

CPRI TESTED & CERTIFIED

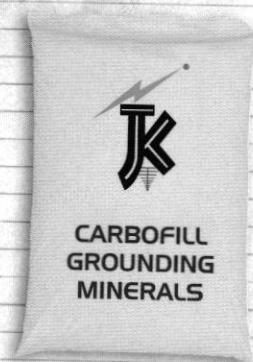
ISO 9001:2008 & ISO 14001:2004 CERTIFIED MANUFACTURER



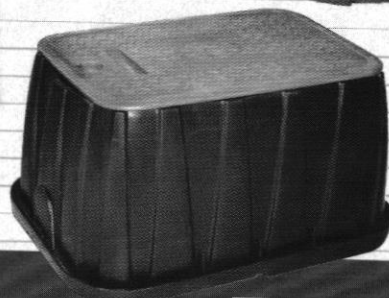
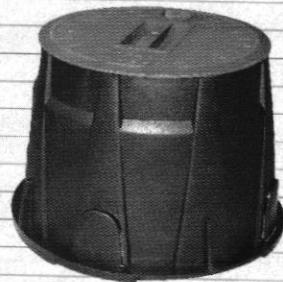
JK Earthing Electrodes Pvt Ltd



**RESLOW
GROUNDING
MINERALS**

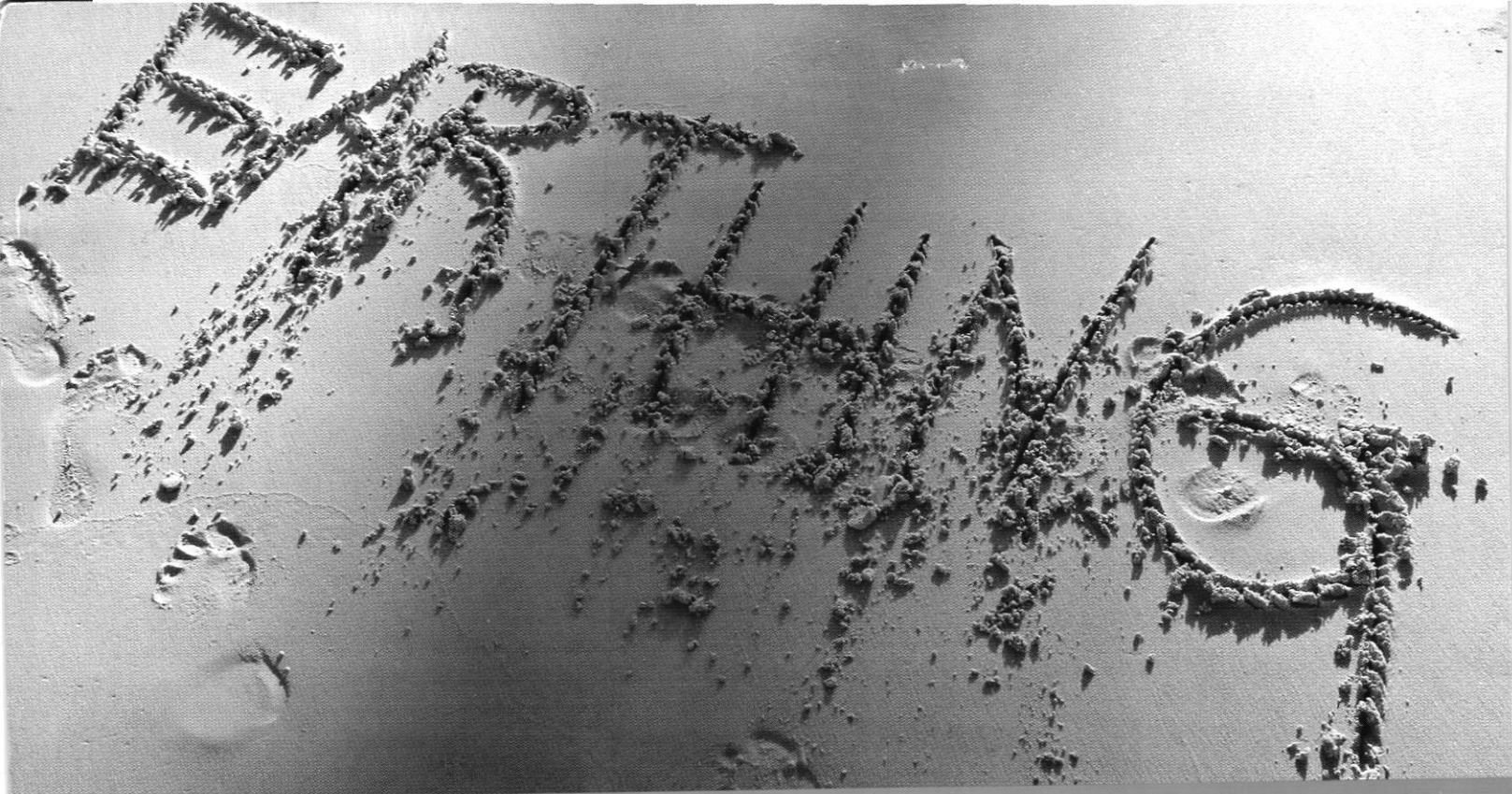


**CARBOFILL
GROUNDING
MINERALS**



www.gelearthing.com

Earthing Simplified



[JK Earthing Electrodes Pvt. Ltd.

Our business is focused on the protection of man and the environment. Founded in 2003, we research, design, develop, manufacture and market high technology systems which solve very specific problems in specialized area of earthing/grounding system.

From dedicated teams of design engineers developing new products to meet the ever-changing demands of the market place, to accredited engineers that can design earth electrode systems to Indian Standards or any other recognized national or international standard, JK technical expertise is focused on the customer.

Our object is to supply safe and efficient products of the highest quality based on state of the art technology utilizing the latest manufacturing processes in accordance to both national and international standards. In this way, we provide our clients with solutions they can trust.

Chemical earthing process is defined in IS 3043:1987 (Code of practice for earthing) under the term of "Artificial Treatment of Soil" and JK Earthing Electrodes confirm to the same.

The equipments and gadgets were also designed & manufactured in such a way to withstand by the method of grounding/earthing for electrical use. The earthing system is being continued to till date without much changes and no revolution in the earthing system. On the contrary, much modernized & sensitive components are being used nowadays for which no appropriate growth or inventions in the grounding/earthing system except the same traditional methods and hence JK Earthing Electrodes came up with the solution which has fetched very good results for electrical safety.

[Certifications

As a registered company, we have a well established quality control system for all our divisions certified as meeting the requirements of ISO 9001: 2008 & ISO 14001:2004

JK CHEMRODE are duly tested & certified from CPRI (Central Power Research Institute, Bangalore), Government of India to ensure the performance of short-circuit handling capacity.

JK RESLOW & JK CARBOFILL grounding minerals are duly analyzed and the compositions are certified by NABL & BIS (Bureau of Indian Standards), Government of India accredited laboratory.



[Introduction

Electrical earthing/grounding and bonding are an integral part of any electrical system. An effective, low-impedance earthing/grounding system is a vital element and it is crucial in ensuring personnel safety as well as providing reliable protection for electrical/electronics equipment.

Prime Objective of Earthing is to provide a Zero potential surface in and around and under the area where the electrical equipment is installed or erected.

To achieve this objective the non-current carrying parts of the electrical equipment is connected to the general mass of the earth which prevents the appearance of dangerous voltage on the enclosures and helps to provide safety to working staff and public.

The function of earthing electrode is to ensure continuous electrical contact with the earth. Proper electrical earthing will minimize the interruptions of service and costly breakdown/downtime.

NEED FOR GOOD EARTHING

- To save human life from danger of electrical shock or death by blowing a fuse.
- To protect buildings, machinery & appliances under fault conditions.
- To provide safe path to dissipate lightning and short circuit currents.
- To provide stable platform for operation of sensitive electronic equipments i.e. To maintain the voltage at any part of an electrical system at a known value so as to prevent over current or excessive voltage on the appliances or equipment
- To provide protection against static electricity from friction.
- Electrical noise reduction.

The fundamental fact of electricity is that it always flows to the point of lowest potential. Electrical earthing/grounding ensure that electricity including faults, lightning and electronic noise are flown to this point with maximum safety to people and at the same time the reliability

of equipment is also maintained. Earthing/grounding varies depend upon the application. The earthing/grounding requirements of a power system will vary from those of electrical equipment, lightning protection or for the proper function of electronic equipment.

To design a proper electrical earthing, one should have the knowledge of the needs and layout of the facility. A well designed and efficient electrical earthing depends upon soil characteristics, earthing/grounding conductor materials, earthing/grounding connections and terminating points. International & national standards also play a vital and supporting role in designing of electrical earthing system.

The well designed electrical earthing system must:

- Efficiently dissipate lightning energy to the ground with the less ground potential rise.
- Efficiently dissipate electrical surges

- Dissipate the fault currents to minimize the chances of injury from "step potentials" or "touch potentials"

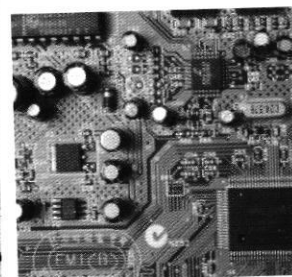
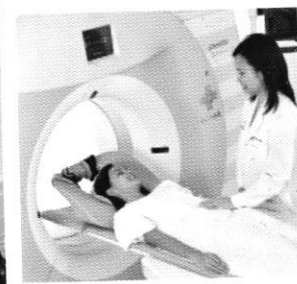
- Step Potential - Step Potential is the voltage difference between a person's feet caused by the dissipation gradient of a fault entering the earth.

- Touch Potential - Touch Potential is similar to 'Step Potential' except that the fault current passes through the person's arm and torso on the way to the ground.

- Electrically and mechanically robust design to assure performance over the longer period of time.

- Provide a stable reference for electrical and RF circuits at the facility to minimize noise during normal operation.

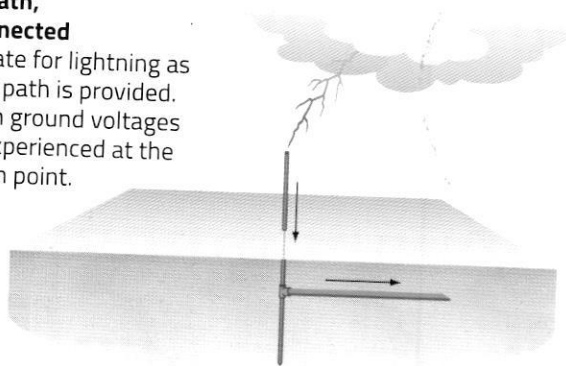
- Properly bonded to provide an equipotential under fault conditions.



COMMON EARTHING SYSTEMS

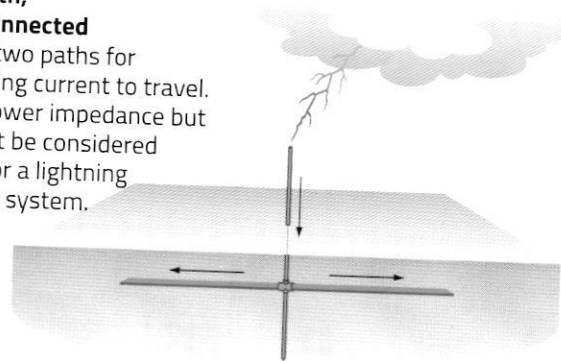
1. Single Path, End Connected

Inadequate for lightning as only one path is provided. Very high ground voltages will be experienced at the injunctuon point.



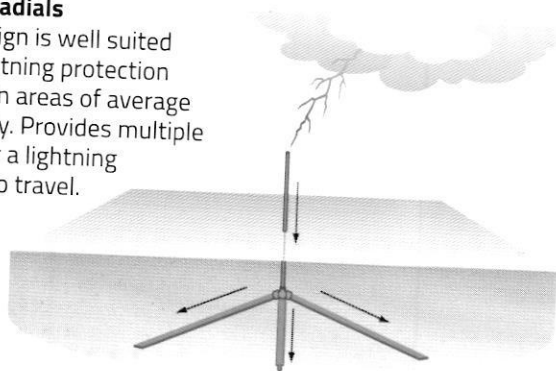
2. Single Path, Centre Connected

Provides two paths for the lightning current to travel. Offers a lower impedance but should not be considered suitable for a lightning protection system.



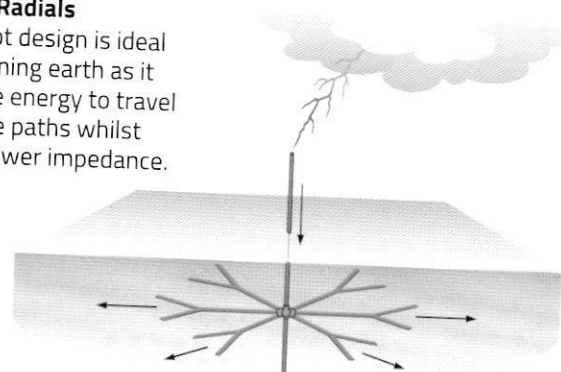
3. Radical Earth with Single Radials

This design is well suited for a lightning protection system in areas of average resistivity. Provides multiple paths for a lightning current to travel.



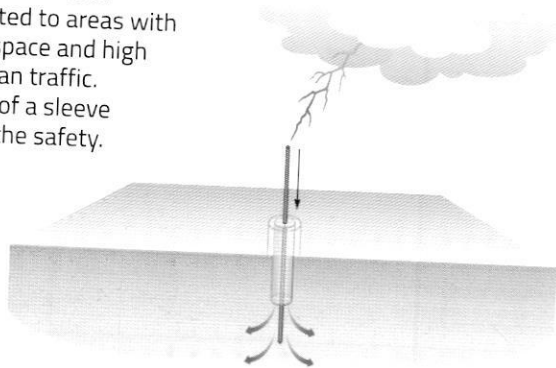
4. Radical Earth with Multiple Radials

Crows foot design is ideal for a lightning earth as it allows the energy to travel in multiple paths whilst offering lower impedance.



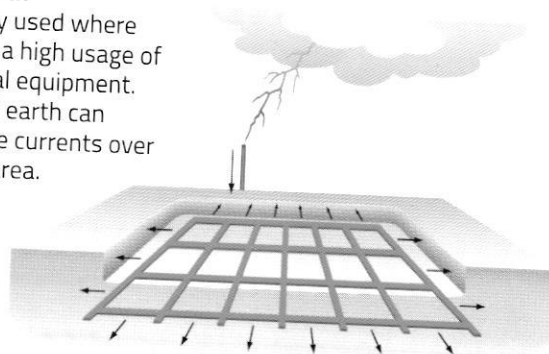
5. Deep Driven Earth

Best suited to areas with limited space and high pedestrian traffic. The use of a sleeve adds to the safety.



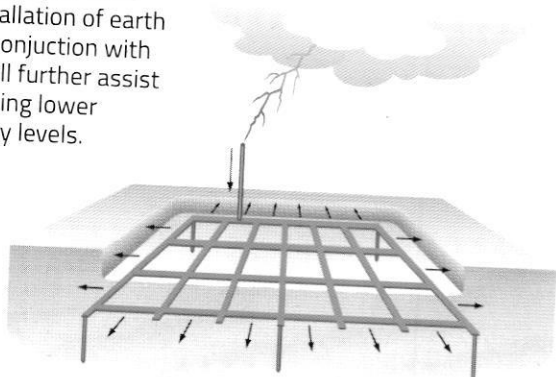
6. Grid Earth

Typically used where there is a high usage of electrical equipment. The grid earth can dissipate currents over a large area.



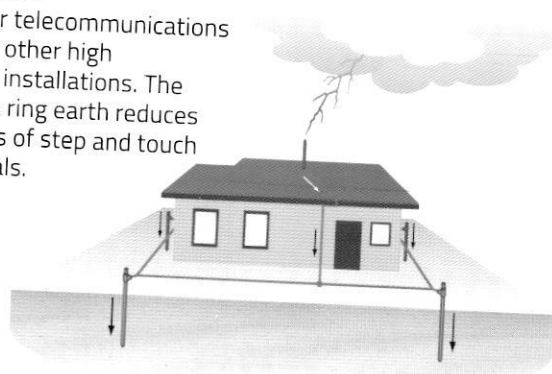
7. Grid with Earth Rods

The installation of earth rods in conjunction with a grid will further assist in providing lower resistivity levels.



8. Ring Earth

Ideal for telecommunications sites or other high voltage installations. The use of a ring earth reduces the risks of step and touch potentials.



[JK CHEMRODE

The core of "JK" brand earthing electrode is termed as "CHEMRODE" which consists of the various constructions & designs listed below.

[**JK CHEMRODE** consists of primary earthing electrode (outer pipe) and secondary earthing electrode (inner pipe). The secondary electrode is inserted inside the primary electrode and the process of hot dip galvanization is well performed. 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.

Also the compound ensures the easy distribution of leakage/fault current lands on the electrode. Both the ends of the electrode are permanently sealed at both the ends with the lead terminal at the top with 2 holes on the terminal for connecting to the load/equipment.

JK CHEMRODE consists of primary earthing electrode (outer pipe) and a strip inside. The strip is inserted inside the primary electrode to the full length from top to bottom and the process of hot dip galvanization is well performed to a level of 80 - 100 microns. The space between the outer pipe and the strip 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.



[Dual Pipe Technology (G.I.)

Technical Specification

Code	Length (mm)	Outer Dia (mm)	Inner Dia (mm)	Terminal (mm)	G.I. Pipe
JK 250	2000	46-50	23-25	32x10	✓
JK 350	3000	46-50	23-25	32x10	✓
JK 280	2000	76-80	47-50	50x10	✓
JK 380	3000	76-80	47-50	50x10	✓

[Strip in Pipe Technology (G.I.)

Technical Specification

Code	Length (mm)	Outer Dia (mm)	Strip Size (mm)	Terminal (mm)	G.I. Pipe
JK 250F	2000	46-50	32x10	32x10	✓
JK 350F	3000	46-50	32x10	32x10	✓
JK 280F	2000	76-80	50x10	50x10	✓
JK 380F	3000	76-80	50x10	50x10	✓

[Single Pipe Technology (G.I.)

Technical Specification

Code	Length (mm)	Outer Dia (mm)	Terminal (mm)	G.I. Pipe
JK 250S	2000	46-50	32x10	✓
JK 350S	3000	46-50	32x10	✓
JK 280S	2000	76-80	50x10	✓
JK 380S	3000	76-80	50x10	✓

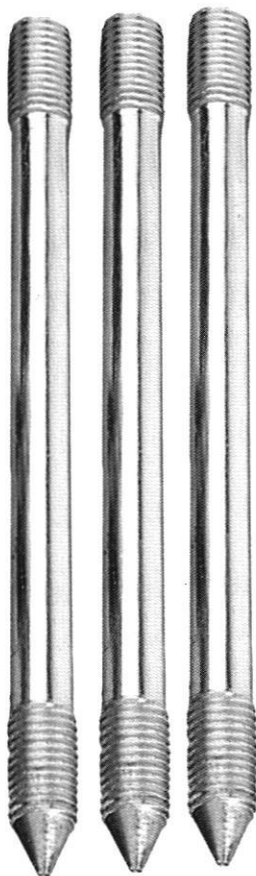


[Copper Bonded Rod

JK CHEMRODE are of **UL listed** copper bonded earth rods are of a high quality which comply by the most demanding regulations, for efficient and long lasting earthings. Copper bonded rods are made by molecularly bonding pure electrolytic copper (99.9%) onto a low carbon, high tensile steel core with exceeding 0.254 mm (254 microns) thick.

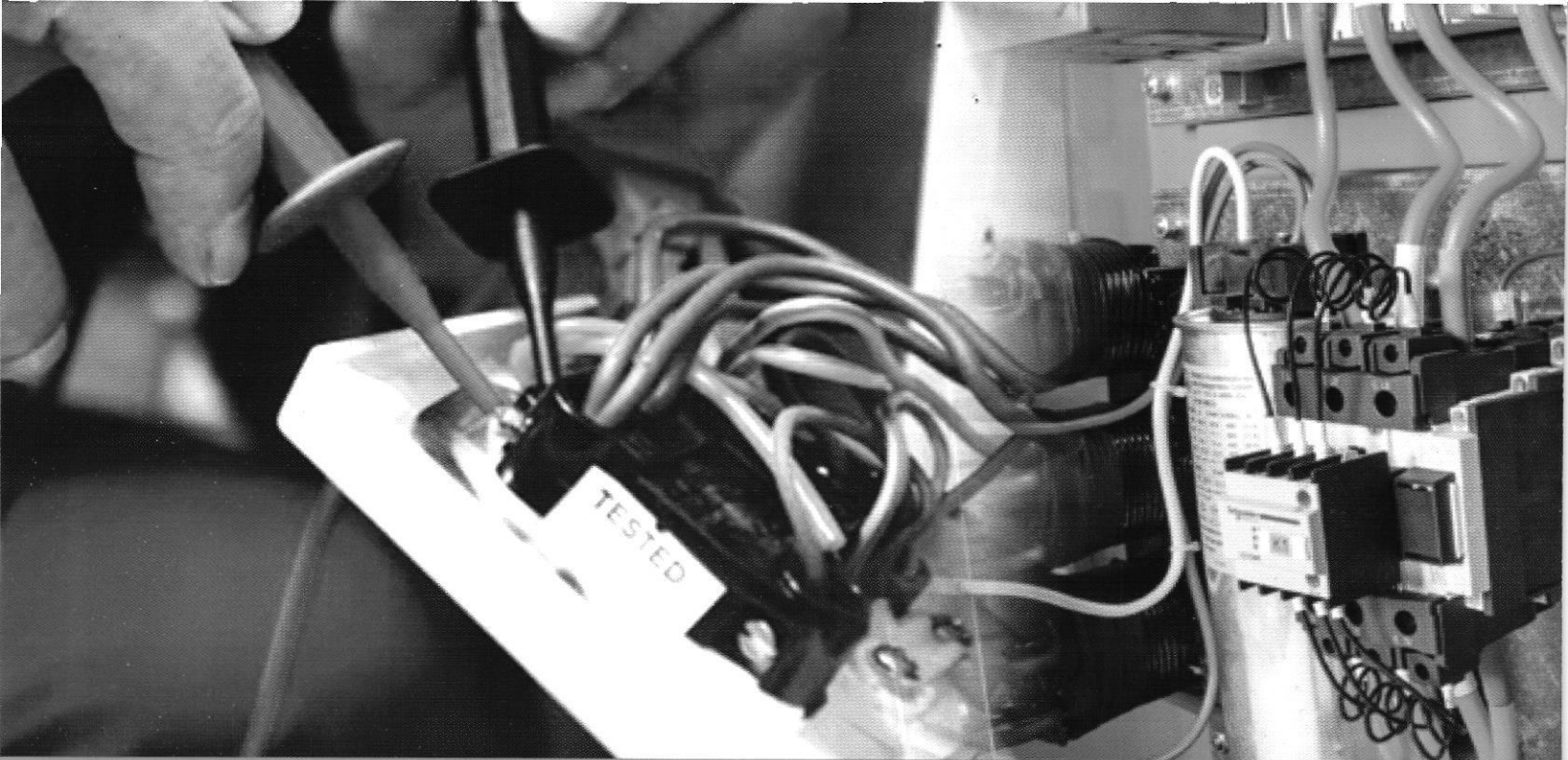
Low carbon & high tensile steel core is selected to ensure a perfect and even bonding between the steel and copper. The thickness of the copper layer is of minimum 254 microns to meet the UL 467 standard.

The low carbon tensile steel comply with UL 467, BS 970 & AISI 1018 that has great capacity of being stretched or extended at least up to 600 N/mm². The steel rods are extremely opposed to oxidization and add a lot of strength & longevity to electrical grounding system.



Technical Specification

Code	Length (feet)	Diameter (inch)	Copper Bonding Thickness
JK 1208CBR	8	1/2	254 microns
JK 1210CBR	10	1/2	254 microns
JK 1212CBR	12	1/2	254 microns
JK 5808CBR	8	5/8	254 microns
JK 314CBR	10	5/8	254 microns
JK 5812CBR	12	5/8	254 microns
JK 3408CBR	8	3/4	254 microns
JK 317CBR	10	3/4	254 microns
JK 3412CBR	12	3/4	254 microns
JK 0108CBR	8	1	254 microns
JK 0110CBR	10	1	254 microns
JK 514CBR	5	5/8	254 microns
JK 517CBR	5	3/4	254 microns



[Copper Pipe Electrode

JK CHEMRODE consists of a 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 secondary electrode getting corrode over a long period of time under the soil.



Also the compound ensures the easy distribution of leakage/fault current lands on the electrode. Both the ends of the electrode are permanently sealed and the top portion of the earth electrode is compressed to form an extended lead with 2 holes on the terminal for connecting to the load/equipment.

Technical Specification

Code	Length (mm)	Outer Dia (mm)	Copper Pipe
JK 250C	2000	47-50	✓
JK 350C	3000	47-50	✓
JK 263C	2000	60-63	✓
JK 363C	3000	60-63	✓
JK 280C	2000	77-80	✓
JK 380C	3000	77-80	✓

[Copper Bonded Pipe Electrode

JK CHEMRODE consists of a primary earthing electrode of copper bonded M.S. Pipe. Copper bonded pipe electrodes are made by molecularly bonding pure electrolytic copper (99.9%) with the thickness/bonding of ranging from 50 to 250 microns.



Low carbon & high tensile steel pipe is selected to ensure a perfect and even bonding between the steel and copper. The hollow space of the electrode is duly filled with a highly conductive and non-corrosive compound which ensures the easy distribution of leakage/fault current lands on the electrode. Both the ends of the electrode are permanently sealed and the top portion of the earth electrode is compressed to form an extended lead with 2 holes on the terminal for connecting to the load/equipment.

Technical Specification

Code	Length (mm)	Outer Dia (mm)	Copper Bonded M.S. Pipe
JK 250CBP	2000	47-50	✓
JK 350CBP	3000	47-50	✓
JK 280CBP	2000	77-80	✓
JK 380CBP	3000	77-80	✓

Note: Dual Pipe Technology of Copper electrode can be supplied if required.

[RESLOW Grounding Minerals

JK EARTHING ELECTRODES has introduced an illustrious compound "RESLOW" grounding minerals which is used around the earth electrodes in order to reduce the resistance between soil & the electrode. RESLOW grounding minerals is a combination of graphite, natural earth minerals, etc which is of hygroscopic property to retain the moisture for a long time. RESLOW grounding minerals is a combination of totally corrosion free and highly conductive & non-corrosive minerals. Reslow grounding minerals will form a low resistance zone surrounding the electrode and provide an easy path for the fault/leakage current dissipation. During installation with proper water pouring, the reslow grounding minerals will convert into the gel formation and its quality to retain the moisture upto twenty times of its dry volume as well as it create a gel layer surrounding the electrode.

The life of the earthing electrode surrounded by the reslow grounding minerals is considerably long compared to the conventional salt & charcoal based system. Since the content of the reslow grounding minerals are extracted from the natural minerals, it is more of environment friendly and suitable to use under the soil. JK reslow is constantly hydrating and absorbs any naturally available moisture from the environment and ensure the stable resistance even in dry conditions. Reslow grounding minerals is available in 25 Kgs bag.



[CARBOFILL Grounding Minerals

Carbofill is a low resistance high conductivity carbon based backfill material, which dramatically lowers ground resistance system in difficult soil conditions. JK Carbofill contains no bentonite or concrete components, which in very dry conditions can cause shrinkage around the electrode, thus rendering it ineffective.



During construction, gelling liquid penetrates into soil and thus forming a conductive layer contacting with the electrode closely. Therefore, the effective contact area between the electrode and compound layer are increased and the contact resistance between them is reduced, which is beneficial to current discharge and resistance reduction. The natural features of strong absorbent and moisture retention keep the soil moist for a long time, and reduce the surrounding soil resistance so that the contact resistance between the soil and core of the electrode.

pH adjusting agent can maintain pH value around the grounding material within the scope of protection. Metal corrosion inhibitor will passivate the surface of the electrode rapidly after construction to prevent the corrosion of the electrode and it also works even pH adjusting agent stop working. The colloid formed through mixing

compound with water during construction closely attached to grounding electrode after mixing with the soil, thus preventing oxygen and corrosive medium in soil from corrosion. JK Carbofill is an environment friendly compound and does no harm to the underground water. JK Carbofill is packed in 12.5 kgs bag.

Advantages:

- Positive low resistance, electrical connection to the earth
- Compatible with all copper, GI, MS & Stainless Steel grounding systems
- Does not contain any hazardous chemicals
- Will not leech into the ground
- Never needs recharging
- Electrically conductive
- Environmentally friendly
- Stable permanent ground for the life of the grounding system
- Contains a corrosion inhibitor to protect copper
- Will not expand or experience any shrinkage
- Not affected by freezing
- Simple to install
- Excellent shelf life with no performance effects

Lightning & the need of safety

Lightning is one of the most devastating natural phenomena. There are many discharges during lightning storms and some of them can even reach hundreds of kilo amperes. The electrical discharges are a great hazard to people, animal, buildings and electronic equipments.

Until now, there is no device that can prevent lightning formation or lightning strikes. However, it is possible to create a path (divert) for the lightning discharge to the ground which will minimise the damage to the environment through a well designed Lightning Protection System (LPS).

Spike Lightning Arrester

JK has always been very active in creating products and solutions with low environmental impact and searching and developing new technologies, anticipating customer needs.

JK involves in designing, manufacturing & implementation of LPS (Lightning Protection System) in accordance to IS 2309 standard. The products manufactured by JK Earthing Electrodes complies the international standards IEC 62305, UL 96A, etc.

Lightning Current & Protection levels

In order to define lightning as a source of interference, lightning protection levels I to IV are laid down. Each lightning protection level requires a set of

- maximum values (dimensioning criteria used to design lightning protection components to meet the demands expected to be made of them) and
- minimum values (interception criteria necessary to be able to determine the areas with sufficient protection against direct lightning strikes (radius of rolling sphere).

Maximum values of lightning current parameters and their probabilities

Lightning protection level	Minimum values (Interception criteria)		
	Minimum lightning current peak value	Probability of the actually upcoming lightning current to be higher than the minimum lightning current peak value	Radius of the rolling sphere
I	3 kA	99%	20 m
II	5 kA	97%	30 m
III	10 kA	91%	45 m
IV	16 kA	84%	60 m

JK Spike Lightning Arrestor consists of base unit and a tubular construction to fix the prolonged spike part on the top. The corona effect on the sharp tip ensures the desired striking point of lightning strikes, thus ensuring the protection of the structure (angle of protection)

Maximum values of lightning current parameters and their probabilities

Lightning protection level	Maximum values (Dimensioning criteria)	
	Maximum lightning current peak value	Probability of the actually upcoming lightning current to be less than the maximum lightning current peak value
I	200 kA	99%
II	150 kA	98%
III	100 kA	97%
IV	100 kA	97%

Technical Specification

Code	Pipe Length (mm)	Pipe Dia (mm)	Base Dia (mm)	Prong Length (mm)	Material
JKLA 325GI	300	25	85	80	G.I.
JKLA 425GI	400	25	85	80	G.I.
JKLA 525GI	500	25	85	80	G.I.
JKLA 625GI	600	25	85	80	G.I.

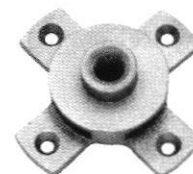


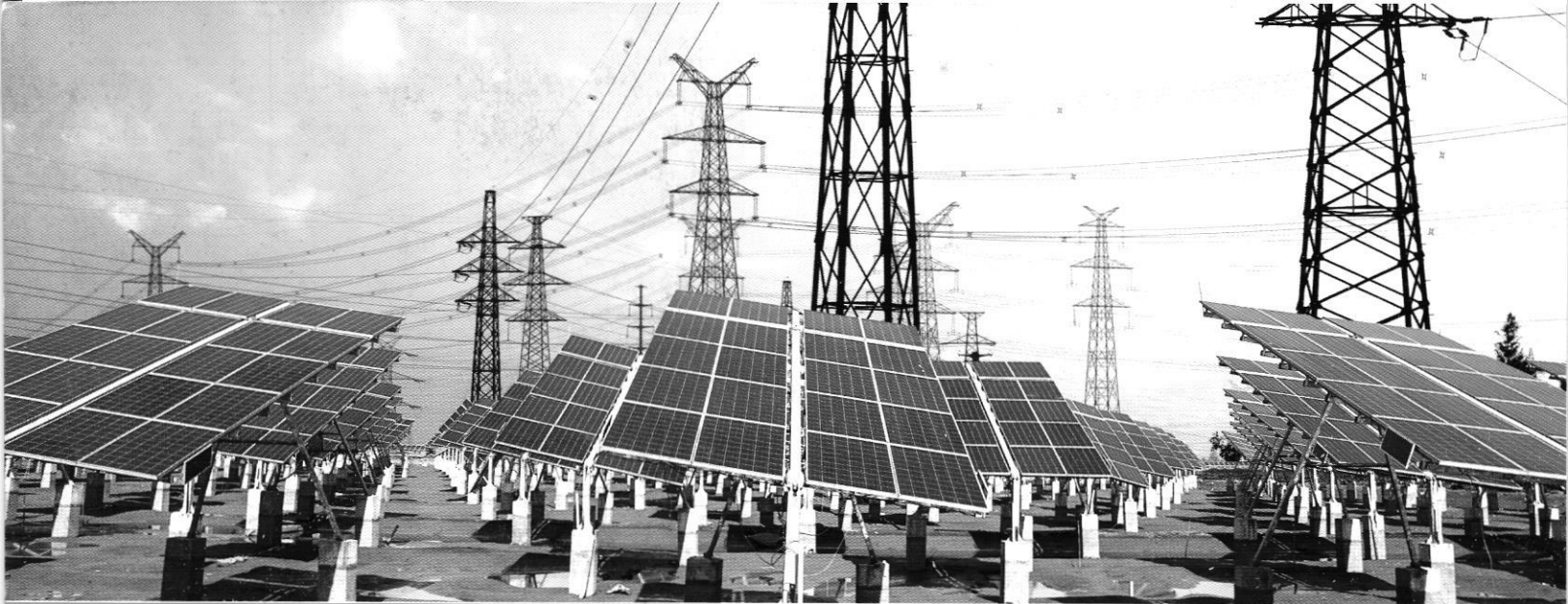
Technical Specification

Code	Rod Length (mtr)	Rod Dia (mm)	Material
JKLA 116A	1	16	Aluminium
JKLA 216A	1.5	16	Aluminium
JKLA 116C	1	16	Copper
JKLA 216C	1.5	16	Copper



JKLB 16BU Air Terminal Base Unit Alloy





[Grounding of Solar PV System

When installing a solar PV system, it is extremely important all the equipment is grounded correctly. Improper earthing can be devastating, especially in an area that experiences lightning on a regular basis. Even if you seldom have electrical storms, all it takes is one lightning strike or a single loose wire and all the equipment can be destroyed. Worse yet, it can start a fire and cause even more damage to your home.

There is an electrical voltage between the PV cell and the frame and it can cause electrons come loose from the material used in the PV module and discharge through grounded frame. This causes a polarization that can adversely alter the characteristic curve of the PV cells. It leads to deterioration of the cells.

Depending on your location, it may be required that your panel frames are earthed and it is certainly advisable. Non earthed frames can acquire an induced electrical voltage (which may or may not be harmful) or could accidentally come into contact with a live conductor. In some cases, the DC circuit should also be earthed, as should the AC circuit, following manufacturers instructions.

When a PV module generates electricity its surface area becomes charged and acts like a capacitor. This capacitance has an undesirable effect and known as parasitic capacitance. During the operation of the PV module it is also connected to the inverter where the fluctuating voltage constantly changes the state of charge of parasitic capacitor and causes a displacement current proportional to the capacitance and to the voltage amplitude. This leads to a leakage current. This leakage current is not dangerous, however, it superimposes possible residual current that could occur through touching a live line through a damaged insulation and can seriously hinder its detection. Hence, grounding of SPV modules and inverter becomes very important. Most of the inverter manufacturers provide negative and positive grounding option depending upon PV module connecting to an inverter.

"JK Solar Earthing Kit" comes in a different combination depending upon the Solar PV plant and soil conditions.

For small Rooftop Solar PV Installations:

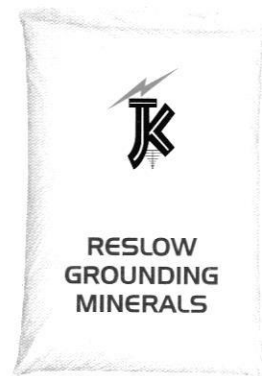
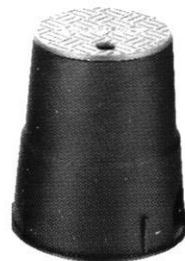
Model: JKSPVGR

JKSPVGR kit contains:

JK RESLOW Grounding Minerals (25 Kgs Bag) - 01

JK GI Rod (1.5 mtr long 25 mm dia) - 01

Earth Pit Cover (PPC Mini) - 01



For large Solar power plants:

Model: JKSPVCB

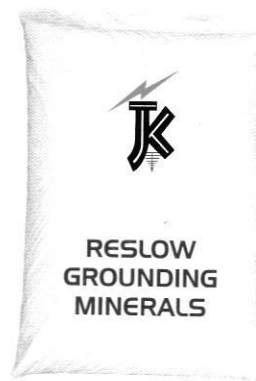
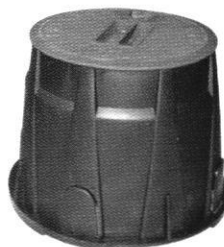
JKSPVCB kit contains:

Normal Soil: JK RESLOW Grounding Minerals (25 Kgs Bag) - 02

Rocky/Sandy Soil: JK CARBOFILL Grounding Minerals (12.5 Kgs Bag) - 02

JK Copper Bonded Rod (3 mtrs long 14 mm dia) - 01

Earth Pit Cover (PPC01) - 01



[Earth Pit Chamber (Lightweight, Heavy duty inspection pit)

The lightweight, heavy duty earth pit chamber with its unique design has resulted in performance capabilities superior to the traditional concrete pit, at a similar cost. Manufactured from a high performance polymer, the lightweight, heavy duty earth pit chamber is UV stable and chemical resistant. The lightweight earth pit chamber weighs only one tenth of the conventional concrete pit yet is load rated to an impressive 5,000 kg. It has a lockable lid and improved working area compared to the concrete inspection Pit. In addition, the features incorporated within its design ensure ease of storage, reduced transportation costs, ease of installation and ease of subsequent inspection and testing of the earth electrode system, therefore providing significant practical benefits to both installers and the customers.



Feature & benefits

■ Light weight construction

The earth pit weighs only one tenth in comparison with a massive 30 kg for a concrete pit.

■ High load-bearing capacity

Safe working load of 5,000 kgs or more superior to that of the traditional concrete pit.

■ Lockable jam free lid

Once installed the lid can be locked to prevent tampering with the earth electrode. Once locked, the design of the lid is such that debris cannot become jammed between the lid and the surround.

■ Unbreakable material

The high performance polymer is significantly less brittle than concrete, reducing the likelihood of wastage due to breakages.

■ Stackable design

Resistant to most substances, including petrol, oil, diesel, bitumen and concrete.

■ UV Stability

UV additive minimizing the effects of direct sunlight.

■ Wide temperature applications

Capable of withstanding a wide range of temperatures.

■ Improved working area

A larger working area, with improved access, simplifies both initial installation and subsequent inspection.

■ Rod placement area

This ensures that the Earth Rod is centrally positioned, simplifying earth clamp connection.

■ Screw retention facility

The stainless steel, rustproof screws may be snapped into the lid, preventing loss whilst in storage or on site.

■ Optional Earth bar facility

An earth bar may be inserted in the pit to allow for multiple connections to the earth rod.

■ Quality assurance

Fully Compliant to the manufacturing quality standards.

Environment friendly rust proof heavy duty weather proof polyplastic earth pit chamber

Model: PPC Mini



DIMENSIONS

At Top (Dia) = 155 mm
At Bottom (Dia) = 210 mm
Height = 240 mm

MAIN FEATURES

- Factory built long holes for accessing strips/wires at two side.
- Made of heavy duty polyethylene for extra durability.
- Resistant materials, assuring long use-life.
- Green top cap matches the environment.

Environment friendly rust proof heavy duty weather proof polyplastic earth pit chamber

Model: PPC 01



DIMENSIONS

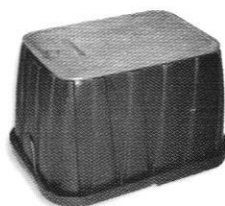
At Top (Dia) = 254 mm
At Bottom (Dia) = 330 mm
Height = 260 mm

MAIN FEATURES

- Factory built long holes for accessing strips/wires at four side.
- Made of heavy duty polyethylene for extra durability.
- Resistant materials, assuring long use-life.
- Green top cap matches the environment.

Environment friendly rust proof heavy duty weather proof polyplastic earth pit chamber

Model: PPC 02



DIMENSIONS

At Top Length = 440 mm, Width = 300 mm
At Bottom Length = 534 mm, Width = 400 mm
Height = 310 mm

MAIN FEATURES

- Factory built long holes for accessing strips/wires easily at two side.
- Made of heavy duty polyethylene for extra durability.
- Resistant materials, assuring long use-life.
- Green top cap matches the environment.

Environment friendly rust proof heavy duty weather proof polyplastic earth pit chamber

Model: PPC Maxi



DIMENSIONS

At Top Length = 570 mm, Width = 400 mm
At Bottom Length = 660 mm, Width = 490 mm
Height = 320 mm

MAIN FEATURES

- Factory built long holes for accessing strips/wires easily at two side.
- Made of heavy duty polyethylene for extra durability.
- Resistant materials, assuring long use-life.
- Green top cap matches the environment.



[Installation Guide

- It is recommended to install chemrode in clay or highly humid soil.
- Make a pit preferably of 4 - 8 inch dia up to an appropriate length of chemrode.
- Place the chemrode in vertical position in the pit with the connection terminal on the top.
- It is recommended to fill the reslow/carbofill grounding minerals on the sides of chemrode which is already mixed with adequate water.
- Adequate bags of reslow/carbofill grounding minerals is recommended for chemrode.
- Make joint on the lead terminal provided on the top of the chemrode with the suitable copper wire/strip or G.I. wire/strips to carry the earthing from your equipment/load. Beware, don't hash during installation & do not use hammer, etc.
- Place the chamber with the cover over the chemrode earthing electrode.
- Do proper water pouring up to 3 to 5 days after installation, if necessary (depended upon the soil conditions).

**** OHMIC VALUE DEPENDS/VARIES ON SOIL CONDITIONS**

AUTHORISED DEALER

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