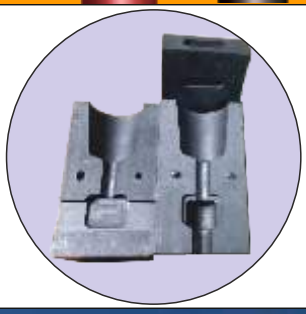
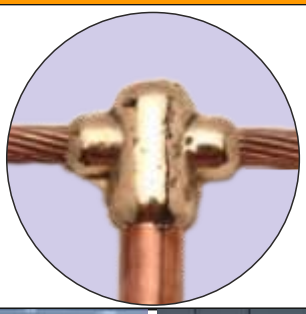
SABO

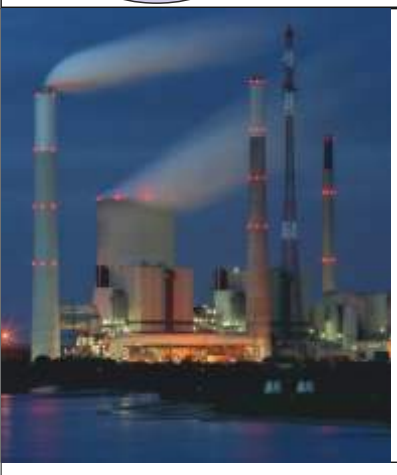
LIGHTNING, GROUNDING
& BONDING SYSTEMS

Maintenance Free Earthing System

Since - 1997







www.saboindia.com

SABO
LIGHTNING, GROUNDING & BONDING SYSTEMS

INTRODUCTION

Sabo Systems Pvt. Ltd, formed in 1997, with an aim of providing safe & quality engineered products to customers. We have expertise in Lightning Protection, Surge Protection, Maintenance Free Earthing, equipotential bonding & Exothermic welding materials. We manufacture & provide the same, considering latest technological advancements & standards. We always put at your disposal latest technology, innovate everyday & provide customized solutions also.

MISSION & VISION

Our mission is to provide optimum, safe & most advanced solutions to our customers. We aim to become a referral in the field of Lightning Protection, Surge Protection, Earthing & Bonding systems.

R & D

Our technical experts, engineers & researchers develops latest technology products for providing safe, efficient & cost effective solutions.

STANDARDS & CERTIFICATIONS

- SIGMA / METU / NABL Lab
- ISO 9001 : 2008
- IEC 61643-11
- CE
- UL 467
- IEEE 837
- IEEE 80
- IS 3043
- IS 2309
- CPRI

SERVICES

- Site Surveys
- Risk Analysis
- Technical Assistance
- Installation
- Verification
- Maintenance Solutions
- Training

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Importance of Earthing

An effective earthing system is a fundamental requirement of any structure / system for operation and safety reasons. Without earthing, safety of any structure, equipments within it and its occupants are compromised. A well designed earthing system is must for any electrical installation to avoid danger of fault currents as mentioned in various standards as below:

- India: IS 3043:1987 - Code of practice for Earthing
- Great Britain: BS 7430 - Code of practice for Earthing
- USA: UL 467 – Grounding and Bonding Equipment
- Germany:- DIN VDE 0100 – Earthing arrangements, protective conductors, equipotential bonding conductors
- France: NFC 15-100 – Low voltage electrical installations

The object of an earthing system is to provide as nearly as possible a surface under and around a station which shall be at a uniform potential and as nearly zero or absolute earth potential as possible. The purpose of this is to ensure that all equipments other than live parts shall be at earth potential and also to ensure that operator or attendant or any person shall be at earth potential at all times to avoid shock in case of short circuit or fault current. Hence, low earth resistance is must for obtaining an efficient earthing.

Conductors of suitable section should be used in order to carry expected current. Earthing associated with current carrying conductor is essential for safety of the system and is known as system earthing while earthing associated with non-current carrying conductor or metal is essential for safety of human, animal or property is known as equipment earthing.

Characteristics of good Earthing system

- Excellent electrical conductivity
- Low resistance and electrical impedance
- Conductors of the sufficient dimensions capable with standing high fault currents with no evidence of the fusing or mechanical deterioration.
- Lower earth resistance ensures that energy is dissipated into the ground in the safest possible manner.
- Lower earth circuit impedance, the more likely that high frequency lightning impulses will flow through the ground electrode path, in preference to any other path.
- High corrosion resistance
- The choice of the material for grounding conductors, electrodes and connections is vital as most of the grounding system will be buried in the earth mass for many years. High hot dipped galvanised electrodes should be used to for this purpose.
- Mechanically robust and reliable.
- Should be maintenance free.

Location for Earth

- Low lying areas close to the building or equipment are good for locating Earth Electrodes.
- The location can be close to any existing water bodies or water points but not naturally well drained.
- Dry sand, lime stone, granite and any stony ground should be avoided.
- Earthing electrode should not be installed on high bank or made-up soil.

Acceptable Earth Resistance value

The acceptable Earth Resistance at equipment level shall not be more than > 10 Ohm for any electrical installation. However, lesser earth resistance values will more efficiently dissipate the fault currents. Also, there are many equipments specially of communications where low earth resistance values upto <0.5Ohm is required.

Earth Conductor & Earthing Conductor

Most important component of earthing is earth conductor size to be used for earthing. Conductors used are flat type/solid round & stranded cable type. Different countries uses different colour codes, it is preferred GREEN in India.

Copper & steel joints should not be made as it is highly corrosive.
Where copper conductor is joined to Aluminium, the copper should be tinned.
Buried copper conductor should be of minimum 25mm^2 & buried steel conductor of 50mm^2.
Aluminium conductors are not used for underground connections to earth electrode.
Connections of earthing conductor to earth electrode or other means of earthing should be accessible & joints should be made through non ferrous metal clamps or soldered or exothermic welded.

SABO GI / Copper / Copper bonded Pipe Earth Electrodes

These are made of dual pipe / flat in pipe / single pipe technology. Inner space is filled with highly conductive, corrosion resistant crystalline mixture (CCM) which provides low earth resistance during all seasons.

MODEL NO.	OUTER PIPE DIA (mm)	INNER PIPE DIA (mm)	INNER FLAT SIZE(mm)	TERMINAL (mm)	TERMINAL HOLE(Nos*mm)
SCE 40XYZ	40	19	32 * 6	75*32*6	2*12
SCE 50XYZ	50	19	32 * 6	75*32*6	2*12
SCE 80XYZ	80	40	50 * 6	75*50*6	2*12

Where

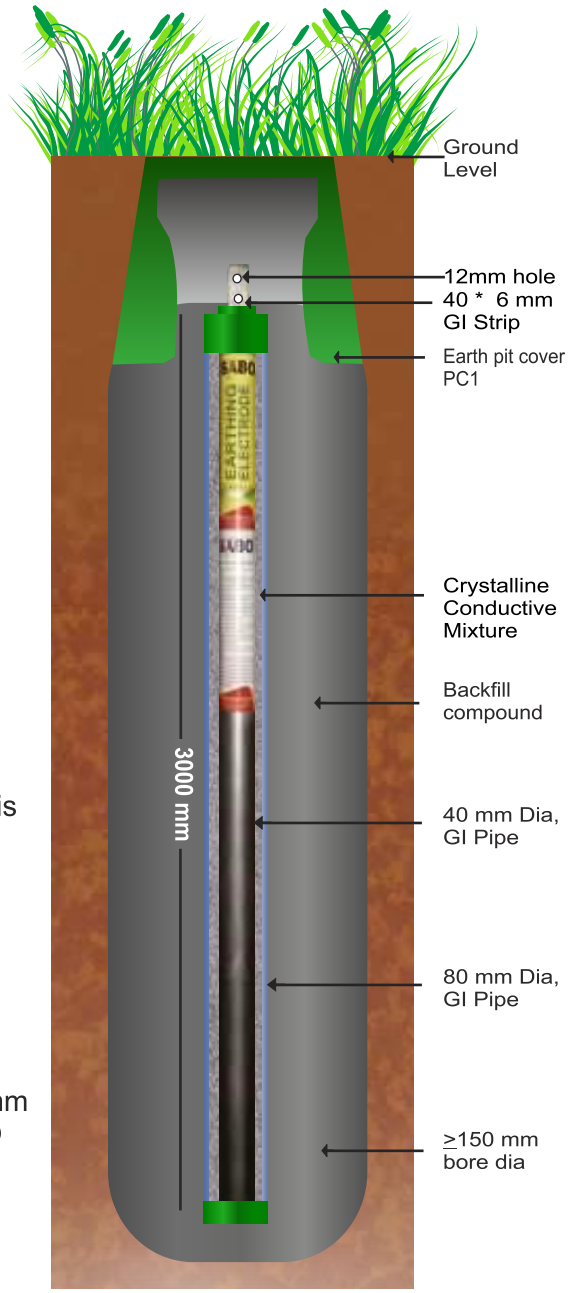
X - GI / Copper electrode / Copper bonded

Y -Type of electrode, i.e. Dual pipe / Flat in pipe / Single pipe technology

Z -Length of electrode, i.e. (in mm)

EARTHING ELECTRODE consists of primary G.I.Conductor (outer pipe) and secondary G.I.Conductor (inner - pipe/Strip) galvanization is 80 – 100 microns.The secondary Conductoris inserted inside the primary Conductor. The space between the primary and the secondary electrode is duly filled with a highly conductive and non-corrosive compound which safeguards the electrode getting corrode over a long period of time under the soil.

All measurments are in MM, PC = Primary Conductor & SC = Secondary Conductor



EARTHING INSTALLATION PROCEDURE:

1. Dig an earth pit of 125 - 150 mm dia of required depth.
2. Wet the side walls of the earth pit & soil surrounding it & allow water to settle down.
3. Now make thick paste of SABO back-fill compound by mixing 3kg compound with 2 litres of water.
4. Pour the paste inside the earth pit and placeearth electrode in the centre of the pit.
5. Now again make paste of SABO back-fill compound by mixing 5kg compound with 5 litres of water and pour inside the pit.
6. Repeat the process till complete pit gets covered with compound.
7. Care should be taken while mixing the compound that no debris or plastic or air gap remains in the mixture
8. Place SABO earth pit cover at the top of the earth pit in such a way that its top level is same as Ground Level.
9. Measure the earth resistance after couple of days once the compound gets set.
10. At locations where desired earth resistance is not achieved by single earthpit, then multiple earth pits should be installed at a distance of 3m from each other and connected together by suitable strip.This interconnecting strip should be buried 500 mm below the ground level for interconnection & covered by SABO backfill compound paste.

Copper Bonded / Coated Earthing Electrode (Solied Rod Type)

EARTHING ELECTRODE consists of low carbon high tensile steel Rods with molecularly Bonded with 99.9% pure Copper with provision for clamp / Terminal at the top for connecting earthing strip to the Machineries / equipments.

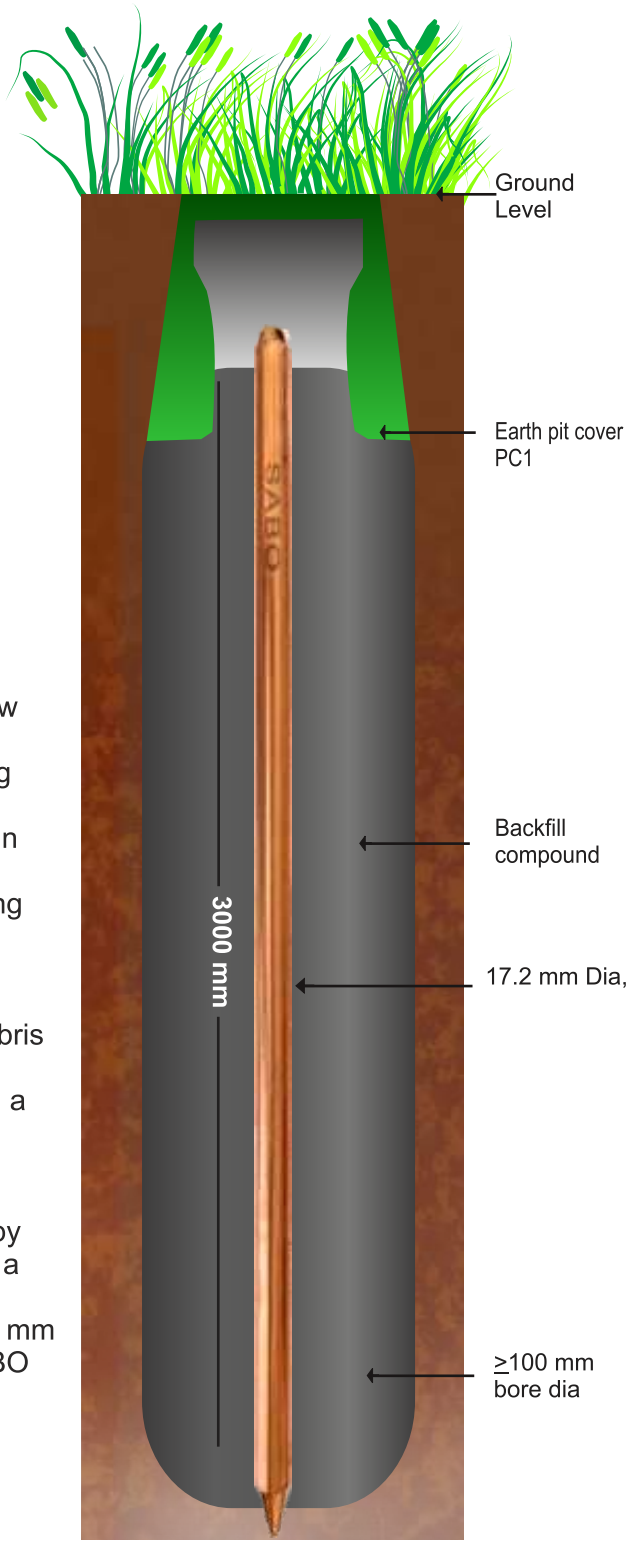
MODEL NO.	DIA (")	DIA (mm)
SCBR 12 XYZ	1/2	12.7
SCBR 12 XYZ	5/8	14.2
SCBR 12 XYZ	3/4	17.2

Where
- X - Copper bonding thickness (in microns)
- Y - Length of rod (in mm)
- Z - Threaded / Unthreaded

Good earth rods are commonly made from either copper, stainless steel or copper bonded steel. Copper bonded steel rods are preferred & most popular across the world due to its combination of corrosion resistance, strength, low cost & fairly high conductiveness.

SABO copper bonded steel earth rods are mild steel of very high grade & tensile strength. They can be driven by power hammers to greater depth. Couplers are used to increase the length of copper bonded rods. SABO couplers are made of copper alloy which are corrosion resistance & high strength. These are of two types, compressed type & threaded type.

SABO SCBR are being manufactured in various lengths and dia with plain & threaded ends. Copper coating thickness upto 400 microns are manufactured but recommended to minimum 250 microns.



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BACKFILL EARTHING COMPOUND

We are engaged in offering a wide range of Back Filling Earthing Compound to our clients. These products are used to improve the conductivity of the earth electrode and ground electrode. The products that we offer to our clients are manufactured using high grade raw material using high technology machines. Our professionals manufacture these products keeping in mind the needs and requirements of our clients as per the set international standards. The product that we offer in this category is Earth Resistance Enhancement Compound. These products are in huge demand across the globe.

Back Fill Compound (SABO-EREC)

SABO-EREC is a superior conductive material that improves earthing effectiveness, especially in areas of poor conductivity (rocky ground, areas of moisture variation, sandy soils etc.). NABL Lab tested 0.039 Ohm-m resistivity. It improves conductivity of the earth electrode and ground contact area.

Features:

- high conductivity, improves earth's absorbing power and humidity retention capability.
- non-corrosive in nature having low water solubility but highly hygroscopic.
- suitable for installation in dry form or in a slurry form.
- does not depend on presence of water to maintain its conductivity.
- permanent & maintenance free and in its "set form", maintains constant earth resistance with time.
- thermally stable between -100 C to + 600 C ambient temperatures.
- does not require periodic charging treatment nor replacement and maintenance.
- suitable for any kind of electrode and all kinds of soils of different resistivity.
- does not pollute the soil or local water table and meets environmental friendly requirements for landfill.
- non explosive.
- does not cause burns, irritation to eye, skin etc.

Ground Resistivity Improver Compound (ERECON)

This is non corrosive, has capacity to absorb & retain moisture from the surrounding. Being non soluble in water, it stays at the place and in not washed out by the rain water/underground water. This mineral filling compound is highly conductive. Back fill compound : Back fill compound is a conductivity improver compound. It is a specially developed compound for having quality of highly conduciveness, non corrosive, absorbing & retaining the moisture for a long time.

Features

High conductive
Non corrosive
Reduce soil resistivity
Retain moisture for a long time

Gel Earthing

SABO earthing electrode consists of primary earthing electrode (outer pipe) of 99.9% pure copper pipe. The hollow space of the electrode is duly filled with a highly conductive and non-corrosive compound which safeguards the electrode against any corrosion and helps in faster dissipation of the fault or leakage current flowing through the earthing electrode.

Both the ends of the earthing electrode are permanently sealed and the top portion of the copper pipe electrode is compressed under a hydraulic machine to form a lead terminal provided at the top with the 2 holes for connecting to the load/equipment. Since there is no joint on the top portion of the copper pipe earth electrode, the dissipation of the current is ensured to the maximum level and the ohmic value is maintained precisely. Depending upon the soil conditions, back fill compounds are selected to install along with the earthing electrode. Reslow grounding minerals are selected for normal soil conditions & Carbofill grounding minerals is selected for rocky / sandy soil conditions.

EARTH PIT COVER

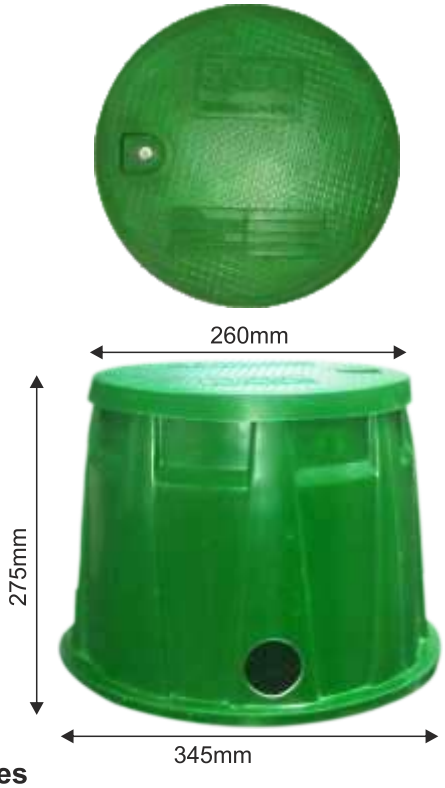
We are a leading manufacturer and supplier of a variety of Earth Pit Cover for our clients. These products are manufactured using superior quality raw material which is sourced from the most reliable vendors of the market. The products offered by us are made as per the set international norms. These products are manufactured keeping in mind the requirements of our clients and are available at the most affordable rates to our clients. The products that we offer in this category are Polyplastic Earth Pit Cover and Earth Pit Cover. These products are in huge demand and are widely appreciated for their durability, efficiency and good quality.

SABO PIT COVER

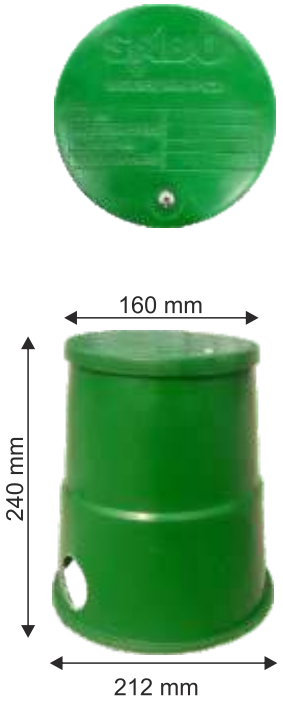
We offer our clients a wide range of Polyplastic Earth Pit Cover. These products are manufactured using high grade raw material using latest technology machines. Offered products are manufactured under the guidance and supervision of our quality check experts who ensure that they deliver only good quality products to our clients. The Plastic pit cover offered by us are made keeping in mind the needs and requirements of our clients.

These products are in wide demand across the globe because of the features listed below:

MODEL No. - SABO PC1



MODEL No. - SABO PC2



Fatures

- Made of heavy duty FRP (Fibre Reinforced Plastic).
- FRP material provides high mechanical strength & zero water absorption.
- High Load bearing capacity.
- Eco friendly - Green colour body and green top cap matches the earthing environment.
- Maintenance free / life long.
- Eliminates expenses of cement / aggregates / masonary works.
- Easy to install & no expertise required.
- Light weight for ease in transportation.
- Ease in checking earthing during maintenance.
- Lockable arrangement through stainless steel nut bolt / screw.
- Factory built holes for cable routing the strip or cable for interconnection.
- SABO PC1 / PC2 embossed at top cover.

Pit No.	
Resistance(Ω)	
Test date	
Test due date	

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READYMADE EARTHING KIT

Specification

1. Robust packing consist of :
   a. 17.2mm 4' long copper bonded rod-SCBR17204
   b. 5kg backfill compound
   c. Clamp for connecting rod to strip / cable
2. Maintenance free earthing solution
3. Highly efficient
4. Easy to carry
5. Suitable for all type of soil / terrains and climatic conditions.

Application

1. Equipment body earth
2. Domestic earthing & Solar panel earthing
3. Suitable for load upto 5KVA, for larger capacity loads, multiple earthing should be done in parallel

Installation procedure:

1. Dig a bore of 100-150mm dia & 1.2m deep
2. Pour 5 litres of water inside the kit & 20 litres of water in soil surrounding the kit.(for rocky soil this step is not required).
3. Make paste of 2 kg compound after mixing 5 litres of water. Mixing of compound with water should be made thoroughly by hand or stick till it take form of homogenous paste or say till 5 minutes.
4. Now pour this paste inside the pit.
5. Insert electrode / rod at the centre of pit & hammer it so that some part should move inside the ground & electrode gets grip.
6. Now fill the hole with the remaining compound paste after mixing with water in the same procedure.
7. Connect equipment and earthing through wire / cable / strip / clamp fitted at the top of the electrode.

EXOTHERMIC WELDING

We offer our clients a wide range of Exothermic Welding to our clients. These products are manufactured using high grade raw material. These products are mainly used in bonding in which one conductor / connector gets molecularity bonded to the other conductor/connector. The products offered by us are available at the most affordable rates to our clients. These products are in huge demand across the world.

Main features:

- Molecular bonding of copper and other metals can be made
- Current carrying capacity becomes equal to or greater than the conductor
- Will not deteriorate with age
- Withstand repeated faults
- Can be checked visually
- No special skills and labor required
- Never loosen or corrode
- No external power is required for jointing
- Easy to handle & Transportable

Applications:

Ideal for all earthing joints, strip joints, solid wire joints, rod joints, cable joints, wire and lug connections, cable and rail joints, continuity bonding and track circuiting, Grounding & bonding and lightning protection in power plants , substations , transmission line , refinery , industrial plant , commercial plants , telecommunication tower , building , housing etc.





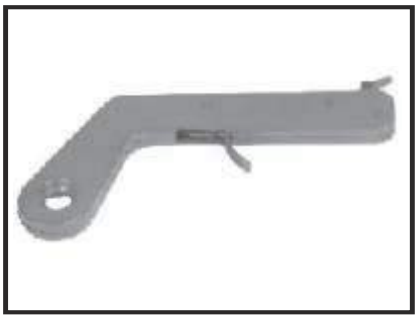



Graphite Mould

SABO-Graphite Mould can be used for more than 50 numbers of joint. For every type and size of joint different graphite moulds are used. Exact sizes of the two metal / conductors for which the exothermic welding is required for selection of the mould and weld metal. Based on the joint size / type exothermic weld powder quantity is decided.

Exothermic Welding Materials & Accessories

This heavy duty brush makes mold cleaning quick and easy.Hefty wooden handles stand up to repeated use. Stiff naturalbristles ensure rapid mold cleaning without harming the softgraphite molds



GROUNDING COUPLERS & CLAMPS

Coupler :-

A coupling is a device used to connect two shafts together at their ends for the purpose of transmitting power. Couplings do not normally allow disconnection of shafts during operation, however there are torque limiting couplings which can slip or disconnect when some torque limit is exceeded.

The primary purpose of couplings is to join two pieces of rotating equipment while permitting some degree of misalignment or end movement or both. By careful selection, installation and maintenance of couplings, substantial savings can be made in reduced maintenance costs and downtime.

Compression Coupler

A wide assortment of Ground Rod Couplings is offered to our prestigious clients. The products offered by us are widely demanded by the clients for their varied use. Our products are made by using copper alloy. They have chamfered on both the ends in order to easy driving. Highly resistant to corrosion these products are known for their long service life.

Features:

- Reliable
- Accurate results
- Corrosion resistant

Threaded Coupler

A wide assortment of Ground Rod Couplings is offered to our prestigious clients. The products offered by us are widely demanded by the clients for their varied use. Our products are made by using copper alloy. They have chamfered on both the ends in order to easy driving. Highly resistant to corrosion these products are known for their long service life.

Features:

- Reliable
- Accurate results
- Corrosion resistant

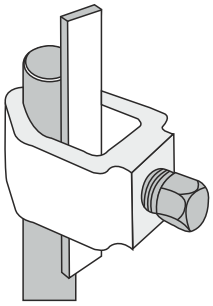
CLAMP :-

A clamp is a fastening device to hold or secure objects tightly together to prevent movement or separation through the application of inward pressure. In the United Kingdom and Australia, the term cramp is often used instead when the tool is for temporary use for positioning components during construction and woodworking; thus a G cramp or a sash cramp but a wheel clamp or a surgical clamp.

There are many types of clamps available for many different purposes. Some are temporary, as used to position components while fixing them together, others are intended to be permanent. In the field of animal husbandry, using a clamp to attach an animal to a stationary object is known as "rounded clamping." A physical clamp of this type is also used to refer to an obscure investment banking term; notably "fund clamps." Anything that performs the action of clamping may be called a clamp, so this gives rise to a wide variety of terms across many fields.

Rod to Clamp - B Type

- Earthing Equipments/Fittings
- Rod to cable-type 'B' suitable for use with a combination of rod size and conductors
- Material : high grade copper alloy
- Bolt : stainless steel-sabo301



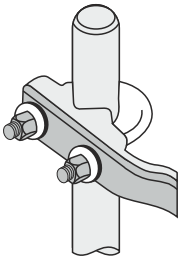
Nom. Rod	Hole Centers	Product Code
5/8"	26 x 12	SBC-1
5/8"	40 x 12	SBC-2
5/8"	51 x 12	SBC-3

U Clamp

We hold specialization in providing a broad array of U Clamps to the clients. These products are manufactured using premium grade raw material, which is procured from trustworthy vendors of the market. We offer these products in different sizes, shapes and other specifications to our respected patrons. Post production, these products are checked on predefined parameters by our quality controllers.

Mentioned below are some of the attributes of these products

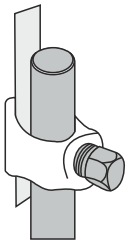
- Dimensionally accurate
- Corrosion resistant



Nom. Rod	Hole Centers	Product Code
5/8'	37 mm	SUC-16
3/4'	37 mm	SUC-20
1'	37 mm	SUC-25

G-Clamp

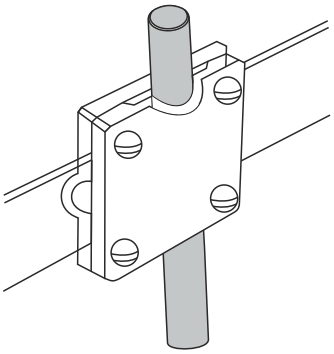
- Earthing Equipments/Fittings
- Rod to cable-type 'g' suitable for use with a combination of rod size and conductors
- Material : high grade copper alloy
- Bolt : stainless steel-sabo301



Nom. Rod	Max Cond.	Product Code
3/8"/9.5	35 mm^2	SGC-1
5/8"/16	50 mm^2	SGC-2
5/8"/16	70 mm^2	SGC-3
3/4"/20	95 mm^2	SGC-4

SQUARE CLAMP

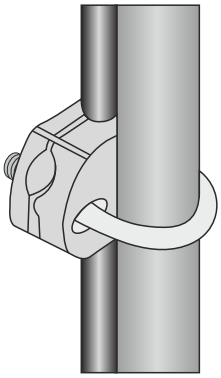
- Square Clamp With combination
- Suitable to connect conductor to tape
- Material : HIGH GRADE COPPER ALLOY
- Fasteners : STAINLESS STEEL-SABO 304

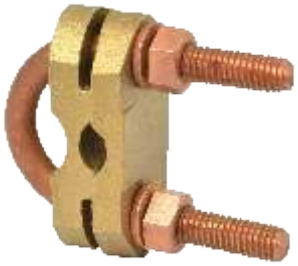


Conductor Size mm^2	Product Code
25 x 3	SSC - 253
25 x 4	SSC - 254
25 x 6	SSC - 256
50 x 6	SSC - 506

Rod to Cable Clamp - U Bolt

These are used for connecting Rod to Cable.
Available with different Rod & Cable Size.
Material : Gunmatel Plates with 'U' Bolt





Nom. Rod Dia. to Cable Dia.	Conductor Range mm^2	Product Code
5/8" to 16mm	16 - 95	SUBC-1
3/4" to 20mm	16 - 70	SUBC-2
1" to 16mm	70 -185	SUBC-3
5/8" to 20mm	70 - 150	SUBC-4

GI STRIP & CABLE

SABO

LIGHTNING, GROUNDING
& BONDING SYSTEMS

SABO SYSTEMS PVT LTD

(ISO 9001:2015 Certified)

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