4-240506	HK4
300	50 x 6	2 x 150W10	CB4-M5-300506	HK5



Cable to Bar CB5

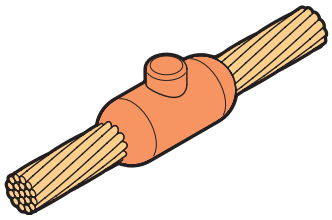
A mm2	B mm x mm	Weld Metal	Mold	Handle
16*	20 x 3	45W10	CB5-M4-16203	HK4
16*	25 x 3	65W10	CB5-M4-16253	HK4
25	20 x 3	45W10	CB5-M4-25203	HK4
25	25 x 3	65W10	CB5-M4-25253	HK4
35	20 x 3	45W10	CB5-M4-35203	HK4
35	25 x 3	65W10	CB5-M4-35253	HK4
50	20 x 3	65W10	CB5-M4-50203	HK4
50	25 x 3	65W10	CB5-M4-50253	HK4
8 mm Ø	20 x 3	65W10	CB5-M4-8SC203	HK4
8 mm Ø	25 x 3	65W10	CB5-M4-8SC253	HK4
70	25 x 3	90W10	CB5-M4-70253	HK4
70	25 x 4	115W10	CB5-M4-70254	HK4
70	25 x 6	115W10	CB5-M4-70256	HK4
10 mm Ø	25 x 3	115W10	CB5-M4-10SC253	HK4
10 mm Ø	25 x 4	115W10	CB5-M4-10SC254	HK4
10 mm Ø	25 x 6	150W10	CB5-M4-10SC256	HK4
95	25 x 4	150W10	CB5-M4-95254	HK4
95	25 x 6	150W10	CB5-M4-95256	HK4
120	25 x 6	150W10	CB5-M4-120256	HK4
120	30 x 5	200W10	CB5-M4-120305	HK4
150	25 x 6	200W10	CB5-M4-150256	HK4
150	30 x 5	200W10	CB5-M4-150305	HK4
150	40 x 5	250W10	CB5-M4-150405	HK4
185	31 x 6	250W10	CB5-M4-185316	HK4
185	40 x 5	250W10	CB5-M4-185405	HK4
185	50 x 5	2 x 150W10	CB5-M5-240505	HK5
240	50 x 5	2 x 150W10	CB5-M5-240505	HK5
240	50 x 6	2 X 200W10	CB5-M5-240506	HK5
300	50 x 6	2 x 250W10	CB5-M5-300506	HK5



*-2 x S103

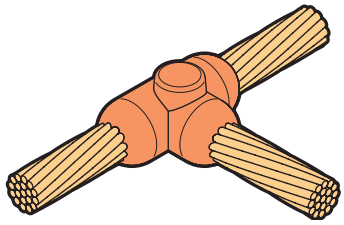
Cable to Cable CC1

A mm 2	Weld Metal	Mold	Handle
16*	32W10	CC1-M4-16	HK4
25	32W10	CC1-M4-25	HK4
35	32W10	CC1-M4-35	HK4
50	45W10	CC1-M4-50	HK4
8 mm Ø	45W10	CC1-M4-85C	HK4
70	65W10	CC1-M4-70	HK4
10 mm Ø	65W10	CC1-M4-10SC	HK4
95	90W10	CC1-M4-95	HK4
120	115W10	CC1-M4-120	HK4
150	115W10	CC1-M4-150	HK4
185	150W10	CC1-M4-185	HK4
240	200W10	CC1-M4-240	HK4
300	250W10	CC1-M4-300	HK4
400	2 x 150W10	CC1-M5-400	HK5



*-2 x S103

Cable to Cable CC2

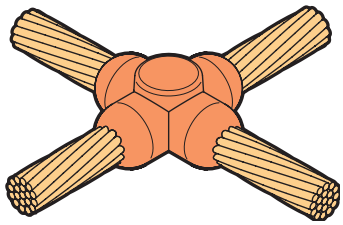


A mm 2	B mm 2	Weld Metal	Mold	Handle
16*	16*	45W10	CC2-M4-1616	HK4
25	25	45W10	CC2-M4-2525	HK4
35	35	45W10	CC2-M4-3535	HK4
35	25	45W10	CC2-M4-3525	HK4
8 mm Ø	8 mm Ø	65W10	CC2-M4-88SC	HK4
50	50	90W10	CC2-M4-5050	HK4
50	35	65W10	CC2-M4-5035	HK4
50	25	65W10	CC2-M4-5025	HK4
10 mm Ø	10 mm Ø	90W10	CC2-M4-1010SC	HK4
70	70	90W10	CC2-M4-7070	HK4
70	50	90W10	CC2-M4-7050	HK4
70	35	65W10	CC2-M4-7535	HK4
70	25	65W10	CC2-M4-7025	HK4
95	95	115W10	CC2-M4-9595	HK4
95	70	90W10	CC2-M4-9570	HK4
95	50	90W10	CC2-M4-9550	HK4
95	35	90W10	CC2-M4-9535	HK4
120	120	150W10	CC2-M4-120120	HK4
120	95	150W10	CC2-M4-12095	HK4
120	70	90W10	CC2-M4-12070	HK4
120	50	90W10	CC2-M4-12050	HK4
150	150	200W10	CC2-M4-150150	HK4
150	120	150W10	CC2-M4-150120	HK4
150	95	150W10	CC2-M4-15095	HK4
150	70	90W10	CC2-M4-15070	HK4
185	185	200W10	CC2-M4-185185	HK4
185	150	200W10	CC2-M4-185150	HK4
185	120	200W10	CC2-M4-185120	HK4
185	95	150W10	CC2-M4-18595	HK4
240	240	2 x 150W10	CC2-M4-240240	HK4
240	185	200W10	CC2-M4-240185	HK4
240	150	200W10	CC2-M4-240150	HK4
240	120	200W10	CC2-M4-240120	HK4
300	300	2 x 200W10	CC2-M5-300300	HK5
300	240	2 x 200W10	CC2-M5-300240	HK5
300	185	250W10	CC2-M4-300185	HK4

*-3 x S103

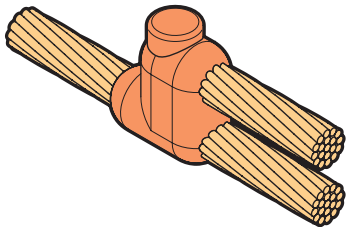
Cable to Cable CC4

A mm 2	B mm 2	Weld Metal	Mold	Handle
16*	16*	65W10	CC4-M4-1616	HK4
25	25	45W10	CC4-M4-2525	HK4
35	35	65W10	CC4-M4-3535	HK4
35	25	65W10	CC4-M4-3525	HK4
8 mm Ø	8 mm Ø	90W10	CC4-M4-88SC	HK4
50	50	90W10	CC4-M4-5050	HK4
50	35	90W10	CC4-M4-5035	HK4
50	25	90W10	CC4-M4-5025	HK4
10 mm Ø	10 mm Ø	115W10	CC4-M4-1010SC	HK4
70	70	115W10	CC4-M4-7070	HK4
70	50	115W10	CC4-M4-7050	HK4
70	35	115W10	CC4-M4-7535	HK4
70	25	115W10	CC4-M4-7025	HK4
95	95	150W10	CC4-M4-9595	HK4
95	70	150W10	CC4-M4-9570	HK4
95	50	115W10	CC4-M4-9550	HK4
95	35	115W10	CC4-M4-9535	HK4
120	120	200W10	CC4-M4-120120	HK4
120	95	200W10	CC4-M4-12095	HK4
120	70	150W10	CC4-M4-12070	HK4
120	50	150W10	CC4-M4-12050	HK4
150	150	250W10	CC4-M4-150150	HK4
150	120	250W10	CC4-M4-150120	HK4
150	95	200W10	CC4-M4-15095	HK4
150	70	150W10	CC4-M4-15070	HK4
185	185	2 x 150W10	CC4-M4-185185	HK4
185	150	250W10	CC4-M4-185150	HK4
185	120	250W10	CC4-M4-185120	HK4
185	95	200W10	CC4-M4-18595	HK4
185	70	200W10	CC4-M4-18570	HK4
240	240	2 x 250W10	CC4-M5-240240	HK5
240	185	2 x 200W10	CC4-M5-240185	HK5
240	150	2 x 200W10	CC4-M5-240150	HK5
240	120	2 x 150W10	CC4-M5-240120	HK5



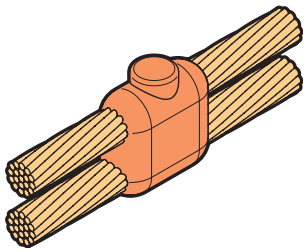
Cable to Cable CC6

A mm 2	B mm 2	Weld Metal	Mold	Handle
16*	16*	65W10	CC6-M4-1616	HK4
25	25	45W10	CC6-M4-2525	HK4
35	35	65W10	CC6-M4-3535	HK4
35	25	65W10	CC6-M4-3525	HK4
50	50	90W10	CC6-M4-5050	HK4
50	35	65W10	CC6-M4-5035	HK4
50	25	65W10	CC6-M4-5025	HK4
70	70	115W10	CC6-M4-7070	HK4
70	50	115W10	CC6-M4-7050	HK4
70	35	90W10	CC6-M4-7535	HK4
70	25	90W10	CC6-M4-7025	HK4
95	95	150W10	CC6-M4-9595	HK4
95	70	115W10	CC6-M4-9570	HK4
95	50	115W10	CC6-M4-9550	HK4
95	35	115W10	CC6-M4-9535	HK4
120	120	200W10	CC6-M4-120120	HK4
120	95	200W10	CC6-M4-12095	HK4
120	70	150W10	CC6-M4-12070	HK4
120	50	115W10	CC6-M4-12050	HK4



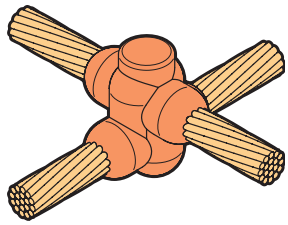
Cable to Cable CC7

A mm 2	B mm 2	Weld Metal	Mold	Handle
16*	16*	65W10	CC7-M4-1616	HK4
25	25	45W10	CC7-M4-2525	HK4
35	35	65W10	CC7-M4-3535	HK4
35	25	65W10	CC7-M4-3525	HK4
8 mm Ø	8 mm Ø	90W10	CC7-M4-88SC	HK4
50	50	90W10	CC7-M4-5050	HK4
50	35	90W10	CC7-M4-5035	HK4
50	25	65W10	CC7-M4-5025	HK4
10 mm Ø	10 mm Ø	115W10	CC7-M4-1010SC	HK4
70	70	115W10	CC7-M4-7070	HK4
70	50	115W10	CC7-M4-7050	HK4
70	35	90W10	CC7-M4-7535	HK4
70	25	90W10	CC7-M4-7025	HK4
95	95	150W10	CC7-M4-9595	HK4
95	70	115W10	CC7-M4-9570	HK4
95	50	115W10	CC7-M4-9550	HK4
95	35	115W10	CC7-M4-9535	HK4
120	120	200W10	CC7-M4-120120	HK4
120	95	200W10	CC7-M4-12095	HK4
120	70	150W10	CC7-M4-12070	HK4
120	50	150W10	CC7-M4-12050	HK4
150	150	2 x 150W10	CC7-M5-150150	HK5
150	120	250W10	CC7-M4-150120	HK4
150	95	200W10	CC7-M4-15095	HK4
150	70	150W10	CC7-M4-15070	HK4
185	185	2 x 150W10	CC7-M5-185185	HK5
185	150	2 x 150W10	CC7-M5-185150	HK5
185	120	250W10	CC7-M4-185120	HK4
185	95	200W10	CC7-M4-18595	HK4
240	240	2 x 200W10	CC7-M5-240240	HK5
240	185	2 x 200W10	CC7-M5-240185	HK5
240	150	2 x 150W10	CC7-M5-240150	HK5
240	120	250W10	CC7-M4-240120	HK4
300	300	2 x 250W10	CC7-M5-300300	HK5
300	240	2 x 250W10	CC7-M5-300240	HK5
300	185	2 x 200W10	CC7-M5-300185	HK5
300	150	2 x 150W10	CC7-M5-300150	HK5



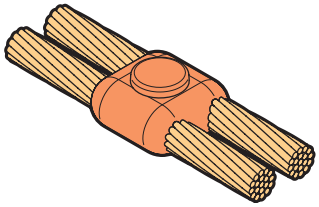
Cable to Cable CC11

A mm 2	B mm 2	Weld Metal	Mold	Handle
50	50	150W10	CC11-M7-5050	HK7
70	70	200W10	CC11-M7-7070	HK7
95	95	250W10	CC11-M7-9595	HK7
120	120	2 x 150W10	CC11-M7-120120	HK7
150	150	2 x 200W10	CC11-M8-150150	HK8
185	185	2 x 250W10	CC11-M8-185185	HK8
240	240	2 x 200W10	CC11-M8-240240	HK8
8 mm Ø	8 mm Ø	150W10	CC11-M7-88SC	HK7
10 mm Ø	10 mm Ø	150W10	CC11-M7-1010SC	HK7



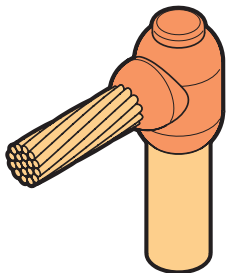
Cable to Cable CC14

A mm 2	B mm 2	Weld Metal	Mold	Handle
16*	16*	65W10	CC14-M4-1616	HK4
25	25	45W10	CC14-M4-2525	HK4
35	35	65W10	CC14-M4-3535	HK4
35	25	65W10	CC14-M4-3525	HK4
8 mm Ø	8 mm Ø	90W10	CC14-M4-88SC	HK4
50	50	90W10	CC14-M4-5050	HK4
50	35	90W10	CC14-M4-5035	HK4
50	25	90W10	CC14-M4-5025	HK4
10 mm Ø	10 mm Ø	115W10	CC14-M4-1010SC	HK4
70	70	115W10	CC14-M4-7070	HK4
70	50	115W10	CC14-M4-7050	HK4
70	35	90W10	CC14-M4-7535	HK4
70	25	90W10	CC14-M4-7025	HK4
95	95	150W10	CC14-M4-9595	HK4
95	70	150W10	CC14-M4-9570	HK4
95	50	150W10	CC14-M4-9550	HK4
95	35	115W10	CC14-M4-9535	HK4
120	120	200W10	CC14-M4-120120	HK4
120	95	200W10	CC14-M4-12095	HK4
120	70	200W10	CC14-M4-12070	HK4
120	50	150W10	CC14-M4-12050	HK4

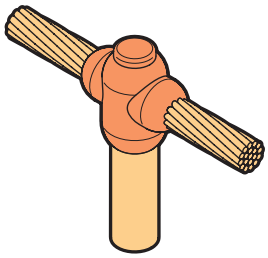


Cable to Earth Rod CR1

A mm Ø	B inches Ø	C mm2	Weld Metal	Mold	Handle
12.7	1/2"	16*	65W10	CR1-M4-12716	HK4
12.7	1/2"	25	65W10	CR1-M4-12725	HK4
12.7	1/2"	35	65W10	CR1-M4-12735	HK4
12.7	1/2"	50	65W10	CR1-M4-12750	HK4
12.7	1/2"	8 mm Ø	65W10	CR1-M4-1278SC	HK4
12.7	1/2"	70	90W10	CR1-M4-12770	HK4
12.7	1/2"	95	90W10	CR1-M4-12795	HK4
12.7	1/2"	120	90W10	CR1-M4-127120	HK4
14.2	5/8"	16*	65W10	CR1-M4-14216	HK4
14.2	5/8"	25	65W10	CR1-M4-14225	HK4
14.2	5/8"	35	65W10	CR1-M4-14235	HK4
14.2	5/8"	50	90W10	CR1-M4-14250	HK4
14.2	5/8"	8 mm Ø	90W10	CR1-M4-1428SC	HK4
14.2	5/8"	70	90W10	CR1-M4-14270	HK4
14.2	5/8"	95	90W10	CR1-M4-14295	HK4
14.2	5/8"	120	90W10	CR1-M4-142120	HK4
14.2	5/8"	150	115W10	CR1-M4-142150	HK4
14.2	5/8"	185	115W10	CR1-M4-142185	HK4
14.2	5/8"	240	150W10	CR1-M4-142240	HK4
17.2	3/4"	16*	65W10	CR1-M4-17216	HK4
17.2	3/4"	25	65W10	CR1-M4-17225	HK4
17.2	3/4"	35	65W10	CR1-M4-17235	HK4
17.2	3/4"	50	90W10	CR1-M4-17250	HK4
17.2	3/4"	8 mm Ø	90W10	CR1-M4-1728SC	HK4
17.2	3/4"	70	90W10	CR1-M4-17270	HK4
17.2	3/4"	95	90W10	CR1-M4-17295	HK4
17.2	3/4"	120	90W10	CR1-M4-172120	HK4
17.2	3/4"	150	115W10	CR1-M4-172150	HK4
17.2	3/4"	185	115W10	CR1-M4-172185	HK4
17.2	3/4"	240	150W10	CR1-M4-172240	HK4
17.2	3/4"	300	200W10	CR1-M4-172300	HK4



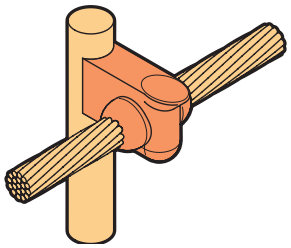
Cable to Earth Rod CR2



A mm Ø	B inches Ø	C mm2	Weld Metal	Mold	Handle
12.7	1/2"	16*	90W10	CR2-M4-12716	HK4
12.7	1/2"	25	90W10	CR2-M4-12725	HK4
12.7	1/2"	35	90W10	CR2-M4-12735	HK4
12.7	1/2"	50	90W10	CR2-M4-12750	HK4
12.7	1/2"	8 mm Ø	90W10	CR2-M4-1278SC	HK4
12.7	1/2"	70	90W10	CR2-M4-12770	HK4
12.7	1/2"	95	115W10	CR2-M4-12795	HK4
12.7	1/2"	120	150W10	CR2-M4-127120	HK4
14.2	5/8"	16*	90W10	CR2-M4-14216	HK4
14.2	5/8"	25	90W10	CR2-M4-14225	HK4
14.2	5/8"	35	90W10	CR2-M4-14235	HK4
14.2	5/8"	50	90W10	CR2-M4-14250	HK4
14.2	5/8"	8 mm Ø	90W10	CR2-M4-1428SC	HK4
14.2	5/8"	70	115W10	CR2-M4-14270	HK4
14.2	5/8"	95	115W10	CR2-M4-14295	HK4
14.2	5/8"	120	150W10	CR2-M4-142120	HK4
14.2	5/8"	150	200W10	CR2-M4-142150	HK4
14.2	5/8"	185	200W10	CR2-M4-142185	HK4
14.2	5/8"	240	250W10	CR2-M4-142240	HK4
17.2	3/4"	16*	90W10	CR2-M4-17216	HK4
17.2	3/4"	25	90W10	CR2-M4-17225	HK4
17.2	3/4"	35	90W10	CR2-M4-17235	HK4
17.2	3/4"	50	115W10	CR2-M4-17250	HK4
17.2	3/4"	8 mm Ø	115W10	CR2-M4-1728SC	HK4
17.2	3/4"	70	115W10	CR2-M4-17270	HK4
17.2	3/4"	95	115W10	CR2-M4-17295	HK4
17.2	3/4"	120	150W10	CR2-M4-172120	HK4
17.2	3/4"	150	200W10	CR2-M4-172150	HK4
17.2	3/4"	185	200W10	CR2-M4-172185	HK4
17.2	3/4"	240	250W10	CR2-M4-172240	HK4
17.2	3/4"	300	2 x 150W10	CR2-M5-172300	HK5

Cable to Earth Rod CR3

A mm Ø	B inches Ø	C mm2	Weld Metal	Mold	Handle
12.7	1/2"	16*	90W10	CR3-M9-12716	HK4
12.7	1/2"	25	90W10	CR3-M9-12725	HK4
12.7	1/2"	35	90W10	CR3-M9-12735	HK4
12.7	1/2"	50	115W10	CR3-M9-12750	HK4
12.7	1/2"	8 mm Ø	115W10	CR3-M9-1278SC	HK4
12.7	1/2"	70	115W10	CR3-M9-12770	HK4
12.7	1/2"	95	115W10	CR3-M9-12795	HK4
12.7	1/2"	120	150W10	CR3-M9-127120	HK4
14.2	5/8"	16*	90W10	CR3-M9-14216	HK4
14.2	5/8"	25	90W10	CR3-M9-14225	HK4
14.2	5/8"	35	90W10	CR3-M9-14235	HK4
14.2	5/8"	50	115W10	CR3-M9-14250	HK4
14.2	5/8"	8 mm Ø	115W10	CR3-M9-1428SC	HK4
14.2	5/8"	70	115W10	CR3-M9-14270	HK4
14.2	5/8"	95	115W10	CR3-M9-14295	HK4
14.2	5/8"	120	150W10	CR3-M9-142120	HK4
14.2	5/8"	150	150W10	CR3-M9-142150	HK4
14.2	5/8"	185	200W10	CR3-M9-142185	HK4
14.2	5/8"	240	2 x 200W10	CR3-M9-142240	HK4
17.2	3/4"	16*	90W10	CR3-M9-17216	HK4
17.2	3/4"	25	90W10	CR3-M9-17225	HK4
17.2	3/4"	35	90W10	CR3-M9-17235	HK4
17.2	3/4"	50	115W10	CR3-M9-17250	HK4
17.2	3/4"	8 mm Ø	115W10	CR3-M9-1728SC	HK4
17.2	3/4"	70	150W10	CR3-M9-17270	HK4
17.2	3/4"	95	150W10	CR3-M9-17295	HK4
17.2	3/4"	120	200W10	CR3-M9-172120	HK4
17.2	3/4"	150	250W10	CR3-M9-172150	HK4
17.2	3/4"	185	2 x 200W10	CR3-M10-172185	HK5
17.2	3/4"	240	2 x 250W10	CR3-M10-172240	HK5
17.2	3/4"	300	3x 300W10	CR3-M10-172300	HK5



*-2 x S103

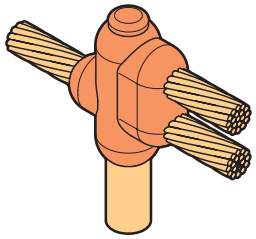
Frame:

Frames come addition into the process to handle clamp while using three mold parts.

Part No	Description
HKF4	Frame for use with Handle Clamp HK4
HKF5	Frame for use with Handle Clamp HK5

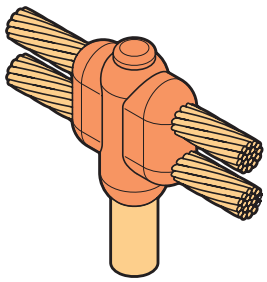
Cable to Earth Rod CR17

A mm Ø	B inches Ø	C mm2	Weld Metal	Mold	Handle
12.7	1/2"	16*	90W10	CR17-M4-12716	HK4
12.7	1/2"	25	90W10	CR17-M4-12725	HK4
12.7	1/2"	35	90W10	CR17-M4-12735	HK4
12.7	1/2"	50	115W10	CR17-M4-12750	HK4
12.7	1/2"	8 mm Ø	115W10	CR17-M4-1278SC	HK4
12.7	1/2"	70	150W10	CR17-M4-12770	HK4
12.7	1/2"	95	200W10	CR17-M4-12795	HK4
12.7	1/2"	120	250W10	CR17-M4-127120	HK4
14.2	5/8"	16*	90W10	CR17-M4-14216	HK4
14.2	5/8"	25	90W10	CR17-M4-14225	HK4
14.2	5/8"	35	90W10	CR17-M4-14235	HK4
14.2	5/8"	50	115W10	CR17-M4-14250	HK4
14.2	5/8"	8 mm Ø	115W10	CR17-M4-1428SC	HK4
14.2	5/8"	70	200W10	CR17-M4-14270	HK4
14.2	5/8"	95	250W10	CR17-M4-14295	HK4
14.2	5/8"	120	250W10	CR17-M4-142120	HK4
14.2	5/8"	150	250W10	CR17-M4-142150	HK4
14.2	5/8"	185	2 x 150W10	CR17-M4-142185	HK4
14.2	5/8"	240	2 x 200W10	CR17-M4-142240	HK4
17.2	3/4"	16*	115W10	CR17-M4-17216	HK4
17.2	3/4"	25	115W10	CR17-M4-17225	HK4
17.2	3/4"	35	115W10	CR17-M4-17235	HK4
17.2	3/4"	50	150W10	CR17-M4-17250	HK4
17.2	3/4"	8 mm Ø	150W10	CR17-M4-1728SC	HK4
17.2	3/4"	70	200W10	CR17-M4-17270	HK4
17.2	3/4"	95	250W10	CR17-M4-17295	HK4
17.2	3/4"	120	250W10	CR17-M4-172120	HK4
17.2	3/4"	150	2 x 150W10	CR17-M4-172150	HK4
17.2	3/4"	185	2 x 150W10	CR17-M4-172185	HK4
17.2	3/4"	240	2 x 200W10	CR17-M4-172240	HK4
17.2	3/4"	300	2 x 250W10	CR17-M5-172300	HK5



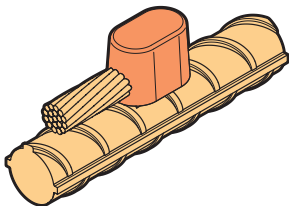
Cable to Earth Rod CR24

A mm Ø	B inches Ø	C mm2	Weld Metal	Mold	Handle
12.7	1/2"	16*	90W10	CR24-M4-12716	HK4
12.7	1/2"	25	90W10	CR24-M4-12725	HK4
12.7	1/2"	35	90W10	CR24-M4-12735	HK4
12.7	1/2"	50	115W10	CR24-M4-12750	HK4
12.7	1/2"	8 mm Ø	115W10	CR24-M4-1278SC	HK4
12.7	1/2"	70	150W10	CR24-M4-12770	HK4
12.7	1/2"	95	200W10	CR24-M4-12795	HK4
12.7	1/2"	120	250W10	CR24-M4-127120	HK4
14.2	5/8"	16*	115W10	CR24-M4-14216	HK4
14.2	5/8"	25	115W10	CR24-M4-14225	HK4
14.2	5/8"	35	115W10	CR24-M4-14235	HK4
14.2	5/8"	50	200W10	CR24-M4-14250	HK4
14.2	5/8"	8 mm Ø	200W10	CR24-M4-1428SC	HK4
14.2	5/8"	70	250W10	CR24-M4-14270	HK4
14.2	5/8"	95	250W10	CR24-M4-14295	HK4
14.2	5/8"	120	2 x 150W10	CR24-M4-142120	HK4
14.2	5/8"	150	2 x 150W10	CR24-M4-142150	HK4
14.2	5/8"	185	2 x 200W10	CR24-M4-142185	HK4
14.2	5/8"	240	2 x 200W10	CR24-M4-142240	HK4
17.2	3/4"	16*	115W10	CR24-M4-17216	HK4
17.2	3/4"	25	115W10	CR24-M4-17225	HK4
17.2	3/4"	35	115W10	CR24-M4-17235	HK4
17.2	3/4"	50	250W10	CR24-M4-17250	HK4
17.2	3/4"	8 mm Ø	250W10	CR24-M4-1728SC	HK4
17.2	3/4"	70	2 x 150W10	CR24-M4-17270	HK4
17.2	3/4"	95	2 x 150W10	CR24-M4-17295	HK4
17.2	3/4"	120	2 x 150W10	CR24-M4-172120	HK4
17.2	3/4"	150	2 x 200W10	CR24-M4-172150	HK4
17.2	3/4"	185	2 x 200W10	CR24-M4-172185	HK4
17.2	3/4"	240	2 x 250W10	CR24-M4-172240	HK4
17.2	3/4"	300	2 x 250W10	CR24-M5-172300	HK5



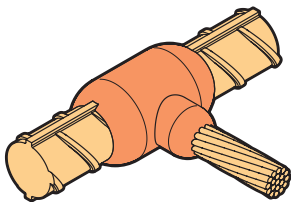
Cable to Reinforcing Bar CRE1

A mm Ø	B mm 2	Weld Metal	Mold	Handle	Packing
10-40	16*	45W10	CRE1-M3-16	HK3-B	PACK-A
10-40	25	45W10	CRE1-M3-25	HK3-B	PACK-A
10-40	35	45W10	CRE1-M3-35	HK3-B	PACK-A
10-40	8 mm Ø	90W10	CRE1-M3-8SC	HK3-B	PACK-A
10-40	50	90W10	CRE1-M3-50	HK3-B	PACK-A
10-40	10 mm Ø	90W10	CRE1-M3-10SC	HK3-B	PACK-A
10-40	70	90W10	CRE1-M3-70	HK3-B	PACK-A
10-40	95	90W10	CRE1-M3-95	HK3-B	PACK-A
10-40	120	90W10	CRE1-M3-120	HK3-B	PACK-A

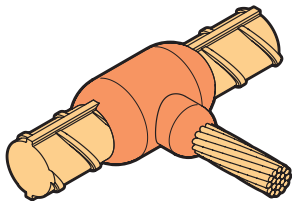


Cable to Reinforcing Bar CRE2 - Part1

A mm Ø	B mm 2	Weld Metal	Mold	Handle
16	16*	90W10	CRE2-M4-16R16	HK4
16	25	90W10	CRE2-M4-61R25	HK4
16	35	90W10	CRE2-M4-16R35	HK4
16	8 mm Ø	115W10	CRE2-M4-16R8SC	HK4
16	50	115W10	CRE2-M4-16R50	HK4
16	10 mm Ø	115W10	CRE2-M4-16R10SC	HK4
16	70	115W10	CRE2-M4-16R70	HK4
16	95	150W10	CRE2-M4-16R95	HK4
16	120	150W10	CRE2-M4-16R120	HK4
16	150	200W10	CRE2-M4-16R150	HK4
16	185	200W10	CRE2-M4-16R185	HK4
16	240	250W10	CRE2-M4-16R240	HK4
16	300	2 x 150W10	CRE2-M4-16R300	HK4
18	16*	115W10	CRE2-M4-18R16	HK4
18	25	115W10	CRE2-M4-18R25	HK4
18	35	115W10	CRE2-M4-18R35	HK4
18	8 mm Ø	150W10	CRE2-M4-18R8SC	HK4
18	50	150W10	CRE2-M4-18R50	HK4
18	10 mm Ø	150W10	CRE2-M4-18R10SC	HK4
18	70	150W10	CRE2-M4-18R70	HK4
18	95	150W10	CRE2-M4-18R95	HK4



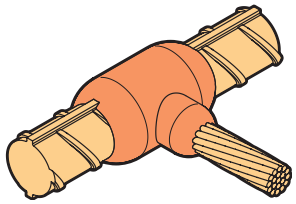
Cable to Reinforcing Bar CRE2 - Part2



A mm Ø	B mm 2	Weld Metal	Mold	Handle
18	120	200W10	CRE2-M4-18R120	HK4
18	150	200W10	CRE2-M4-18R150	HK4
18	185	200W10	CRE2-M4-18R185	HK4
18	240	250W10	CRE2-M4-18R240	HK4
18	300	2 x 150W10	CRE2-M4-18R300	HK4
20	16*	115W10	CRE2-M4-20R16	HK4
20	25	115W10	CRE2-M4-20R25	HK4
20	35	115W10	CRE2-M4-20R35	HK4
20	8 mm Ø	150W10	CRE2-M4-20R8SC	HK4
20	50	150W10	CRE2-M4-20R50	HK4
20	10 mm Ø	150W10	CRE2-M4-20R10SC	HK4
20	70	200W10	CRE2-M4-20R70	HK4
20	95	200W10	CRE2-M4-20R95	HK4
20	120	200W10	CRE2-M4-20R120	HK4
20	150	200W10	CRE2-M4-20R150	HK4
20	185	250W10	CRE2-M4-20R185	HK4
20	240	2 x 150W10	CRE2-M4-20R240	HK4
20	300	2 x 200W10	CRE2-M5-20R300	HK5
25	16*	250W10	CRE2-M4-25R16	HK4
25	25	250W10	CRE2-M4-25R25	HK4
25	35	250W10	CRE2-M4-25R35	HK4
25	8 mm Ø	2 x 150W10	CRE2-M4-25R8SC	HK4
25	50	2 x 150W10	CRE2-M4-25R50	HK4
25	10 mm Ø	2 x 150W10	CRE2-M4-25R10SC	HK4
25	70	2 x 150W10	CRE2-M4-25R70	HK4
25	95	2 x 150W10	CRE2-M4-25R95	HK4
25	120	2 x 200W10	CRE2-M4-25R120	HK4
25	150	2 X 200W10	CRE2-M4-25R150	HK4
25	185	2 X 250W10	CRE2-M5-25R185	HK5
25	240	3 X 200W10	CRE2-M5-25R240	HK5
25	300	3 x 200W10	CRE2-M5-25R300	HK5
30	16*	250W10	CRE2-M4-30R16	HK4
30	25	250W10	CRE2-M4-30R25	HK4
30	35	250W10	CRE2-M4-30R35	HK4
30	8 mm Ø	2 x 150W10	CRE2-M4-30R8SC	HK4
30	50	2 x 150W10	CRE2-M4-30R50	HK4

Cable to Reinforcing Bar CRE2 - Part3

A mm Ø	B mm 2	Weld Metal	Mold	Handle
30	10 mm Ø	2 x 150W10	CRE2-M4-30R10SC	HK4
30	70	2 x 150W10	CRE2-M4-30R70	HK4
30	95	2 x 150W10	CRE2-M5-30R95	HK5
30	120	2 x 200W10	CRE2-M5-30R120	HK5
30	150	2 X 200W10	CRE2-M5-30R150	HK5
30	185	2 X 250W10	CRE2-M5-30R185	HK5
30	240	3 X 200W10	CRE2-M5-30R240	HK5
30	300	3 X 200W10	CRE2-M5-30R300	HK5



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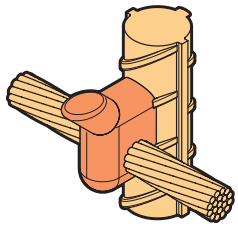
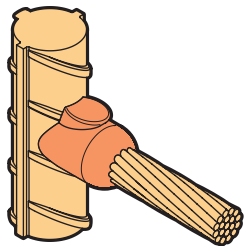
Cable to Reinforcing Bar CRE3

A mm Ø	B mm 2	Weld Metal	Mold	Handle
10-40	16*	45W10	CRE3-M3-10R16	HK3-A
10-40	25	45W10	CRE3-M3-10R25	HK3-A
10-40	35	45W10	CRE3-M3-10R35	HK3-A
10-40	8 mm Ø	90W10	CRE3-M3-10R8SC	HK3-A
10-40	50	90W10	CRE3-M3-10R50	HK3-A
10-40	10 mm Ø	90W10	CRE3-M3-10RSC	HK3-A
10-40	70	90W10	CRE3-M3-10R70	HK3-A
10-40	95	90W10	CRE3-M3-10R95	HK3-A
10-40	120	90W10	CRE3-M3-10R120	HK3-A



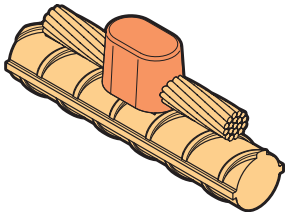
Cable to Reinforcing Bar CRE6

A mm Ø	B mm 2	Weld Metal	Mold	Handle
10-40	16*	45W10	CRE6-M3-16	HK3-A
10-40	25	45W10	CRE6-M3-25	HK3-A
10-40	35	45W10	CRE6-M3-35	HK3-A
10-40	8 mm Ø	65W10	CRE6-M3-8SC	HK3-A
10-40	50	65W10	CRE6-M3-50	HK3-A
10-40	10 mm Ø	90W10	CRE6-M3-10SC	HK3-A
10-40	70	90W10	CRE6-M3-70	HK3-A
10-40	95	90W10	CRE6-M3-95	HK3-A
10-40	120	115W10	CRE6-M3-120	HK3-A



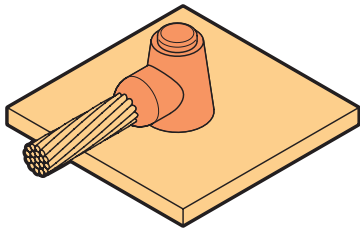
Cable to Reinforcing Bar CRE17

A mm Ø	B mm 2	Weld Metal	Mold	Handle
10-40	16*	45W10	CRE17-M3-16	HK3-B
10-40	25	45W10	CRE17-M3-25	HK3-B
10-40	35	45W10	CRE17-M3-35	HK3-B
10-40	8 mm Ø	90W10	CRE17-M3-8SC	HK3-B
10-40	50	90W10	CRE17-M3-50	HK3-B
10-40	10 mm Ø	90W10	CRE17-M3-10SC	HK3-B
10-40	70	90W10	CRE17-M3-70	HK3-B
10-40	95	90W10	CRE17-M3-95	HK3-B
10-40	120	90W10	CRE17-M3-120	HK3-B



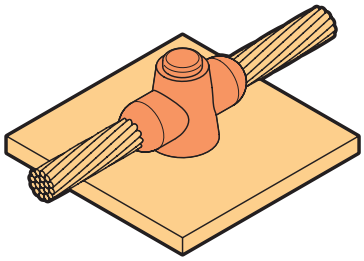
Cable to Steel Surface & Pipe CS1

A mm2	Weld Metal	Mold	Handle
16*	45W10	CS1-M4-16	HK4
25	45W10	CS1-M4-25	HK4
35	45W10	CS1-M4-35	HK4
8 mm Ø	90W10	CS1-M4-8SC	HK4
50	90W10	CS1-M4-50	HK4
10 mm Ø	90W10	CS1-M4-10SC	HK4
70	90W10	CS1-M4-70	HK4
95	115W10	CS1-M4-95	HK4
120	115W10	CS1-M4-120	HK4
150	150W10	CS1-M4-150	HK4
185	200W10	CS1-M4-185	HK4
240	200W10	CS1-M4-240	HK4
300	200W10	CS1-M4-300	HK4



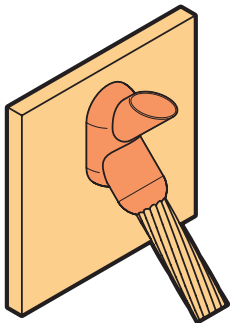
Cable to Steel Surface & Pipe CS2

A mm2	Weld Metal	Mold	Handle
16*	45W10	CS2-M4-16	HK4
25	45W10	CS2-M4-25	HK4
35	45W10	CS2-M4-35	HK4
8 mm Ø	90W10	CS2-M4-8SC	HK4
50	90W10	CS2-M4-50	HK4
10 mm Ø	115W10	CS2-M4-10SC	HK4
70	115W10	CS2-M4-70	HK4
95	115W10	CS2-M4-95	HK4
120	150W10	CS2-M4-120	HK4
150	200W10	CS2-M4-150	HK4
185	250W10	CS2-M4-185	HK4
240	2 x 150W10	CS2-M5-240	HK5
300	2 x 200W10	CS2-M5-300	HK5



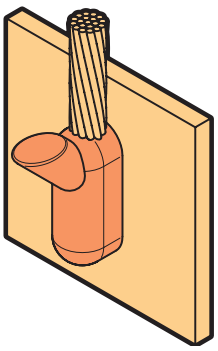
Cable to Steel Surface & Pipe CS3

A mm2	Weld Metal	Mold	Handle
16*	45W10	CS3-M4-16	HK4
25	45W10	CS3-M4-25	HK4
35	45W10	CS3-M4-35	HK4
8 mm Ø	65W10	CS3-M4-8SC	HK4
50	65W10	CS3-M4-50	HK4
10 mm Ø	90W10	CS3-M4-10SC	HK4
70	90W10	CS3-M4-70	HK4
95	115W10	CS3-M4-95	HK4
120	115W10	CS3-M4-120	HK4
150	115W10	CS3-M4-150	HK4
185	200W10	CS3-M4-185	HK4
240	200W10	CS3-M4-240	HK4
300	250W10	CS3-M4-300	HK4



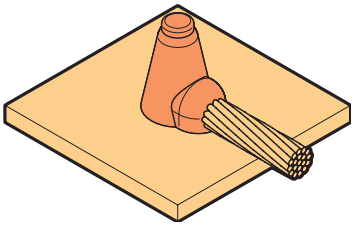
Cable to Steel Surface & Pipe CS7

A mm2	Weld Metal	Mold	Handle
16*	65W10	CS7-M4-16	HK4
25	65W10	CS7-M4-25	HK4
35	65W10	CS7-M4-35	HK4
8 mm Ø	90W10	CS7-M4-8SC	HK4
50	90W10	CS7-M4-50	HK4
10 mm Ø	150W10	CS7-M4-10SC	HK4
70	150W10	CS7-M4-70	HK4
95	200W10	CS7-M5-95	HK4
120	200W10	CS7-M5-120	HK4
150	250W10	CS7-M5-150	HK4
185	2 x 150W10	CS7-M9-185	HK4
240	2 x 150W10	CS7-M9-240	HK4
300	2 x 200W10	CS7-10-300	HK5



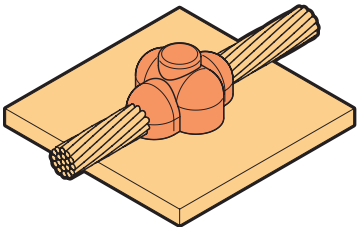
Cable to Steel Surface & Pipe CS8

A mm2	Weld Metal	Mold	Handle
16*	45W10	CS8-M2-16	HK2
25	45W10	CS8-M2-25	HK2
35	45W10	CS8-M2-35	HK2
8 mm Ø	45W10	CS8-M2-8SC	HK2
50	45W10	CS8-M2-50	HK2
10 mm Ø	65W10	CS8-M2-10SC	HK2
70	65W10	CS8-M2-70	HK2
95	90W10	CS8-M5-95	HK2
120	115W10	CS8-M4-120	HK4
150	150W10	CS8-M4-150	HK4
185	200W10	CS8-M4-185	HK4
240	200W10	CS8-M4-240	HK4
300	250W10	CS8-M4-300	HK4



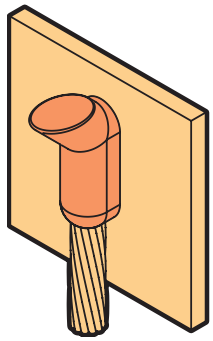
Cable to Steel Surface & Pipe CS9

A mm2	Weld Metal	Mold	Handle
16*	45W10	CS9-M2-16	HK2
25	45W10	CS9-M2-25	HK2
35	45W10	CS9-M2-35	HK2
8 mm Ø	90W10	CS9-M4-8SC	HK4
50	90W10	CS9-M4-50	HK4
10 mm Ø	115W10	CS9-M4-10SC	HK4
70	115W10	CS9-M4-70	HK4
95	115W10	CS9-M4-95	HK4
120	150W10	CS9-M4-120	HK4
150	200W10	CS9-M4-150	HK4
185	250W10	CS9-M4-185	HK4
240	2 x 150W10	CS9-M4-240	HK5



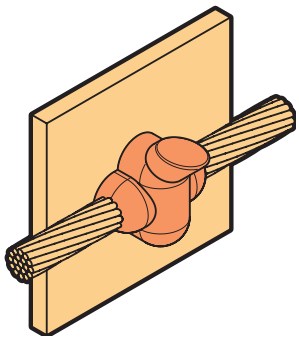
Cable to Steel Surface & Pipe CS25

A mm2	Weld Metal	Mold	Handle
16*	45W10	CS25-M4-16	HK4
25	45W10	CS25-M4-25	HK4
35	45W10	CS25-M4-35	HK4
8 mm Ø	65W10	CS25-M4-8SC	HK4
50	65W10	CS25-M4-50	HK4
10 mm Ø	90W10	CS25-M4-10SC	HK4
70	90W10	CS25-M4-70	HK4
95	115W10	CS25-M4-95	HK4
120	115W10	CS25-M4-120	HK4
150	150W10	CS25-M4-150	HK4
185	200W10	CS25-M4-185	HK4
240	200W10	CS25-M4-240	HK4
300	250W10	CS25-M4-300	HK4



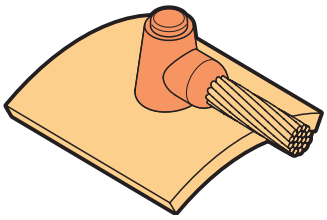
Cable to Steel Surface & Pipe CS27

A mm2	Weld Metal	Mold	Handle
16*	45W10	CS27-M4-16	HK4
25	45W10	CS27-M4-25	HK4
35	45W10	CS27-M4-35	HK4
8 mm Ø	65W10	CS27-M4-8SC	HK4
50	65W10	CS27-M4-50	HK4
10 mm Ø	115W10	CS27-M4-10SC	HK4
70	115W10	CS27-M4-70	HK4
95	150W10	CS27-M4-95	HK4
120	150W10	CS27-M4-120	HK4
150	200W10	CS27-M5-150	HK5
185	250W10	CS27-M5-185	HK5
240	2 x 150W10	CS27-M5-240	HK5
300	2 x 200W10	CS27-M5-300	HK5



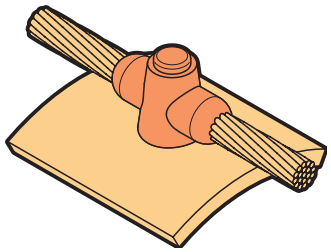
Cable to Steel Surface & Pipe CS32

A mm2	B mm Ø	Weld Metal	Mold	Handle
2.5	<125	15W10	CS32-M1-2.5-A	HK1
2.5	>125	15W10	CS32-M1-2.5-B	HK1
4	<125	15W10	CS32-M1-M4-A	HK1
4	>125	15W10	CS32-M1-M4-B	HK1
6	<125	15W10	CS32-M1-6-A	HK1
6	>125	15W10	CS32-M1-6-B	HK1
10	<125	25W10	CS32-M1-10-A	HK1
10	>125	25W10	CS32-M1-10-B	HK1
16	<125	45W10	CS32-M2-16-A	HK2
16	>125	45W10	CS32-M2-16-B	HK2
25	<70	25W10	CS32-M1-25-C	HK1
25	70-165	25W10	CS32-M1-25-D	HK1
25	>165	25W10	CS32-M1-25-E	HK1
35	<70	45W10	CS32-M2-35-C	HK2
35	70-165	45W10	CS32-M2-35-D	HK2
35	165-250	45W10	CS32-M2-35-F	HK2
35	>250	45W10	CS32-M2-35-G	HK2
50	<70	45W10	CS32-M2-50-C	HK2
50	<125	45W10	CS32-M2-50-D	HK2
50	70-165	45W10	CS32-M2-50-F	HK2
50	165-250	45W10	CS32-M2-50-G	HK2
70	<70	65W10	CS32-M2-70-C	HK2
70	70-165	65W10	CS32-M2-70-D	HK2
70	165-250	65W10	CS32-M2-70-F	HK2
70	>250	65W10	CS32-M2-70-G	HK2



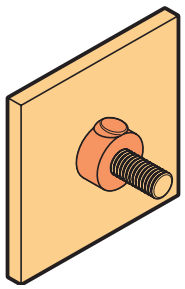
Cable to Steel Surface & Pipe CS34

A mm2	B mm Ø	Weld Metal	Mold	Handle
2.5	<125	15W10	CS34-M2-2.5-A	HK2
2.5	>125	15W10	CS34-M2-2.5-B	HK2
4	<125	15W10	CS34-M2-M4-A	HK2
4	>125	15W10	CS34-M2-M4-B	HK2
6	<125	15W10	CS34-M2-6-A	HK2
6	>125	15W10	CS34-M2-6-B	HK2
10	<125	32W10	CS34-M2-10-A	HK2
10	>125	45W10	CS34-M2-10-B	HK2
16	<125	45W10	CS34-M2-16-A	HK2
16	>125	45W10	CS34-M2-16-B	HK2
25	<70	32W10	CS34-M1-25-C	HK2
25	70-165	32W10	CS34-M1-25-D	HK2
25	>165	32W10	CS34-M1-25-E	HK2
35	<70	45W10	CS34-M2-35-C	HK2
35	70-165	45W10	CS34-M2-35-D	HK2
35	165-250	45W10	CS34-M2-35-F	HK2
35	>250	45W10	CS34-M2-35-G	HK2
50	<70	65W10	CS34-M2-50-C	HK2
50	70-165	65W10	CS34-M2-50-D	HK2
50	165-250	65W10	CS34-M2-50-F	HK2
50	>250	65W10	CS34-M2-50-G	HK2



Stud to Steel Surface RS1 :

A	Weld Metal	Mold	Handle	
M6	25W10	RS1-M4-M6	HK4	RSSM6
M8	32W10	RS1-M4-M8	HK4	RSSM8
M10	45W10	RS1-M4-M10	HK4	RSSM10
M12	65W10	RS1-M4-M12	HK4	RSSM12
M16	115W10	RS1-M4-M16	HK4	RSSM16



Handle Clamps :

Part No.	Description
HK1	Handle Clamp 1
HK2	Handle Clamp 2
HK3	Handle Clamp 3
HK4	Handle Clamp 4
HK5	Handle Clamp 5
HK6	Handle Clamp 6
HK7	Handle Clamp 7
HK8	Handle Clamp 8
HK9	Handle Clamp 9

Accessories:

Part No.	Description
HCCB	Cable cleaning brush
HMCB	Mold cleaning brush
HTCB	Tape cleaning brush
HFG	Flint gun
HFGR	Replacement Flints (Pack of 100)
HMCS	Mold cleaning scraper
HWT	Welding toolbox
DUX	DUX Seal Compund

Welding Powder:

Part No	Weight per pack
WP015	15 grams
WP025	25 grams
WP032	32 grams
WP045	45 grams
WP065	65 grams
WP090	90 grams
WP115	115 grams
WP150	150 grams
WP200	200 grams
WP250	250 grams

Bahra Weld Complies with UL 467

UL LIGHTNING PROTECTION SYSTEM

UL LIGHTNING PROTECTION SYSTEM
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UL 96A & NFPA 780 COMPLIED LIGHTNING PROTECTION SYSTEM

WHY RISK?

A properly installed lightning protection system safe-guards a business structurally and also protects property, inventory, electronic equipment and personnel from the destructive forces of lightning. As with fire alarms, sprinklers, and security systems, a lightning protection system provides the peace of mind that comes from knowing that a potentially catastrophic problem has been dealt with proactively.

DESIGN MATTERS

Design is important, which is why modern lightning protection systems are made to blend with the style of a structure, making the system practically undetectable from the ground. It is also imperative that all of the metals in a lightning protection system are compatible with all of the metals in a structure and that the system complies with Underwriters Laboratories UL96A and National Fire Protection Association NFPA 780 lightning protection standards.

PROTECT AGAINST LOSS

It's Simple

A lightning protection system performs a simple task. It provides a specified path on which lightning can travel. When a building is equipped with a lightning protection system, the destructive power of the lightning strike is directed safely into the ground, leaving the structure, personnel, and equipment unharmed.

The Primary Components

A lightning protection system should include all of the following elements, which work together to prevent lightning damage:

- Strike termination devices (Air Rods)
- Conductor (Cable)
- Bonds with metallic bodies
- Ground electrodes (Earth Rods ...)
- Surge suppression devices (SPD's)

Compliance Counts

Nationally recognized safety standards for lightning protection system design and installation are maintained by the National Fire Protection Association (NFPA 780) and Underwriters' Laboratories (UL96A). These standards are designed to help ensure safe, effective protection from lightning. There are other lightning protection design standard depending on the application such as Lightning Protection Institute (LPI175), Air Force Instruction (AFI32) and Saudi Building Code (SBC 401).

Electronic Protection

Modern facilities are especially vulnerable to the havoc that lightning can wreak on sensitive electronic equipment. To assure the highest level of protection, UL-listed lightning surge protection devices should be installed on electric service panels. Surge protection devices (SPD's) are the first line of defense against harmful electrical surges that can enter a structure through power lines.

By filtering and dissipating the harmful current, surge protection devices prevent electrical fires and protect against transients that can damage a building's electrical system. For additional protection, UL-listed transient voltage surge protection devices can be installed to protect specific electronic components. A qualified lightning protection specialist can make recommendations for surge protection that is tailored to the specific facility.

UL LIGHTNING PROTECTION SYSTEM
GENERAL INTRODUCTION

QUALITY MATTERS
Bahra Earthing is associated with UL File # E524796 (https://iq.ulprospector.com/en/profile?e=4353372)

Bahra Cables products are listed and labeled for the UL Master Label Certificate Program for Lightning Protection. Specifiers rely on the UL Master Label to ensure compliance for individual lightning protection installations. Bahra Cables products also meet or exceed the requirements for lightning protection established by the National Fire Protection Association and the Lightning Protection Institute.

CONSULTANT SPECS:

REFERENCES
Publications listed below (including amendments, addenda, revisions, supplements, and errata) form part of this specification to the extent referenced. Publications are referenced in the text by the basic designations only.

1. Saudi Building Code - Latest Edition.
2. National Fire Protection Association (NFPA) standards:
    a. Lightning Protection NFPA-780.
3. Underwriter's Laboratories standards:
    a. UL 96 Requirements of Master Label
    b. UL 96A Installation Requirements for Lightning Protection Systems
    c. Comply with latest edition of UL 467, "Grounding and Bonding Equipment
    d. NFPA70
    e. LPI175
4. IEEE-81 (Latest Edition): Guide for measuring earth resistivity, ground impedance and earth surface potentials for a grounding system.
5. All requirements of Local Authority having Jurisdiction.

QUALITY ASSURANCE
1. Installer Qualifications: Certified by UL, trained and approved for installation of units required for this Project.
2. Designer Qualifications: Engage an experienced designer who is NRTL listed to design and lay out the lightning protection system certified at least five years.
3. Inspector Qualifications: Engage an experienced inspector who is NRTL listed to perform periodic inspections during installation of the lightning protection system.
4. Provide UL Master Label for lightning protection system.
5. System Certificate: UL Master Label.
6. Electrical Components, Devices, and Accessories: Listed and labelled as defined in NFPA 780, "Definitions" Article.
7. Provide services of qualified lightning protection engineer, supplier, and installer to perform work for lightning protection system. Provide components for complete lightning protection system, lightning protection system ground and installation of system to NFPA 780. System shall meet UL 96A requirements for Master-Labelled lightning protection systems. Deliver Master Label to Owner.

FIELD QUALITY CONTROL
1. Obtain the UL Master Label and attach it to the structure at the location specified by the Owner.
2. At time of application for UL Master Label, a copy of the application shall be sent to an Owner's Representative.
3. UL Inspection: Meet requirements to obtain a UL Master Label for system.

UL Master Label Certificate

Why required?

Master Label Certificate is a safety compliance and accreditation for any structure. This covers the materials and the installation assurance to meet the requirement of the Lightning Protection standards as below:

- Materials comply and tested as per UL96 and UL467 standard
- Installation according to the UL96A & NFPA780 (referenced in Saudi Building Code SBC)
- Surge Protection Devices Materials and Installation according to UL1449

Benefits?

- Design review by UL enrolled specialist and UL team to verify compliance and empower the design aspects as per standard requirement and project specifications.
- Design deviations due to standard amendment or updated will be reported as findings.
- Installation inspection by UL Master Installer and UL team to verify compliance and empower the installation aspects to maximize the safety.
- All materials will be tested and listed as per UL standards.
- It is providing confidence that the system has been installed in accordance with applicable recognized standards.

Process?

- Choose the professional trained installer.
- Determine the scope of the project and associated structures.
- The design review will be performed by UL, based on information provided by the customer and the UL Enrolled company (drawings, system designs, etc.).
- The Design Review will result in a report. One report revision will be included in the quoted price, based on updated information provided.
- Phase 2 will consist of a GAP Analysis of the installation. The GAP Analysis will be performed by UL, based on photos/video/documentation provided.
- The GAP Analysis will result in a report. Any non-compliances noted in the report will be verified for compliance during phase 3 (on-site inspection).
- Phase 3 is for the On-Site Inspection at the site to inspect the project structures.
- Master Label Certificates will then be issued for the structures that are within full compliance of the applicable standards (NFPA 780 and UL96A).
- Additional Assumptions:
    - The Installer shall be an active UL Listed Installer in good standing with UL's listed installer program. Training of the installation team can be provided.
    - All Lightning protection system components must be UL Listed and Tested

UL LIGHTNING PROTECTION SYSTEM

BARE AND TINNED COPPER CONDUCTOR

Structures not exceeding 75 ft (23 m) in height shall be protected with Class I materials.
Structures exceeding 75 ft (23 m) in height shall be protected with Class II materials.
If part of a structure exceeds 75 ft (23 m) in height (e.g., a steeple) and the remaining portion does not exceed 75 ft (23 m) in height, the requirements for Class II air terminals and conductors shall apply only to that portion exceeding 75 ft (23 m) in height.

Copper shall be of the grade required for commercial electrical work and shall be of 95 percent conductivity when annealed.

Part No.	Description
BC14	14 strands of 17 gauge (1.15 mm) Secondary Bonding Copper Cable. 92 pounds per thousand feet (137 grams/meter). 28,729 circular mils (14.5 mm2) of conductivity
BC14T	As above but with tinned copper strands
BC29	29 strands of 17 gauge (1.15 mm) Basket Weave Copper Cable. 192 pounds per thousand feet (286 grams/meter). 59,450 circular mils (30 mm2) of conductivity Exceeds Class I requirements.
BC29T	As above but with tinned copper strands
BC32	32 strands of 17 gauge (1.15 mm) Basket Weave Copper Cable. 217 pounds per thousand feet (323 grams/meter). 65,667 circular mils (33 mm2) of conductivity Exceeds Class I requirements.
BC32T	As above but with tinned copper strands
BC230	28 strands of 16 gauge (1.29 mm) Rope Lay Copper Cable. 230 pounds per thousand feet (343 grams/meter). 72,758 circular mils (36.5 mm2) of conductivity Exceeds Class I requirements.
BC385	28 strands of 0.066 gauge (1.68 mm) Rope Lay Copper Cable. 385 pounds per thousand feet (573 grams/meter). 121,968 circular mils (61.5 mm2) of conductivity Exceeds Class II requirements.
BC385T	As above but with tinned copper strands
BC420	28 strands of 0.069 gauge (1.75mm) Rope Lay Copper Cable. 420 pounds per thousand feet (625 grams/meter). 133,308 circular mils (70 mm2) of conductivity Exceeds Class II requirements.
BC420T	As above but with tinned copper strands
BC2/0-19	19 strands of 0.0837 gauge (2.13 mm) Concentric Lay Copper Cable. 411 pounds per thousand feet (612 grams/meter). 133,108 circular mils (70 mm2) of conductivity Exceeds Class II requirements.
BC2/0-19 Tinned	As above but with tinned copper strands
BC4/0-19	19 strands of 0.1055 gauge (2.68 mm) Concentric Lay Copper Cable. 653 pounds per thousand feet (972 grams/meter). 211,475 circular mils (120 mm2) of conductivity Exceeds Class II requirements.
BC4/0-19 Tinned	As above but with tinned copper strands

UL LIGHTNING PROTECTION SYSTEM
ALUMINUM COPPER CONDUCTOR

Structures not exceeding 75 ft (23 m) in height shall be protected with Class I materials.
Structures exceeding 75 ft (23 m) in height shall be protected with Class II materials.
If part of a structure exceeds 75 ft (23 m) in height (e.g., a steeple) and the remaining portion does not exceed 75 ft (23 m) in height, the requirements for Class II air terminals and conductors shall apply only to that portion exceeding 75 ft (23 m) in height.

Aluminum shall not be used where contact with the earth is possible or where rapid deterioration is possible. Conductors shall be of electrical-grade aluminum with a minimum chemical composition of 99 percent aluminum.

Part No.	Decription
BA11	11 strands of 14 gauge (1.63 mm) Secondary Bonding Aluminum Cable. 45 pounds per thousand feet (67 grams/meter). 45,107 circular mils (23 mm2) of conductivity
BA24	24 strands of 14 gauge (1.63 mm) Basket Weave Aluminum Cable. 102 pounds per thousand feet (152 grams/meter). 98,640 circular mils (50 mm2) of conductivity Exceeds Class I requirements.
BA28	28 strands of 14 gauge (1.63 mm) Basket Weave Aluminum Cable. 115 pounds per thousand feet (172 grams/meter). 115,047 circular mils (58 mm2) of conductivity Exceeds Class I requirements.
BA37	37 strands of 12-1/2 gauge (1.92 mm) Concentric Wind Aluminum Cable. 200 pounds per thousand feet (298 grams/meter). 211,475 circular mils (107 mm2) of conductivity Exceeds Class II requirements.

UL LIGHTNING PROTECTION SYSTEM
BLUNT AIR TERMINALS – CLASS I

The tip of an air terminal shall be not less than 10 in. (254 mm) above the object or area it is to protect.

Air terminals shall be secured against overturning or displacement by at least one of the following methods:
(1) Attachment to the object to be protected
(2) Braces that are permanently and rigidly attached to the structure

Air terminals exceeding 24 in. (600 mm) in height shall be supported at a point not less than one-half their height.

Product	Decription
ALUMINUM CLASS I	1/2 " (12.7 mm diameter, threaded base) BAT10AB ½" x 10" (12.7mm x 254 mm) BAT12AB ½" x 12" (12.7mm x 305 mm) BAT15AB ½" x 15" (12.7mm x 381 mm) BAT18AB ½" x 18" (12.7mm x 458 mm) BAT24AB ½" x 24" (12.7mm x 610 mm) BAT36AB ½" x 36" (12.7mm x 915 mm) BAT48AB ½" x 48" (12.7mm x 1220 mm)
COPPER CLASS I	3/8 " (9.5 mm diameter, threaded base) BAT10CB 3/8" x 10" (9.5mm x 254 mm) BAT12CB 3/8" x 12" (9.5mm x 305 mm) BAT15CB 3/8" x 15" (9.5mm x 381 mm) BAT18CB 3/8" x 18" (9.5mm x 458 mm) BAT24CB 3/8" x 24" (9.5mm x 610 mm) BAT36CB 3/8" x 36" (9.5mm x 915 mm) BAT48CB 3/8" x 48" (9.5mm x 1220 mm)
TINNED COPPER CLASS I	3/8 " (9.5 mm diameter, threaded base) BAT12TB 3/8" x 12" (9.5mm x 305 mm) BAT15TB 3/8" x 15" (9.5mm x 381 mm) BAT18TB 3/8" x 18" (9.5mm x 458 mm) BAT24TB 3/8" x 24" (9.5mm x 610 mm)

UL LIGHTNING PROTECTION SYSTEM
BLUNT AIR TERMINALS – CLASS II

The tip of an air terminal shall be not less than 10 in. (254 mm) above the object or area it is to protect.

Air terminals shall be secured against overturning or displacement by at least one of the following methods:
(1) Attachment to the object to be protected
(2) Braces that are permanently and rigidly attached to the structure

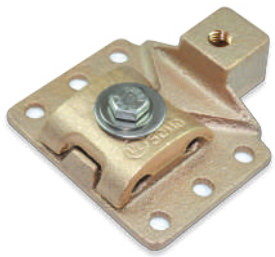
Air terminals exceeding 24 in. (600 mm) in height shall be supported at a point not less than one-half their height.

Product	Decription
ALUMINUM CLASS II	5/8" (15.9 mm diameter, threaded base) BAT110AB 5/8" x 10" (15.9mm x 254 mm) BAT112AB 5/8" x 12" (15.9mm x 305 mm) BAT115AB 5/8" x 15" (15.9mm x 381 mm) BAT118AB 5/8" x 18" (15.9mm x 458 mm) BAT124AB 5/8" x 24" (15.9mm x 610 mm) BAT136AB 5/8" x 36" (15.9mm x 915 mm) BAT148AB 5/8" x 48" (15.9mm x 1220 mm)
COPPER CLASS II	1/2 " (12.7 mm diameter, threaded base) BAT110CB 1/2" x 10" (12.7mm x 254 mm) BAT112CB 1/2" x 12" (12.7mm x 305 mm) BAT115CB 1/2" x 15" (12.7mm x 381 mm) BAT118CB 1/2" x 18" (12.7mm x 458 mm) BAT124CB 1/2" x 24" (12.7mm x 610 mm) BAT136CB 1/2" x 36" (12.7mm x 915 mm) BAT148CB 1/2" x 48" (12.7mm x 1220 mm)
TINNED COPPER CLASS II	1/2 " (12.7 mm diameter, threaded base) BAT112TB 1/2" x 12" (12.7mm x 305 mm) BAT115TB 1/2" x 15" (12.7mm x 381 mm) BAT118TB 1/2" x 18" (12.7mm x 458 mm) BAT124TB 1/2" x 24" (12.7mm x 610 mm)

UL LIGHTNING PROTECTION SYSTEM
BOLT BASES

Air terminals shall be mounted to metal roof top units by using one of the following methods:

1. Adhered with adhesive bases to the metal units housing.
2. Secured on bases having a minimum contact area of 3 in. 2 (1940 mm2), each to the bare metal of the unit's housing using mechanical fasteners.
3. Drilled, tapped, and screwed directly into the unit's frame.

Part No.	Decription	
BBB3B Adhesive Base	A cast bronze base with 2 way bolt pressure cable holder. Cap can be rotated 90 degrees. Suitable for use on built-up, single membrane, or other roof surfaces where mechanical penetrations must be avoided. For use with adhesives compatible to roof surfaces. 5/16-18 stainless steel bolt and washer. 4-1/4" x 4" (10.8cm x 10.2cm): approximately 16oz. (454 grams). Use suffix 3/8, 1/2 or 5/8 to denote air terminal thread size.	
BBB3A Aluminum	ALUMINUM Approximately 6 oz. (170 grams). Use suffix 1/2or 5/8 to denote air terminal thread size.	
BBB900B	A cast bronze base with 2 way cable holder. Threaded for top or side mounting. Features a wide mounting surface for a variety of mounting applications. 5/16-18 stainless steel bolt and washer. 3-1/8" x 3-5/8" (79.4cm x 92cm): approximately 13.6oz. (386 grams). Use suffix 3/8, 1/2 or 5/8 to denote air terminal thread size.	
BBB900A	ALUMINUM Approximately 4.8 oz. (136 grams). Use suffix 2/1 or 8/5 to denote air terminal thread size.	

UL LIGHTNING PROTECTION SYSTEM
TERMINAL BRACES

Air terminals exceeding 24 in. (600 mm) in height shall be supported at a point not less than one-half their height.

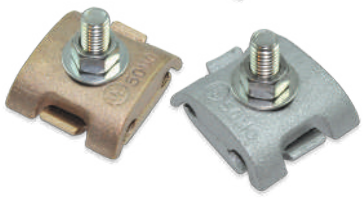
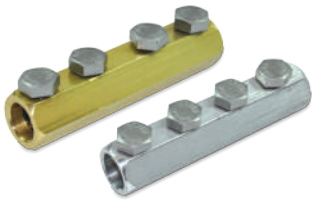
Air terminal supports are located at a point not less than one-half the height of the air terminal.

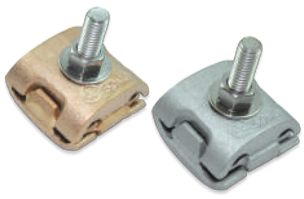
Product	Decription		
GALVANIZED BRACE Galvanized steel tripod braces for use with air terminals up to "8/5 15.9)mm) in diameter	BTB18 BTB24 BTB36 BTB48	18" 24" 36" 48"	(45.7cm) (61cm) (91.4cm) (122cm)
BRACE WITH ALUMINUM FEET As above but with cast aluminum feet for adhesive application	BTB18A BTB24A BTB36A BTB48A	18" 24" 36" 48"	(45.7cm) (61cm) (91.4cm) (122cm)
BRACE WITH BRONZE FEET As above but with bronze feet for adhesive application	BTB18B BTB24B BTB36B BTB48B	18" 24" 36" 48"	(45.7cm) (61cm) (91.4cm) (122cm)

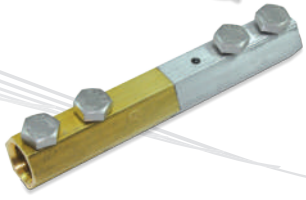
UL LIGHTNING PROTECTION SYSTEM
BOLT FITTINGS

Conductors shall be fastened to the structure upon which they are placed at intervals not exceeding 3 ft (1 m).
Attachment by nails, screws, bolts, or adhesive shall be permitted to be used as necessary.
The fasteners shall not be subject to breakage.
Roofing membrane strapped over the conductor shall not be considered a suitable fastener.
Fasteners shall be of the same materials as the conductor or of a material equally resistant to corrosion as that of the conductor.
No combination of materials shall be used that will form an electrolytic couple of such a nature that, in the presence of moisture, corrosion will be accelerated.
Bimetallic connectors and fittings shall be used for splicing or bonding dissimilar metals.

Part No.	Decription
BBF1B	Round-Round Cast bronze, bolt pressure cable to cable or cable to rod clamp, 1-1/4" stainless steel hex head bolt and washer, 1-9/16" x 1-3/4" (4cm x 4.45cm); approximately 6.3oz. (179 grams).
BBF1A	Aluminum As above but aluminum. Approximately 3 oz. (85 grams).
BBF100B	Round-Round Cast bronze, bolt pressure cable to cable or cable to rod clamp, 1-1/2" stainless steel carriage bolt. Specifically designed for cables splices on single membrane roofs. 1-9/16" x 1-3/4" (4cm x 4.45cm); approximately 7.6oz. (215 grams).
BBF100A	Aluminum As above but aluminum. Approximately 3 oz. (85 grams).
BBF3B	Straight 4-bolt hex brass straight splicer. Stainless steel bolts. 3-1/2" x 3/4" (8.9cm x 1.9cm); approximately 6 oz. (170 grams).
BBF3A	Aluminum As above but alumimun. Approximately 2 oz. (57 grams)
BBF8B	2 Way Bonding Plate Cast bronze, 8 square inch bonding plate with 2-way bolt pressure cable holder. Stainless steel bolt and washer, 2-1/16" x 4" (52.38mm x 101.6mm); approximately 10.3oz. (292 grams).
BBF8A	Aluminum As above but aluminum. Approximately 3.8 oz. (108 grams).
BBF13B	Cross Run Cast bronze, bolt pressure cross run or cross tee clamp. Stainless steel carriage bolt, nut and washer, 1-9/16" x 1-3/4" (4cm x 4.5cm); approximately 8oz. (227 grams).
BBF13A	Aluminum As above but aluminum. Approximately 3.5 oz. (99 grams).
BBF19B	4 Square Inch Beam Clamp Cast bronze, 4 square inch bonding plate with one 2-way bolt pressure cable holder. For primary bonding to beams and similar flat metal protrusions. Stainless steel bolts and washer, 3-1/4" x 2" (82.6mm x 50.8mm); approximately 1 lb 1 oz. (482 grams).
BBF19A	Aluminum As above but aluminum. Approximately 6.7 oz. (190 grams).
BBM3	Bimetallic 4-Bolt Straight Splicer For joining aluminum and copper cables. Stainless Steel bolts. 5" x ¾" (8.9cm x 1.9cm) hex; approximately 8 oz. (170 grams).





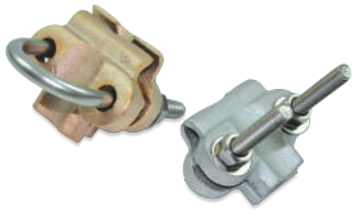
UL LIGHTNING PROTECTION SYSTEM
U BOLT PIPE CLAMPS

Clamps or welding shall be used for all connections to the reinforcing steel and to the down conductors.
Grounded media and buried metallic conductors shall be bonded to the lightning protection grounding system below a height 12 ft (3.6 m) vertically above the base of the structure.

Inherent bonding is achieved in construction through common methods such as welding or compression fittings (bolting). Bonding forms, a mechanically robust, low-resistance electrical connection between conductive parts.

The bonding resistance value should typically be in the tens of milliohms but should not exceed 200 milliohms.

Product No.	Decription
BPC1UB	1 inch U-Bolt Clamp Cast bronze pipe clamp. Fits rod or pipes with 1" to 1-1/4" (1.3cm to 3.cm) OD. 5/16-18" stainless steel U-bolt, nuts and washers. 2-1/2" x 3-1/2" (6.35cm x 8.9cm); approximately 9 oz. (255 grams)
BPC1UA	1 inch U-Bolt Clamp – Aluminum Approximately 5 oz. (142 grams).
BPC2UB	2 inch U-Bolt Clamp Cast bronze pipe clamp. Fits rod or pipes with 2" (5.1cm) OD pipe. 2-way bolt pressure cable holder cover can be turned 90 degrees. 5/16-18" stainless steel U-bolt, nuts and washers. 3-1/4" x 3-1/2" (8.25cm x 8.9cm); approximately 8.5 oz. (241 grams)
BPC2UA	2 inch U-Bolt Clamp – Aluminum Approximately 4.2 oz. (119 grams).
BPC3UB	3 inch U-Bolt Clamp Cast bronze pipe clamp. Fits up to 3" (7.6cm) OD pipe. 2-way bolt pressure cable holder cover can be turned 90 degrees. 5/16-18" stainless steel U-bolt, nuts and washers. 4-1/4" x 4-1/2" (10.8cm x 11.43cm); approximately 13 oz. (369 grams)
BPC3UA	3 inch U-Bolt Clamp – Aluminum Approximately 6 oz. (170 grams).
BPC6UB	6 inch U-Bolt Clamp Cast bronze pipe clamp. Fits up to 6-3/4" (17.14cm) OD pipe. 2-way bolt pressure cable holder cover can be turned 90 degrees. stainless steel U-bolt, nuts and washers. 8-1/4" x 8-1/2" (21cm x 21.6cm); approximately 2 lbs 5.4oz. (1060 grams)
BPC6UA	6 inch U-Bolt Clamp – Aluminum Approximately 14 oz. (397 grams).



UL LIGHTNING PROTECTION SYSTEM
FASTENER LOOPS

Conductors shall be fastened to the structure upon which they are placed at intervals not exceeding 3 ft (1 m). Attachment by nails, screws, bolts, or adhesive shall be permitted to be used as necessary.

The fasteners shall not be subject to breakage.

Fasteners shall be of the same materials as the conductor or of a material equally resistant to corrosion as that of the conductor.

Part No.	Decription
BFL1C*	1- Nail stamped copper loop
BFL1T*	1- Nail stamped tinned copper loop
BFL1A*	1- Nail stamped aluminum loop
BFL100A*	1- Nail stamped aluminum loop
BFL51C*	1/4" hole, small stamped copper loop
BFL51T*	1/4" hole, small stamped tinned copper loop
BFL2C*	1/4" hole, medium stamped copper loop
BFL2T*	1/4" hole, medium stamped tinned copper loop
BFL3C**	1/4" hole, largest stamped copper loop
BFL3T**	1/4" hole, largest stamped tinned copper loop
BFL3A**	1/4" hole, largest stamped alumimun loop
BFL300C**	1/4" hole, large stamped copper loop
BFL300A**	1/4" hole, large stamped tinned copper loop
BFL4C	Stamped Adhesive Crimp Copper Loop For use on built, single membrane or other flat roof surfaces where mechanical penetrations must be avoided. Use with adhesives compatible to roof surface. 2-1/4" x 3-1/2" (5.7cm x 8.9cm): approximately 1.4 oz. (40 grams).
BFL4T	Stamped Adhesive Crimp Tinned Copper Loop As above but tinned. Approximately 1.4 oz. (40 grams)
BFL4A	Stamped Adhesive Crimp Aluminum Loop As above but aluminum. Approximately 0.8 oz. (23 grams)

Note: * Use with Class I conductors. ** Use with Class II conductors.

UL LIGHTNING PROTECTION SYSTEM
ADHESIVE SEALANTS

Product	Decription
M-1 Structural Adhesive Sealant By Chemlink	High performance sealant adheres to a variety of building substrates. Moisture curing polyether adhesive sealant. 10.1 fluid ounce tubes available in Black, Grey, White, Limestone, Tan colors. Note: Not recommended for adhering copper to copper.
Duralink Roof Sealant By Chemlink	Extremely elastic moisture curing polyether sealant. Bonds well to cementitious siding and metal architecture including PVDF coated metal. 10.1 fluid ounce tubes available in Black, Grey, White colors.
Durasil Silicone Sealant By Chemlink	High performance adhesive/sealant designed for application on dissimilar metals and a wide range of materials including glass, masonry, PVDF coated metal and engineered plastics. Neutral cure silicone sealant. 10.1 fluid ounce tubes available in clear. Product of choice for adhering copper to copper.
Clear General Purpose Sealant By Chemlink	Moisture curing polyether sealant adheres to a variety of substrates. 10.1 fluid ounce tube.

UL LIGHTNING PROTECTION SYSTEM
GROUND ROD CLAMPS

The down conductor(s) shall be attached permanently to the grounding electrode system by bolting, brazing, welding, or high-compression connectors listed for the purpose.

Part No.	Decription
BGC3/4	Cast bronze, cable to 3/4" (1.91cm) ground rod clamps. Stainless steel bolts. 2-3/16" x 1-13/16" (5.55cm x 4.6cm). Approximately 9 oz. (255 grams).
BGCUB	Cast bronze, cable to 3/4" (1.91cm) ground rod clamps. Designated to join rods up to 7/8" OD and one or two cables with a cast bronze parallel cable holder. Stainless steel bolt, nuts and washers. 1-7/8" x 2-1/4" (47.6mm x 57.1mm). Approximately 8.8 oz. (250 grams).

UL LIGHTNING PROTECTION SYSTEM
GROUND TEST WELLS

Product	Decription
Heavy Duty Ground Test Well	**12" Length** B3100 PVC Schedule 80 12 3/4" x 12" B3102 3/8" Steel 12 3/4" x 12" **18" Length** B3120 PVC Schedule 80 12 3/4" x 18" B3122 3/8" Steel 12 3/4" x 18"
Heavy Duty High Traffic Area Ground Test Well	**12" Length** B3110 PVC Schedule 80 13 3/4" x 12" B3112 3/8" Steel 13 3/4" x 12" B3114 Concrete 13 3/4" x 12" **18" Length** B3130 PVC Schedule 80 13 3/4" x 18" B3132 3/8" Steel 13 3/4" x 18"

SURGE PROTECTION DEVICES

Lightning strikes may introduce severe transient voltages into electronic equipment and sensitive systems inside the building, these surges depend not only on the lightning protection of the building itself but also on the installation details of the wiring and sensors and the route to the electronic equipment in the building. For the protection of the equipment against these transient surges, surge protective devices (SPD) should be fitted as close as possible to the point of entry/exit to the building and as close as possible to the power supplied to electronic equipment and sensitive systems.

Over voltages that are transmitted through distribution networks can be originated in commutation networks because of their deficiencies as well as atmospheric discharges. Furthermore, we can not ignore over voltages caused by users of the network or its environment, electric discharge lamps, engines starts, variable speed drives, generators and power generators start and stops which cause surges and transient intensities of short duration, as well as high pick values.

These surges are characterised nationally and internationally as 1,2 / 50 - 5/65 - 8/20 and 10/350 μsec shock waves by the SBC, CCITT, ITU, DIN, UL and IEC/BS EN Standards. The first value of the expression makes reference to Rise time of the wave front and the second one to Fall time until middle value expressed in μsec. These waveforms are transmitted as high frequency currents through electrical and phone networks, railway catenary, etc., with frequency ranging between 30 and 300 kHz in highest energy components. This value depends mainly on the rise of the transient component.

Transformers and stabilizers operate properly at industrial frequencies (50 - 60 cycles), while their behaviour is completely transparent to them at a high frequency range. This is the reason why these phenomena are so destructive and reach all the connected devices to the network.

Voltage gaps and micro-interruptions are short interruptions in the power supply. Closing or opening a circuit give rise to overvoltage impulses at the beginning and at the end of the micro-interruption as a consequence of the self-induction electromotive force. For this reason, micro-interruptions are associated to breakdowns, especially the most sensitive electronic elements.

The materials used shall withstand the electric and electromagnetic effects of the lightning current and predictable accidental stress without being damaged.

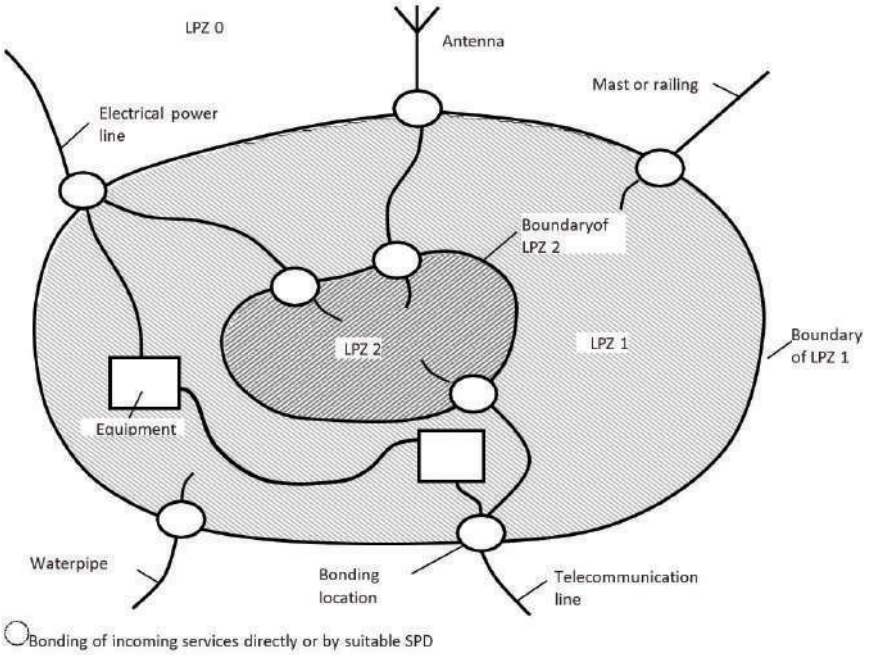
Lightning protection systems shall be made of materials that are tested against lightning direct and indirect surges. **Surge protective device (SPD)** Device that is intended to limit transient over voltages and divert surge currents. It contains at least one non-linear component.

Surge protective device (SPD) integrating in a single package the means for providing surge protection at two or more ports of equipment connected to different systems, such as a power system and a communications system are referred as Combined multi-port SPD.

Electrical and electronic systems are subject to damage from a **lightning electromagnetic impulse (LEMP)**. Therefore, Surge Protection Measures SPM need to be provided to avoid failure of internal systems.

The design of SPM should be carried out by experts in lightning and surge protection who possess a broad knowledge of EMC and installation practices.

Protection against LEMP is based on the **lightning protection zone (LPZ)** concept: the zone containing systems to be protected shall be divided into LPZs. These zones are theoretically assigned part of space (or of an internal system) where the LEMP severity is compatible with the withstand level of the internal systems enclosed. Successive zones are characterized by significant changes in the LEMP severity. The boundary of an LPZ is defined by the protection measures employed.



With respect to lightning threat, the following LPZ are defined (IEC 62305-1:4):

Outer zones:

LPZ 0 Zone where the threat is due to the unattenuated lightning electromagnetic field and where the internal systems may be subjected to full or partial lightning surge current. LPZ 0 is subdivided into:

LPZ 0A Zone where the threat is due to the direct lightning flash and the full lightning electromagnetic field. The internal systems may be subjected to full lightning surge current.

LPZ 0B Zone protected against direct lightning flashes but where the threat is the full lightning electromagnetic field. The internal systems may be subjected to partial lightning surge currents.

Inner zones: (protected against direct lightning flashes)

LPZ 1 Zone where the surge current is limited by current sharing and isolating interfaces and/or by SPDs at the boundary. Spatial shielding may attenuate the lightning electromagnetic field.

LPZ 2…n Zone where the surge current may be further limited by current sharing and isolating interfaces and/or and by additional SPDs at the boundary. Additional spatial shielding may be used to further attenuate the lightning electromagnetic field.

The LPZs are implemented by the installation of the SPM, e.g. installation of a coordinated SPD system and/or magnetic shielding. Depending on the number, type and withstand level of the equipment to be protected, suitable LPZ can be defined. These may include small local zones (e.g. equipment enclosures) or large integral zones (e.g. the whole structure).

Interconnection of LPZs of the same order may be necessary if either two separate structures are connected by electrical or signal lines, or the number of required SPDs is to be reduced (see Figure 3).

SURGE PROTECTION DEVICES
GENERAL INTRODUCTION

Selection of characteristics for two or more SPDs (Surge Protection Device) to be connected across the same conductors of a system but separated by some decoupling impedance such that, given the parameters of the impedance and of the impinging surge, this selection (Coordination of SPDs) will ensure that the energy deposited in each of the SPDs is commensurate with its rating.

Surge Protection Device SPD requires an internal or external disconnector for disconnecting a surge protective device (SPD) from the system in the event of SPD failure. It is intended to prevent a persistent fault on the system and may give visible indication of the SPD failure.

Operational condition when the sustained power loss of an SPD exceeds the thermal dissipation of the housing and connections, leading to a cumulative increase in the temperature of the internal elements culminating in failure.

Bahra Earthing team can help you to make the correct selection and application of SPDs needed to protect the low-voltage supply systems against the effects of transient surges or over-voltages. When required in accordance with SASO IEC 62305, UL 1449 or otherwise specified, SPDs shall be installed at the origin of the installation. Additional SPDs may be necessary to protect sensitive equipment. Such SPDs shall be coordinated with the SPDs installed upstream. In the case where SPDs are part of the fixed electrical installation, but not mounted inside a distribution board (e.g. in a socket-outlet), their presence shall be indicated by a label on or as near as is reasonably possible to the origin of the circuit under consideration.

Connection of SPDs Surge protective devices at or near the origin of the installation shall be connected at least between the following points:

a) If there is a direct connection between the neutral conductor and the PE at or near the origin of the installation or if there is no neutral conductor: Between each line conductor and either the main earthing terminal or the main protective conductor, whichever is the shortest route; NOTE The impedance connecting the neutral to the PE in IT systems is not considered as a direct connection.

b) If there is no direct connection between the neutral conductor and the PE at or near the origin of the installation, then either: " between each line conductor and either the main earthing terminal or the main protective conductor, and between the neutral conductor and either the main earthing terminal or the protective conductor, whichever is the shortest route – **connection type 1**; or " between each line conductor and the neutral conductor and between the neutral conductor and either the main earthing terminal or the protective conductor, whichever route is shorter – **connection type 2**.

In small installations it is only required to settle a surge suppressor and harmonic filter in the main switchboard to protect the installation. Loads of the installation themselves generate the high frequency harmonics and the transitory peaks. If the filter is settled distant enough from the problematic loads and especially from the critical ones to be protected, these may be affected by over voltages and harmonics.

In large facilities it is not enough to install a unique device to allow the proper functioning of itself and avoid breakdowns in power supplies and circuit boards. When engines start and stop, when variable-frequency drives themselves chop the sinusoidal wave, the group starts, the signal micro-interruptions (the peaks associated with micro-interruptions are not only originated by the electrical connection, all the loads inside the installation will also behave like small generators injecting voltage peaks) can produce over voltages but in the case of internal origin they will wear the electronic equipment of the installation away slowly or quickly in case of a high overvoltage.

SURGE PROTECTION DEVICES
GENERAL INTRODUCTION

In addition, it is necessary to take into consideration the any type of cable, whether it is electrical, coaxial, data, telephone, etc. over voltages can be induced.

Bahra Earthing provides a complete range of **Surge Protective Devices SPDs** as well as **Unified Protection Systems (SPU)** made up of several redundant and coordinated protection sets, conceived under criteria of maximum discharge capacity and minimum residual voltage. Its design allows the implementation of accessory modules, as well as its adaptation to the needs of each installation, putting its safety and proper functioning first.

Our range of products include:

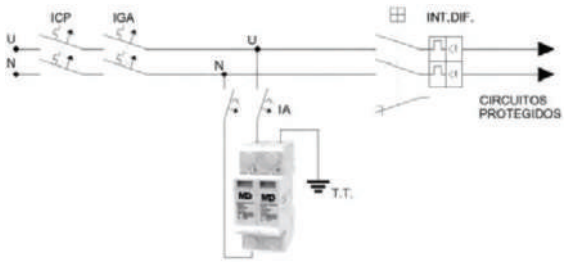
- Multi-Stage Surge Protection Devices, as against Medium and High Frequency Harmonics in Low-Voltage AC Power Supply Networks.
- Multi-stage Surge Protective Device and Middle & High Frequency Harmonics with Voltage Stabilization.
- Surge protective devices for High Voltage AC power supply networks
- Modular transitory overvoltage protective devices in Low Voltage power supply networks:
  - Transient overvoltage protective devices in Low-Voltage installations:
    - Type 1 surge protective devices
    - Type 1+2 surge protective devices
    - Type 2 surge protective devices
    - Type 3 surge protective devices
  - Photovoltaic surge protective devices: Surge protective devices specially designed for the protection of electrical generators and communication buses in photovoltaic installations.
  - LED surge protective devices: Surge protective devices specially designed to protect LED installations.
- Control, data and communication lines protective devices.
- Protective devices in coaxial cables.
- Relays for The Protection Against Permanent Over voltages
- UL1449 Listed and Tested Surge protective devices

SURGE PROTECTIVE MODULES | LV POWER SUPPLY NETWORKS

BD2-20/240

Type 2 single-phase surge protective devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and maneuvers origin.

- Protection Class II in accordance with EN 61643-11.
- Protection Type 2 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Two-pole surge protective devices consisting of a base part and a plug- in protection module.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



Circuit Diagram

Electrical diagram and dimensions of BD2-20

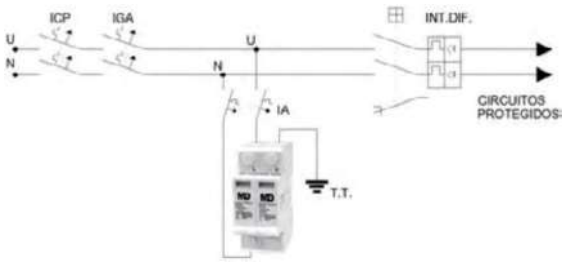
DEVICE MODEL	BD2-20/240
Connection mode	Parallel / Monofásica F+N+T
Rated voltage / Frequency	240 VAC / 50-60 Hz
Earthing System	TT, IT y TN-S
Desconexión térmica	Internal; green-normal, red-failed
Remote alarm contact	Optional; Cod BD2-25 / 240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Type 2+3 / Class II + III
Maximum continuous operating voltage (Uc) AC [L–N/N–TE]	275 VAC / 255 VAC
Nominal discharge current (8/20) In	10 kA
Maximum discharge current (8/20)Imax	20 kA
Lightning impulse current (10/350) Iimp	-
Protection level Up [L–N/N–TE]	1,2 kV / 1,2 kV
DC sparkover voltage DC [L–N]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤32A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C … +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,22
Dimensions (mm) (Height×Wide×Depth)	2 DIN modules (98×36×66)

SURGE PROTECTIVE MODULES | LV POWER SUPPLY NETWORKS

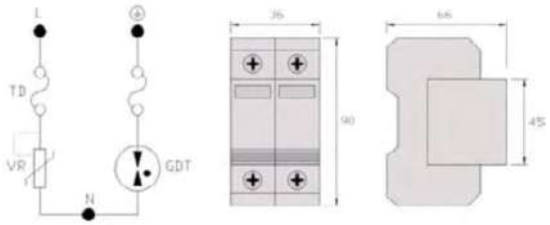
BD2-40/240

Type 2 single-phase surge protective devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and maneuvers origin.

- Protection Class II in accordance with EN 61643-11.
- Protection Type 2 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Two-pole surge protective devices consisting of a base part and a plug- in protection module.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



Circuit Diagram



Electrical diagram and dimensions of BD2-40

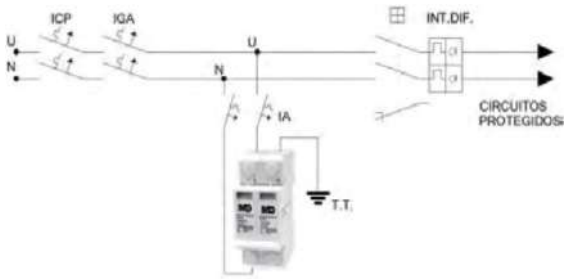
DEVICE MODEL	BD2-40/240
Connection mode	Parallel / Monofásica F+N+T
Rated voltage / Frequency	240 VAC / 50-60 Hz
Earthing System	TT, IT y TN-S
Desconexión térmica	Internal; green-normal, red-failed
Remote alarm contact	Optional; Cod BD2-40 / 240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Type 2 / Class II
Maximum continuous operating voltage (Uc) AC [L–N/N–TE]	250 VAC / 255 VAC
Nominal discharge current (8/20) In	20 kA
Maximum discharge current (8/20)Imax	40 kA
Lightning impulse current (10/350) Iimp	-
Protection level Up [L–N/N-T]	1,3 kV / 1,5 kV
DC sparkover voltage DC [N–TE]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤32A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C … +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,19
Dimensions (mm) (Height×Wide×Depth)	2 DIN modules (98×36×66)

SURGE PROTECTIVE MODULES | LV POWER SUPPLY NETWORKS

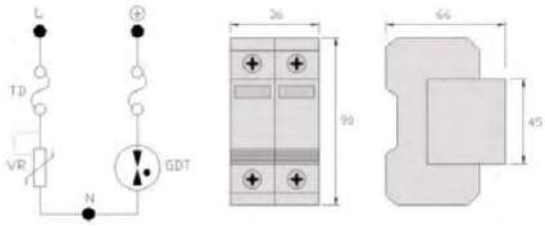
BD2-60/240

Type 1+2 surge protector devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and manoeuvres origin.

- Protection Class II in accordance with EN 61643-11.
- Protection Type 2 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Two-pole surge protective devices consisting of a base part and a plug- in protection module.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



Circuit Diagram



Electrical diagram and dimensions of BD2-60

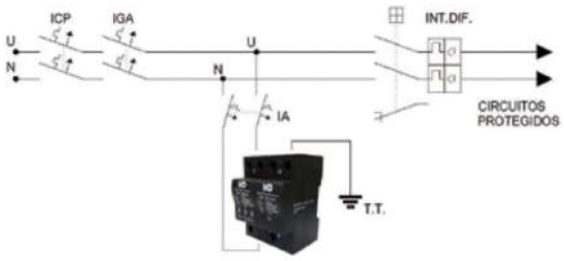
DEVICE MODEL	BD2-20/240
Connection mode	Parallel / Monopolar F+N+T
Rated voltage / Frequency	240 VAC / 50-60 Hz
Earthing System	TT, IT y TN-S
Thermal disconnection	Internal; green-normal, red-failed
Remote alarm contact	Optional; Cod BD2-60 / 240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Class I+II / Type 1+2
Maximum continuous operating voltage (Uc) AC [L–N/N–TE]	250 VAC / 255 VAC
Nominal discharge current (8/20) In [L–N/N–TE]	30 kA / 30 kA
Maximum discharge current (8/20)Imax [L–N/N–TE]	60 kA / 60 kA
Lightning impulse current (10/350) Iimp [L–N/N–TE]	- / 7 kA
Protection level Up [L–N/N–TE]	1,3 kV / 1,5 kV
DC sparkover voltage [N–TE]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤80A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C ... +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,25
Dimensions (mm) (Height×Wide×Depth)	2 DIN modules (98×36×66)

SURGE PROTECTIVE MODULES | LV POWER SUPPLY NETWORKS

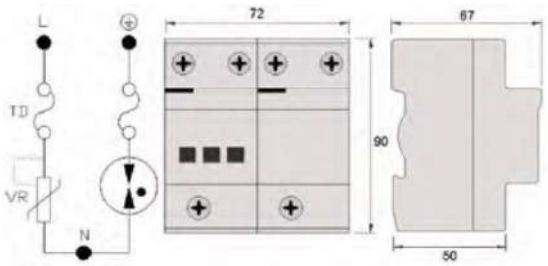
BD2-100/240

Type I+II surge protector devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and manoeuvres origin.

- Protection Class I+II in accordance with EN 61643-11.
- Protection Type 1+2 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Modular design.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



Circuit Diagram



Electrical diagram and dimensions of BD2-100

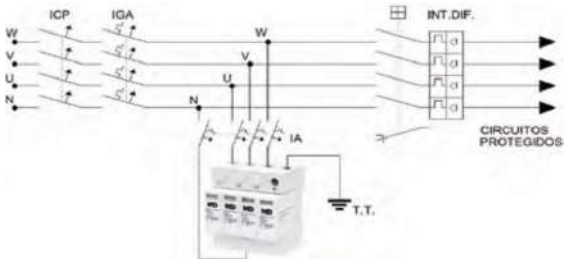
DEVICE MODEL	BD2-100/240
Connection mode	Parallel / Monopolar F+N+T
Rated voltage / Frequency	240 VAC / 50-60 Hz
Earthing System	TT, IT y TN-S
Thermal disconnection[L–N]	Internal; green-normal, red-failed
Remote alarm contact [L–N]	Optional; Cod BD2-100 / 240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Class I+II / Type 1+2
Maximum continuous operating voltage (Uc) AC [L–N/ N–TE]	250 VAC / 255 VAC
Nominal discharge current (8/20) In [L–N/N–TE]	50 kA / 50 kA
Maximum discharge current (8/20)Imax [L–N/N–TE]	100 kA / 100 kA
Lightning impulse current (10/350) Iimp [L–N/N–TE]	12,5 kA / 25 kA
Protection level Up [L–N/N–TE]	1,3 kV / 1,5 kV
DC sparkover voltage DC [N–TE]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤80A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C ... +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,39
Dimensions (mm) (Height×Wide×Depth)	4 DIN modules (98×72×67)

SURGE PROTECTIVE MODULES | LV POWER SUPPLY NETWORKS

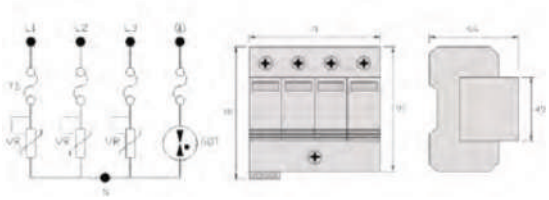
BD4-20/240

Type 2+3 single-phase surge protective devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and manoeuvres origin.

- Protection Class II+III in accordance with EN 61643-11.
- Protection Type 2+3 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Two-pole surge protective devices consisting of a base part and a plug-in protection module.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



Circuit Diagram



Electrical diagram and dimensions of BD4-60

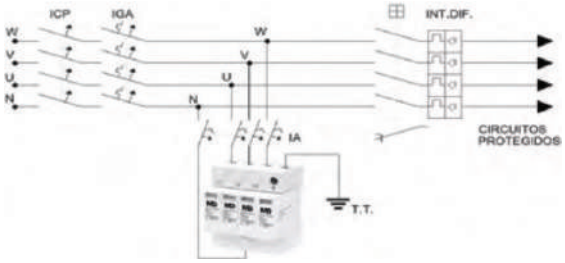
DEVICE MODEL	BD4-20/240
Connection mode	Parallel / Trifásica 3F+N+T
Rated voltage / Frequency	240 VL - 400 VL-L / 50-60 Hz
Earthing System	TT, IT y TN-S
Desconexión térmica	Internal; green-normal, red-failed
Remote alarm contact	Optional; Cod BD4-20/240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Type 2+3 / Class II + III
Maximum continuous operating voltage (Uc) AC [L–N/ N–TE]	250 VAC / 255 VAC
Nominal discharge current (8/20) In	10 kA
Maximum discharge current (8/20)Imax	20 kA
Lightning impulse current (10/350) Iimp	-
Protection level Up [L–N//N-T]	1,2 kV / 1,2 kV
DC sparkover voltage DC [N–TE]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤32A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C ... +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,36
Dimensions (mm) (Height×Wide×Depth)	4 DIN modules (98×72×66)

SURGE PROTECTIVE MODULES | LV POWER SUPPLY NETWORKS

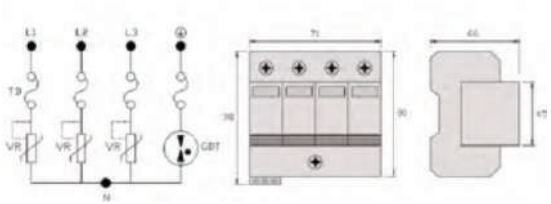
BD4-40/240

Type 2 three-phase surge protective devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and manoeuvres origin.

- Protection Class II in accordance with EN 61643-11.
- Protection Type 2 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Two-pole surge protective devices consisting of a base part and a plug-in pro- tection module.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



Circuit Diagram



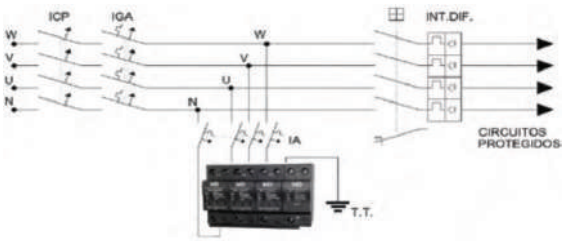
Electrical diagram and dimensions of BD2-100

DEVICE MODEL	BD4-40/240
Connection mode	Parallel / Trifásica 3F+N+T
Rated voltage / Frequency	240 VL - 400 VL-L / 50-60 Hz
Earthing System	TT, IT y TN-S
Desconexión térmica	Internal; green-normal, red-failed
Remote alarm contact	Optional; Cod BD4-40/240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Type 2 / Class II
Maximum continuous operating voltage (Uc) AC [L-N/N-T]	250 VAC / 255 VAC
Nominal discharge current (8/20) In	20 kA
Maximum discharge current (8/20)Imax	40 kA
Lightning impulse current (10/350) Iimp	-
Protection level Up [L–N/N–TE]	1,3 kV / 1,5 kV
DC sparkover voltage DC [N–TE]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤32A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C … +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,39
Dimensions (mm) (Height×Wide×Depth)	4 DIN modules (98×72×66)

BD4-100/240

Type 1+2 surge protector devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and manoeuvres origin by coordinating Type 1 and Type 2 features.

- Protection Class I+II in accordance with EN 61643-11.
- Protection Type 2 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Modular design.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



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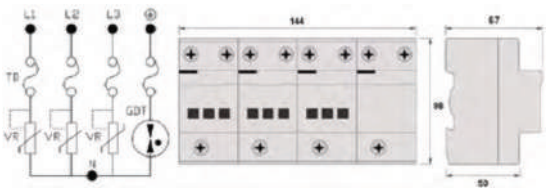


Electrical diagram and dimensions of BD4-60

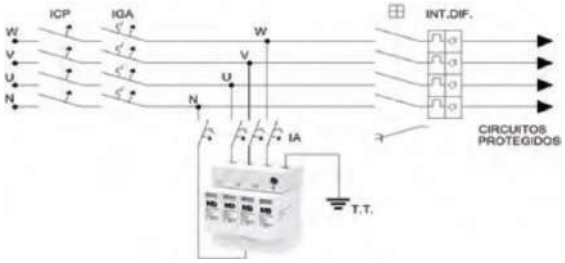
DEVICE MODEL	BD4-100/240
Connection mode	Parallel / Three-phase 3F+N+T
Rated voltage / Frequency	240 VL-N - 400 VL-L / 50-60 Hz
Earthing System	TT, IT y TN-S
Thermal disconnection[L-N]	Internal; green-normal, red-failed
Remote alarm contact [L-N]	Optional; Cod BD4-100 / 240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Class I+II / Type 1+2
Maximum continuous operating voltage (Uc) AC [L-N/N-TE]	275 VAC / 255 VAC
Nominal discharge current (8/20) In [L-N/N-TE]	50 kA / 50 kA
Maximum discharge current (8/20)Imax [L-N/N-TE]	100 kA / 100 kA
Lightning impulse current (10/350) Iimp [L-N/N-TE]	12,5 kA / 25 kA
Protection level Up [L–N/N-T]	2 kV / 2 kV
DC sparkover voltage [N–TE]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤80A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C ... +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,82
Dimensions (mm) (Height×Wide×Depth)	8 DIN modules (98×144×67)

SURGE PROTECTIVE MODULES | LV POWER SUPPLY NETWORKS

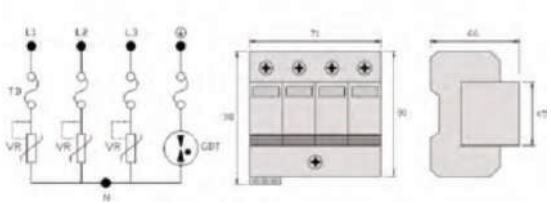
BD4-60/240

Type 1+2 surge protector devices are installed in the main electrical panel of the installation.
They are recommended to protect electric and electronic devices against surges of atmospheric and manoeuvres origin.

- Protection Class II in accordance with EN 61643-11.
- Protection Type 2 in accordance with IEC 61643-1.
- Easy supervision due to the disconnection device.
- Two-pole surge protective devices consisting of a base part and a plug-in protection module.
- Fault indication by red flag window.
- Rapid response.
- Optional remote alarm terminal.



Circuit Diagram



Electrical diagram and dimensions of BD4-60

DEVICE MODEL	BD4-60/240
Connection mode	Parallel / Three-phase 3F+N+T
Rated voltage / Frequency	240 VL-N - 400 VL-L / 50-60 Hz
Earthing System	TT, IT y TN-S
Desconexión térmica	Internal; green-normal, red-failed
Remote alarm contact	Optional; Cod BD4-60/240-S
Surge Response	
Protection type (EN 61643-11 / IEC 61643-1)	Class I+II / Type 1+2
Maximum continuous operating voltage (Uc) AC [L-N/N-TE]	255 VAC / 255 VAC
Nominal discharge current (8/20) In [L-N/N-TE]	30 kA / 30 kA
Maximum discharge current (8/20)Imax [L-N/N-TE]	60 kA / 60 kA
Lightning impulse current (10/350) Iimp [L-N/N-TE]	- / 7 kA
Protection level Up [L–N/N-T]	1,3 kV / 1,5 kV
DC sparkover voltage [N–TE]	600 V
Response time Rt [L–N/N–TE]	25 ns / 100 ns
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	D Curve MCB or fuse (In≤80A)
Enclosure material	Thermoplastic
Installation method	35 mm DIN-rail
Operating temperature	-40 °C ... +80 °C
IP protection degree	IP20
Location category	Indoor
Weight (Kg)	0,44
Dimensions (mm) (Height×Wide×Depth)	4 DIN modules (98×72×66)

SPU // 2D SERIES

MULTI-STAGE SURGE | MEDIUM & HIGH FREQUENCY HARMONICS PROTECTIVE DEVICE IN AC LV POWER SUPPLY NETWORKS

SP 2D-10

- It is destined for low power single-phase panels.
- Ideal for sensistive loads protection.
- High discharge capacity.
- Easy suervision and maintenance.
- Both common and differential protection mode for all protective modes.
- Adjusted thresholds to the operating voltage range.
- Network indicator light plus fuses.

DEVICE MODEL	SP 2D-10
Installation mode	Parallel / Single-phase
Nominal voltage / Frequency / Topology	230 V / 50-60 Hz / P+L+TT
Connection mode to the electrical supply	Power strip
Recommended power of the installation to be protected	10 kVA
Network topoloy	TT, IT and TN
Elements of internal disconnection	20 A fuse
Number of Indicator lights	1
Surge Response	
Protection type	2
Maximum continuous operating voltage (Uc) AC	250 VAC
Operation threshold (Un)	275 VAC
Response time (tA)	25 ns
ITmax (8/20) – Differential mode (Phase – Neutral)	60 kA
ITmax (8/20) – Common mode (Phase – Earth / Neutro – Tierra)	60 kA / 60 kA
ITimp (10/350) – Differential mode (Phase – Neutral)	-
ITimp (10/350) – Common mode (Phase – Earth / Neutro – Tierra)	- / -
Total ITmax (8/20)	180 kA
Total ITimp (10/350)	-
Number of surge protective stages	3
Frequency Response (Z = 10 Ω)	
Cut off frequency	23 kHz
Attenuation at 30 KHz	4,2 dB
Installation Data	
Recommended minimum section of connecting cables	Cu 4 mm2
Recommended protection	25 A
Enclosure material	Polycarbonate
Installation method	DIN-Rail
Operating temperature	[-10 °C ... +60°C]
IP protection degree	IP 20
Location category	Indoor
Weight (Kg)	0,5 Kg
Dimmensions (mm) (Height×With×Depth)	90×70×60

SPU // 2D SERIES

MULTI-STAGE SURGE SP 2D-80

MEDIUM & HIGH FREQUENCY HARMONICS PROTECTIVE DEVICE IN AC LV POWER SUPPLY NETWORKS

- Destined to low power single-phase panels.
- Ideal for sensitive loads protection against MF and HF harmonics.
- High discharge capacity.
- Easy supervision and maintenance.
- Both common and differential protection mode for all protective modes.
- Adjusted thresholds to the operating voltage range.
- Network indicator light plus MCBs.

DEVICE MODEL	SP 2D-80
Installation mode	Parallel / Single-phase
Nominal voltage / Frequency / Topology	230 V / 50-60 Hz / F+N+TT
Connection mode to the electrical supply	Terminal blocks
Recommended power of the installation to be protected	80 kVA
Network topoloy	TT, IT y TN
Elements of internal disconnection	(1) MCB 80A
Number of Indicator lights	2
Surge Response	
Protection type	1+2
Maximum continuous operating voltage (Uc) AC	250 VAC
Operation threshold (Un)	275 VAC
Response time (tA)	25 ns
ITmax (8/20) – Differential mode (Phase – Neutral)	470 kA
ITmax (8/20) – Common mode (Phase – Earth / Neutro – Tierra)	170 kA / 470 kA
ITimp (10/350) – Differential mode (Phase – Neutral)	110 kA
ITimp (10/350) – Common mode (Phase – Earth / Neutro – Tierra)	35 kA / 110 kA
Total ITmax (8/20)	1.110 kA
Total ITimp (10/350)	255 kA
Number of surge protection stages	3
Frequency Response (Z = 10 Ω)	
Cut off frequency	300 Hz
Attenuation at 30 KHz	40 dB
Installation Data	
Recommended minimum section of connecting cables	Cu 25 mm2
Recommended protection	80 A
Enclosure material	Metallic
Installation method	Wall mounting
Operating temperature	[-10 °C ... +85°C]
IP protection degree	IP 20
Location category	Indoor
Weight (Kg)	7 Kg
Dimmensions (mm) (Height×With×Depth)	400×300×150

SPU // 4D SERIES

MULTI-STAGE SURGE | MEDIUM & HIGH FREQUENCY HARMONICS PROTECTIVE DEVICE IN AC LV POWER SUPPLY NETWORKS

SP 4D-25

- It is destined for low power three-phase panels.
- Ideal for sensistive loads protection.
- High discharge capacity.
- Easy suervision and maintenance.
- Both common and differential protection mode for all protective modes.
- Adjusted thresholds to the operating voltage range.
- Network indicator light.

DEVICE MODEL	SP 4D-25
Installation mode	Parallel / Three-Phase
Nominal voltage / Frequency / Topology	230 V / 400 V / 50-60 Hz / 3F+N+TT
Connection mode to the electrical supply	Power strip
Recommended power of the installation to be protected	25 kVA
Network topoloy	TT, IT y TN
Elements of internal disconnection	-
Number of Indicator lights	1
Surge Response	
Protection type	2
Maximum voltage in continuous operation (Uc) AC	250 / 430 VAC
Current threshold (Un)/Operationthreshold	275 / 470 VAC
Response time (tA)	25 ns
Itmax (8/20) – Differential mode (Phase – Phase /Phase – Neutral)	45 kA / 60 kA
Itmax(8/20) – (Phase – Earth / Neutral – Earth)	45 kA / 60 kA
Itimp(10/350) – Differential mode (Phase – Phase / Phase – Neutral)	- / -
Itimp (10/350) – Common mode (Phase – Earth / Neutral – Earth)	- / -
ITmax (8/20) Total	510 kA
ITimp (10/350) Total	-
Number of surge protection stages	3
Frequency Response (Z = 10 Ω)	
Cut off frequency	23 kHz
Attenuation at 30 KHz	4,2 dB
Installation Data	
Recommended minimum section of the connecting cable	Cu 10 mm2
Recommended protection	40 A
Enclosure material	Polycarbonate
Installation method	DIN rail
Operating temperature	[-10 °C ... +85°C]
IP protection degree	IP 20
Location category	Indoor
Weight (Kg)	1,4 Kg
Dimmensions (mm) (Height×With×Depth)	185×213×102

SPU // 4D SERIES

MULTI-STAGE SURGE SP 4D-80

MEDIUM & HIGH FREQUENCY HARMONICS PROTECTIVE DEVICE IN AC LV POWER SUPPLY NETWORKS

- Specially designed for being installed in secondary industrial panels or in the main electrical panel of the installation.
- Ideal to protect sensistive loads against MF or HF harmonics and
- voltage oscillations.
- High discharge capacity.
- Easy suervision and maintenance.
- Both common and differential protection mode for all protective modes.
- Adjusted thresholds to the operating voltage range.
- Network and alarm indicator lights plus MCBs

DEVICE MODEL	SP 4D-80
Installation mode	Parallel / Trifásica
Nominal voltage / Frequency / Topology	230 V / 400 v / 50-60 Hz / 3F+N+TT
Connection mode to the electrical supply	MCB
Recommended power of the installation to be protected	80 kVA
Network topoloy	TT, IT y TN
Elements of internal disconnection	80A MCB
Number of Indicator lights	1
Surge Response	
Protection type	1+2
Maximum voltage in continuous operation (Uc) AC	250 / 430 VAC
Current threshold (Un)/Operationthreshold	275 / 470 VAC
Response time (tA)	25 ns
Itmax (8/20) – Differential mode (Phase – Phase /Phase – Neutral)	60 kA / 140 kA
Itmax(8/20) – (Phase – Earth / Neutral – Earth)	100 kA / 140 kA
Itimp(10/350) – Differential mode (Phase – Phase / Phase – Neutral)	- / 30 kA
Itimp (10/350) – Common mode (Phase – Earth / Neutral – Earth)	20 kA / 30 kA
ITmax (8/20) Total	1040 kA
ITimp (10/350) Total	180 kA
Number of surge protection stages	3
Frequency Response (Z = 10 Ω)	
Cut off frequency	23 kHz
Attenuation at 30 KHz	4,2 dB
Installation Data	
Recommended minimum section of the connecting cable	Cu 35 mm2
Recommended protection	80 A
Enclosure material	Metallic cabinet with foamed-in polyurethane gasket
Installation method	Wall-mounting
Operating temperature	[-10 °C ... +85°C]
IP protection degree	IP 20
Location category	Indoor
Weight (Kg)	14 Kg
Dimmensions (mm) (Height×With×Depth)	400×300×150

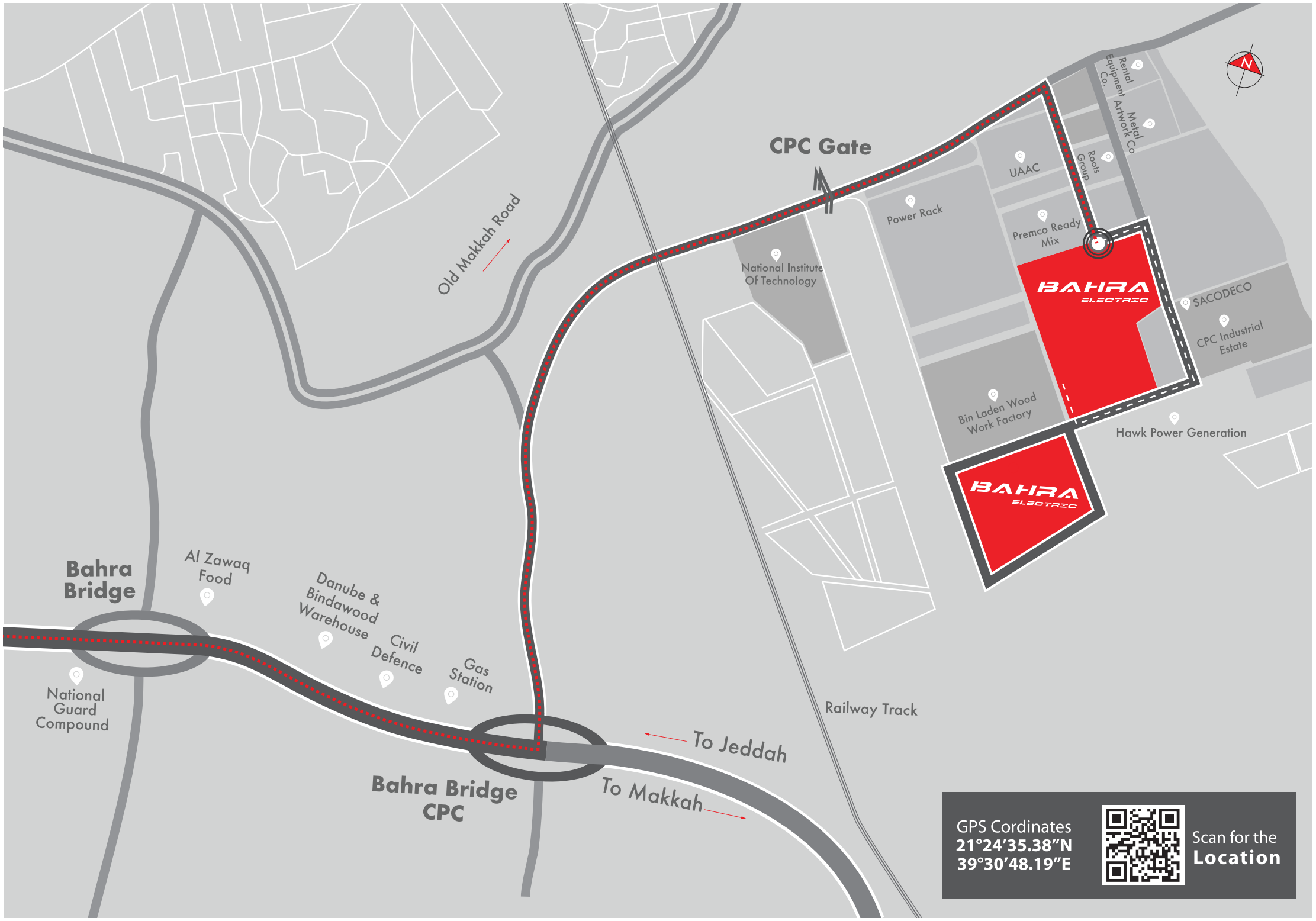
SPU // 4D SERIES

MULTI-STAGE SURGE | MEDIUM & HIGH FREQUENCY HARMONICS PROTECTIVE DEVICE IN AC LV POWER SUPPLY NETWORKS

SP 4D-100

- Specially designed for being installed in secondary industrial panels or in the main electrical panel of the installation.
- It is ideal to protect sensistive loads against MF and HF harmonics and voltage oscillations.
- High discharge capacity.
- Easy supervising and maintenance.
- Both common and differential protection mode for all protective modes.
- Adjusted thresholds to the operating voltage range.
- Network indicator light plus MCB for internal disconnection.

DEVICE MODEL	SP 4D-100
Installation mode	Parallel / Three-Phase
Nominal voltage / Frequency / Topology	230 V / 400 V / 50-60 Hz / 3L+N+PE
Connection mode to the electrical supply	MCB terminals
Recommended power of the installation to be protected	100 kVA
Network topoloy	TT, IT y TN
Elements of internal disconnection	80A MCB
Number of Indicator lights	1
Surge Response	
Protection type	1+2
Maximum voltage in continuous operation (Uc) AC	250 / 430 VAC
Current threshold (Un)/Operationthreshold	275 / 470 VAC
Response time (tA)	25 ns
Itmax (8/20) – Differential mode (Line – Neutral)	60 kA / 140 kA
Itmax(8/20) – (Line – Protective Earth / Neutral – Protective Earth)	140 kA / 140 kA
Itimp(10/350) – Differential mode (Line – Neutral)	- / 30 kA
Itimp (10/350) – Common mode (Line – Earth / Neutral – Protective Earth)	30 kA / 30 kA
Total ITmax (8/20)	1160 kA
Total ITimp (10/350)	210 kA
Number of surge protection stages	3
Frequency Response (Z = 10 Ω)	
Cut off frequency	250 Hz
Attenuation at 30 KHz	41 dB
Installation Data	
Recommended minimum section of the connecting cable	Cu 35 mm2
Recommended protection	80 A
Enclosure material	Metallic cabinet with foamed-in polyurethane gasket
Installation method	Wall mounting
Operating temperature	[-10 °C ... +85°C]
IP protection degree	IP 20
Location category	Indoor
Weight (Kg)	14 Kg
Dimmensions (mm) (Height×With×Depth)	500×400×200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Old Makkah Road
National Institute Of Technology
Power Rack
UAAC
Roots Group
Rental Equipment Co.
Metal Artwork Co
Premco Ready Mix
BAHRA ELECTRIC
SACODECO
CPC Industrial Estate
Bin Laden Wood Work Factory
Hawk Power Generation
BAHRA ELECTRIC
Railway Track
Bahra Bridge
Al Zawaq Food
Danube & Bindawood Warehouse
Civil Defence
Gas Station
National Guard Compound
To Jeddah
To Makkah
Bahra Bridge CPC
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Scan for the Location