

SENTRI®



Sentri Earthing
& Lightning Protection
System



Sentri®

Cupra

The name defines the very message. When Copper is used to maintain continuity and reduce resistance, what better name to call our product than Cupra. Cupra is derived from Cuprous that means 'of Copper'.

The name is thought to come from the Sabine word cuprum, which is usually glossed as "good". This word is likely derived from cup, "desire" (related to the Latin root of the name Cupid), making Her "good" in the sense that She is "the Sought After", or "the Desired One", implying a Goddess who fulfills wishes and answers prayers, or who is sought out because She is benevolent and powerful.

At Cupra, the customer is at the heart of all that we do. We believe in our philosophy of providing the best products and services to our customers. By selectively picking our distributors, we ensure that our partners are best equipped to provide an exceptional level of service to our customers.

The Core of Cupra

We believe in the fact that we are accountable to our stakeholders. Quality products and services are the expectations from Cupra. All personnel at Cupra are experienced and experts at their jobs. Cupra employees are individually qualified and, as a team, we produce the world's most respected and preferred products. We take responsibility for our decisions at the individual and company levels.

The core values:-

Caring, Health and Safety

The industry that Cupra is in involves interaction at the human level. Most products are electrically orientated. The end customer is subject to shock, and other risks, if the products are not of a good quality. At Cupra, we care for our customers. The products are manufactured in an environment where Health and Safety norms are stressed.

Continuous Improvement, continued successes

We believe that we will get better by the day. This will apply to products, services, processes, teamwork and every aspect that we deal with at work. Continuous improvement is applicable in every thing that we do, which will ensure world leadership position to Cupra and its products.



In Roman/Greek Mythology, Cupra is considered to be a form of the Great Goddess of the Etruscans. She was considered one of the Nine Great Gods who had the ability to throw thunderbolts (called by the Romans Novensiles), and was part of a triad with Tinia (Jupiter) and Menrfa (Minerva), who were said to have temples in every Etruscan city. Her origins are said to be Sabine, and She was worshipped among the Etruscans, Piceni, and the Umbrians (all located in modern central Italy).





Sentri®



Global Footprints & Team Work

With a presence in virtually every continent across the globe, Cupra products are serviced by a superior supply chain. This has been made possible by exceptional team work and a determination to achieve a market leadership position.

An Eye For Detail

Trained, carefully chosen, right people are the key to the success of an organization. Correct and continuous training ensures an eye for detail that ultimately translates into effectiveness and efficiency. The customer is therefore assured of the right products and services, at the best price levels.

The Cupra Vision

We will work towards building a safer tomorrow for our children. We will encourage the use of non-polluting, bio-degradable or recyclable materials to produce our products thereby ensuring that the environment is safe for future generations.

It is our vision to ensure that we build long term partnerships with our stakeholders that are mutually fulfilling and profitable. By imbibing our core values in everything that we do, we will ensure that we will remain customercentric.

It is endeavour to expand the product range from Cupra to encompass the entire gamut of products within the electrical industry.



“Cupra Earthing and Lightning Protection had its origins in the United Kingdom as a small and medium business unit, before merging with LCC, France. The merger has created a brand with footprints across the world, comprising products to varying standards and concepts. The LCC Group is now known as Cupra International.”

Cupra Today

The Cupra range has grown to include various metal components used in the Electrical Industry, ranging from Cable Glands and Gland Kits, Cable Lugs and Terminations. Additionally, the brand has diversified into GI Back Boxes, Channel Supports, cable management, etc covering a comprehensive range, and a host of other electrical accessories that go into buildings.

Cupra is on the verge of tremendous growth, a growth that has the potential to spiral the brand to new heights and successes. Come, be part of the Cupra family, and join us in our march towards greater success and glory.

Customercentric®





Sentri®

Earthing

Earthing systems are a vital aspect that find application in many industries such as telecommunication, oil and gas, petrochemicals, power, civil and computer sciences. Earthing is essential for all computer networks, power distribution panels, substations, telecommunication towers, microwaves, precision tool making, industrial machines and even electrical home appliances. The importance assigned to earthing can be determined from the fact that service providers do not enable supplies unless this important parameter has been adhered to.

In case the earthing systems are not sound, installers and manufacturers hesitate to provide warranties.

The key objectives of an earthing system are as follows:

- . Lightning and overvoltage protection
- . Reassuring human safety in fault and normal conditions with restricting step and touch voltage
- . Assuring proper functioning of electrical and electronic equipments
- . Avoiding malfunctioning or total break-down of electrical and electronic equipments

A reliable, permanent earthing system is a great aid to ensure proper functioning of electronic and electrical equipment. This avoids break-downs caused by static build up, surge voltage, switching and electromagnetic fields created by lightning discharge.

What is Shock?

There are few reliable figures for shock current effects, because they differ from person to person, and for a particular person, with time. However, over one milliampere of current in the body produces the sensation of shock, and that one hundred milliamperes is likely quickly to prove fatal, particularly if it passes through the heart.

If a shock persists, its effects are likely to prove to be more dangerous. For example, a shock current of 500 mA may have no lasting ill effects if its duration is less than 20 ms, but 50 mA for 10 s could well prove to be fatal. The effects of the shock will vary, but the most dangerous results are ventricular fibrillation (where the heart beat sequence is disrupted) and compression of the chest, resulting in a failure to breathe.

Another important factor to limit the severity of electric shock is the limitation of earth fault loop impedance. Whilst this impedance adds to that of the body to reduce shock current, the real purpose

Electric Current	Voltage for Body Resistance	Voltage Maximum for Body Resistance	Physiological Power	Effect
Ampere	10.000 Ohms	10.000 Ohms	Watts	
0.001 A	10 V	1 V	0.01 W	Threshold of feeling an electric shock
0.005 A	50 V	5 V	0.25 W	Maximum current which would be harmless
0.01-0.02 A	100-200 V	10-20 V	1-4 W	Sustained muscular contraction.
0.050 A	500 V	50 V	25 W	Ventricular interference, pain, respiratory difficulty
0.1-0.3 A	1000-3000 V	100-300 V	100-900 W	Ventricular fibrillation can be fatal
6 A	60,000 V	6,000 V	400,000 W	Sustained ventricular contraction followed by normal heart rhythm. These are the operation parameters for a Deibrillator. Temporary respiratory paralysis and possibly burns.

of the requirement is to allow enough current to flow to operate the protective device and thus to cut off the shock current altogether quickly enough to prevent death from shock.

How quickly this must take place depends on the level of body resistance expected. Where sockets are concerned, the portable appliances fed by them are likely to be grasped firmly by the user so that the contact resistance is lower. Thus, disconnection within 0.4 s is required. In the case of circuits feeding fixed equipment, where contact resistance is likely to be higher, the supply must be removed within 5 s. For situations where earth contact is likely to be good, such as farms and construction sites, disconnection is required within 0.2 s.

In shock situations, the disconnection from the source of shock is of prime importance. Also of equal importance is the earth impedance, and the potential difference that exists at the instant of shock. Such situations may be avoided by ensuring that earthing provisions for your structure are within limits.

The Sentri Earthing System from Cupra ensures that the impedance levels are well within control, and enables higher levels of protection to the end user by the usage of quality components.

Sentri.Quick and Fast to the Ground.

The various components of an earthing system are enlisted below:-

Earth Connectors

This is one of the most critical aspects of an earthing system, as this enables the flow of leakage current down to earth. The right conductor for the right application ensures a trouble-free earthing system.

Round conductors, flat conductors and braided copper conductors are options from Sentri.

Earth Rods

Site conditions may require the usage of high conductivity solid copper rods. It may become necessary to achieve better levels of conductivity using conductivity enhancing soil. This will ensure that the resistivity levels are within parameters.



The Sentri range features a comprehensive range of earth rods, ranging from copper bonded earth rods (upwards of 250 microns), solid copper rods, stainless rods, and threaded and unthreaded versions.

The soil conductivity levels at greater depths is considerably higher. Earth Rods allow the customer to take advantage of this factor. Additionally, the usage of conductivity enhancing soils helps in improved parameters during earthing.

Sentri **COPPER BONDED EARTH RODS**

are manufactured from **99.9%** pure electrolytic copper that is molecularly bonded onto a steel core in accordance with international standards. As the electroplating is done in-house to exacting standards, dissimilar metal reaction cannot occur and the copper cannot be separated from the steel. The core is manufactured from low carbon steel of grade 080A20 to PD 970 (formerly BS 970-1:1996) and has high tensile strength of 600 N/mm. The copper covering is maintained even at the root of the thread as the threads are rolled onto the rod which ensures that an even copper covering is maintained.

Rolled threads also give strength greater than cut threads.

Earth Plates

In areas where the soil resistivity is high, and difficulty is encountered in driving earth rods into the ground, earth plates are used to achieve the required earth impedance levels. These may be used in conjunction with conductivity enhancing soils. Earth grids may also be used to achieve a similar effect to that enabled by earth plates, if the situation allows it.



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Exothermic Welding

Exothermic Welding is a chemical process by which a high quality connection is achieved using the exothermic reaction of chemicals, in the presence of copper connectors. Various moulds are available to enable connections between different types of cables, for different applications.

Equipotential Earth Strips and Inspection Pits

The Sentri equipotential earth strips allow the installer to achieve a quick and efficient connection between the various earthing points in the building. A disconnect facility is also present that allows isolation as required.

Design Criteria

The design of a good earthing system depends on a variety of factors such as soil conditions, conductor properties and plan of the area. It is worthwhile mentioning that a good earth system should have low resistance values. This can be measured using appropriate earth resistance measuring equipment. Additionally, the earthing system should be able to repeatedly conduct the leakage currents generated in a system to ground. As it is difficult to 'change' the earthing system in a building, it is recommended that the system should exhibit longevity.

Sentri earth rods are coated to high thicknesses that enable the system to discharge current to earth effectively, and efficiently. The average coating thickness of Sentri earth rods range from 250 microns upwards.

Soil conditions are dependent on the type of soil that the earthing system is installed in. Wet and marshy soil offers excellent conductivity, while rocky terrain is bad for earthing. Rainy/wet areas are therefore ideal to ensure highly conductive soil conditions. Salts in soil can also aid in increasing conductivity and

improving earthing. While the practice of adding salts has existed in the past, it is worthwhile noting that the added salt in the presence of moisture, can affect the copper bonding of the earth rods, thereby proving counter productive in terms of ultimate earth conductivity, in the long run.

Earth rods are available in various configurations(see table of products). An important factor to consider while implementing earthing systems is that the diameter and the depth of the earth rod determine the effectiveness of the earthing system. While some players claim that the earth rod diameter does not impact the resistance values, empirical studies have proven that an increased diameter increases the net surface area allowed for dissipation of electrical leakage current, and therefore the effectiveness of the earthing system improves significantly.

The depth to which the earth rod is driven is an important factor, as the deeper the rod goes into earth, the lesser the chances of the earthing system being impacted by vagaries of nature. In case rocks are available beneath the top crust, a combination of earth plates and multiple earth rods can help achieve the required earthing levels. In such cases, or in cases where multiple earth rods are used, the resistance seen is reduced by increasing the number of rods. As the Sentri rods are within parameters from one rod to the other, it is correct to state that the resistance level is inversely proportional to the number of rods used.



Sentri Earth Rods

Sentri Earth Rods are available in Pure Electrolytic Copper Bonded, Pure Copper and Stainless Steel versions. Each copper rod has its own application that varies according to the situation.

Sentri Copper Bonded Earth Rods are manufactured from 99.9% pure electrolytic copper bonded onto a low carbon steel core to PD 970 (formerly BS 970-1:1996). The rod has a tensile strength of 600 N/m², which allows the end user to drive the rods to great depths. The thickness of copper is at least 254 microns. The



Threaded Copper Bonded Earth Rods

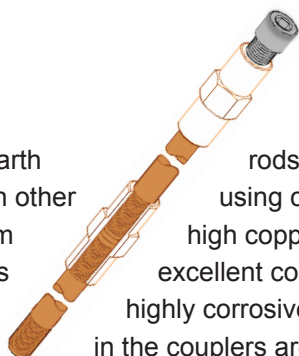
thickness of copper coating ensures that the rod is capable of withstanding corrosion to a great extent.

The threads are presented in 1/2", 5/8" and 3/4" versions. The shank diameter is available in 9.5mm, 12.7mm, 14.2mm and 17.2mm versions. Threads are not cut- they are rolled onto the low carbon core steel rods. The rolling process ensures that there is uniformity in the copper coating

Fittings for Copper Bonded Earth Rods

Couplings

Copper bonded earth rods are connected to each other using couplers manufactured from high copper content alloy. This ensures excellent corrosion resistance under highly corrosive environs. The threads in the couplers are deep to ensure that the earth rods are completely enclosed.



THREADED COPPERBONDED RODS

Threading	Shank Diameter	Length	Part Number
1/2"	12.7	1200	SENER1212
1/2"	12.7	1500	SENER1215
1/2"	12.7	1800	SENER1218
1/2"	12.7	2000	SENER1220
1/2"	12.7	2400	SENER1224
1/2"	12.7	3000	SENER1230
5/8"	14.2	1200	SENER1612
5/8"	14.2	1500	SENER1615
5/8"	14.2	1800	SENER1618
5/8"	14.2	2000	SENER1620
5/8"	14.2	2400	SENER1624
5/8"	14.2	3000	SENER1630
3/4"	17.2	1200	SENER2012
3/4"	17.2	1500	SENER2015
3/4"	17.2	1800	SENER2018
3/4"	17.2	2000	SENER2020
3/4"	17.2	2400	SENER2024
3/4"	17.2	3000	SENER2030

Driving Heads, Couplers & Spikes

Sentri Driving Heads are manufactured from high tensile strength steel to ensure capability to withstand repeated use with power hammers.



Driving Couplers

Driving Head

ACCESSORIES - THREADED COPPERBONDED ROD

	Coupler	Driving Head	Driving Spike
Threading	Catalogue	Catalogue	Catalogue
1/2"	SENERC12*	SENERD12	SENER12
5/8"	SENERC14*	SENERD14	SENER14
3/4"	SENERC17*	SENERD17	SENER17

Replace * with B for Brass finish



Sentri®

UNTHREADED COPPERBONDED RODS

Diameter	Length	Part Number
9	1200	SENUER0912
12.7	1200	SENUER1212
12.7	1500	SENUER1215
12.7	1800	SENUER1218
12.7	2000	SENUER1220
12.7	2400	SENUER1224
12.7	3000	SENUER1230
14.2	1200	SENUER1612
14.2	1500	SENUER1615
14.2	1800	SENUER1618
14.2	2000	SENUER1620
14.2	2400	SENUER1624
14.2	3000	SENUER1630
17.2	1200	SENUER2012
17.2	1500	SENUER2015
17.2	1800	SENUER2018
17.2	2000	SENUER2020
17.2	2400	SENUER2024
17.2	3000	SENUER2030



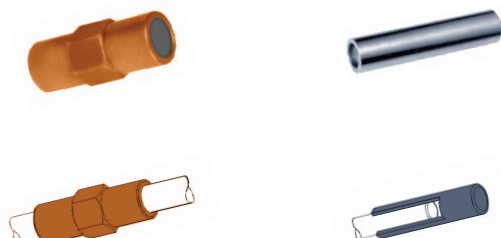
Unthreaded Copper Bonded Earth Rods

ACCESSORIES - UNTHREADED COPPERBONDED ROD

	Coupler	Driving Head	Driving Spike
Diameter	Catalogue	Catalogue	Catalogue
12.7	SENUERC12*	SENUERD12	SENUERS12
14.2	SENUERC14*	SENUERD14	SENUERS14
17.2	SENUERC17*	SENUERD17	SENUERS17

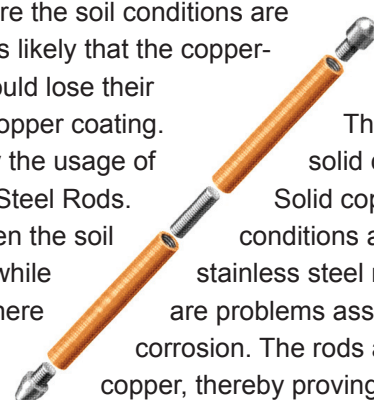
Replace * with B for Brass finish

Manufactured to BSEN 62305 (BS 6651), BS7430



Solid Copper/Stainless Steel Rods

In areas where the soil conditions are corrosive, it is likely that the copper-earth rods could lose their conductive copper coating. This can be prevented by the usage of solid copper or Stainless Steel Rods. Solid copper rods are used when the soil conditions are very aggressive, while stainless steel rods are used when there are problems associated with galvanic corrosion. The rods are more useful when copper, thereby proving more galvanic corrosion is possible.



SOLID COPPER RODS

Diameter	Length	Catalogue
16	1200	SENSCER1612
16	1500	SENSCER1615
20	1200	SENSCER2012
20	1500	SENSCER2015

SOLID STAINLESS STEEL RODS

Diameter	Length	Catalogue
16	1200	SENSSER1612
16	1500	SENSSER1615
20	1200	SENSSER2012
20	1500	SENSSER2015

ACCESSORIES- SOLID COPPER/SS RODS

	Coupling Dowel		Driving Head		Driving Spike	
Diameter	Length	Catalogue	Length	Catalogue	Length	Catalogue
16	40	SENSCERC1	40	SENSCERD1	40	SENSCERS1
20	40	SENSCERC2	40	SENSCERD2	55	SENSCERS2

For Stainless Steel Coupling Dowel, replace SC with SS.
Manufactured to BSEN 62305 (BS 6651), BS7430

Accessories for Solid Copper & Stainless Steel Rods are manufactured from hardened and tempered steel to ensure that the rods drive down to earth effectively, without damaging the earth rods.



Conventional earthing practices demand the use of copper bonded or pure copper earth rods as a grounding aid. The grounding resistance has to be below a value of 1 Ohm when measured using appropriate instruments.

However, the bigger concern is the continued presence of the earth rod in corrosive conditions and chemical corrosive agents in the soil surrounding the earth rods.

To resolve this issue, Cupra are proud to present our newest addition to the Earth Rod offerings:-

CUPRO - NICKEL ALLOY EARTH RODS

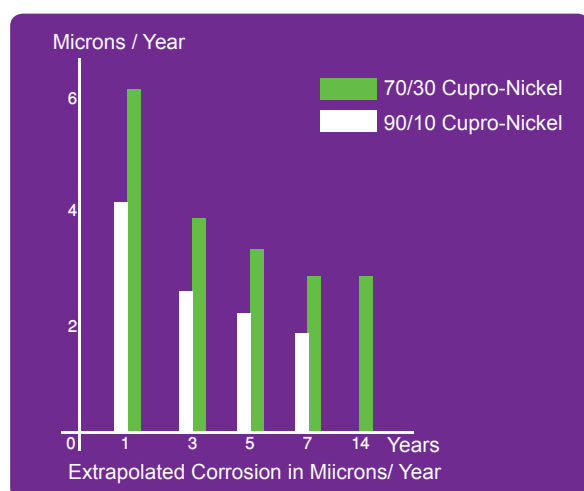


Key Features

- Presented in 90/10 offering (90 percent Copper and 10 percent Nickel alloy)
- Shows excellent stability in sea water conditions, and in resistance to sulphates and other impurities
- Can be threaded like conventional earth rods
- Can last the life of the building
- Cost effective than cathodic protection
- Effective resistance less than 1.0 Ohm
- High conductivity with high corrosion resistance
- Resistance to sulphates, chlorides, zinc and other minerals
- Safety is paramount, as it provides excellent continuity and good grounding

Advantages of Cupro - Nickel Earth Rods

- Does not corrode in the presence of alkalis or acids
- Ensures continued safety and protection in diverse conditions
- 90/10 is a better solution compared to the 70/30 option which is more expensive



CUPRO NICKEL EARTH ROD ACCESSORIES			
Diameter	Coupler	Driving Head	Driving Spike
16	SENCNERC16	SENCNERD16	SENCNERS16
20	SENCNERC20	SENCNERD20	SENCNERS20

Manufactured to BS 6651, BS7430

Environmental Properties	
Resistance Factors 1=Poor 5 = Excellent	
Flammability	5
Fresh Water	5
Organic solvents	5
Oxidation at 500C	3
Sea Water	5
Strong Acid	2
Strong Alkalis	5
UV	5
Wear	5
Weak Acid	4
Weak Alkalis	5

CUPRO NICKEL EARTH RODS		
Diameter	Length	Catalogue
16	1200	SENCNER1612
16	1500	SENCNER1615
20	1200	SENCNER2012
20	1500	SENCNER2015

Cupro Nickel Rods from Sentri is a giant step in ensuring the safety and security of electrical systems. Earthing Systems are protected from corrosive elements, and provide continuous years of service to discerning customers.



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Earth Clamps

Clamps are used to connect earth rods to conductors of various sizes in different applications. Different Clamps are used to connect Earth Rods to Tape, and to conductors. The clamps are manufactured from different materials for different applications.

Type A Clamps are available in various configurations to suit different down conductors and sizes.



ROD TO TAPE CLAMP

Diameter	Rod Dia	Tape Width	Catalogue
3/4"	12-20mm	25mm	SENCL3425GMP*
3/4"	12-20mm	31mm	SENCL3431GMP*
3/4"	12-20mm	38mm	SENCL3438GMP*
3/4"	12-20mm	50mm	SENCL3450GMP*

Replace * with B for brass finish

Pipe Clamps are used to connect earth cables to pipes of various diameters



PIPE CLAMP

Pipe Dia	Cable Size	Catalogue
1/2"	35-95mm ²	SENPC12
3/4"	35-95mm ²	SENPC34
1"	35-95mm ²	SENPC10
1 1/2"	35-95mm ²	SENPC11
2"	35-95mm ²	SENPC20
2 1/2"	35-95mm ²	SENPC21
3"	35-95mm ²	SENPC30
4"	35-95mm ²	SENPC40
5"	35-95mm ²	SENPC50
6"	35-95mm ²	SENPC60

Rod to Cable Clamps (Type G) are manufactured from high strength copper alloys, Gun Metal, aluminium bronze and their derivatives, with bolts manufactured from similar materials/SS as required.



ROD TO CABLE CLAMP

Diameter	mm	Cable Size	Catalogue
3/8"	9.5	6-35mm ²	SENRC38*
1/2"	12.5	16-70mm ²	SENRC12*
5/8"	16	16-70mm ²	SENRC58*
3/4"	20	50-95mm ²	SENRC34*
1"	25	70-120mm ²	SENRC10*

Torque to (BS EN 62561-1:2012)12Nm

U Bolt Clamps are threaded to M10, and are manufactured from copper with gunmetal backplates for excellent strength/conductivity properties. U bolt clamps are available in single plate and double plate versions, with capability to fix double plates to cable and tape as desired.



Type E single

Type E double

Type GUV

U - BOLT CLAMP- TYPE E

SINGLE		DOUBLE		
Rod Dia. inch	Rod Dia.mm	Catalogue	Tape Size	Catalogue
3/4"	12-20	SENUB25	25mm	SENUB125
1 1/2"	16-25	SENUB38	38mm	SENUB138
2"	25-50	SENUB50		

Torque to (BS EN 62561-1:2012)12Nm

ROD TO CABLE U BOLT CLAMP – TYPE GUV

Rod Dia. inch	Rod Dia.mm	Cable Size	Catalogue
3/4"	16-20mm	16-70mm ²	SENUBC216
3/4"	16-20mm	70-150mm ²	SENUBC220
3/4"	16-20mm	150-300mm ²	SENUBC225

Torque to (BS EN 62561-1:2012)12Nm



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Additionally, **Rod to cable lug Clamps** (key slit design) are available. These are manufactured from gunmetal to standards.



ROD- CABLE LUG CLAMPS

Rod Diameter	Application	Catalogue
mm	Inches	
9.5	Copper Bonded Rods	SENRC95
5/8"	Copper Bonded Rods	SENRC58
15	Solid Copper Rods	SENRC15
3/4"	Copper Bonded Rods	SENRC34
20	Solid Copper Rods	SENRC20

Torque to (BS EN 62561-1:2012)12Nm

Bonding Clamps are used to connect earth connectors to metal surfaces and structures.



B Bond



RWP Bond

RWP Bonds or rainwater pipe bonds are manufactured from gunmetal and are used to bond earth tapes to pipework, handrails, and similar structures.

BONDING CLAMP

Tape Size	Bolt Size	B Bond	RWP Bond
26	M10	SENBB26#	SENRRWP25#
30	M10	SENBB30#	

Torque to (BS EN 62561-1:2012)12Nm

Replace # with A for aluminium finish

Metal Work Bonds and **Re-bar Clamps** are used to bond earth cables to rebar and metal structures and achieve continuity.



Metal Work Bond



Re-bar Clamp

BONDING CLAMP

Cable size	Metal Work Bond	Re-bar Dia	Re-bar Clamp
8mm	SENMBW08#	8-18mm	SENRRBC08
8mm		18-38mm	SENRRBC18

Torque to (BS EN 62561-1:2012)12Nm

Replace # with A for aluminium finish

Watermain Bonds are used to bond metal pipes to earthing systems.



BONDING CLAMP

Cable size	Watermain Bond	Pipe Dia	Pipe Bond
26	SENWM25	50-200mm	SENPB08#

Torque to (BS EN 62561-1:2012)12Nm

Flexible Braid Bond are used to bond metal dynamic structures to the earthing system.



FLEXIBLE BRAID BOND

Dimension	Hole size	Hole Centres	Catalogue
25 x 3.5mm	12	150	SENFCBB253515*
25 x 3.5mm	12	200	SENFCBB253520*
25 x 3.5mm	12	250	SENFCBB253525*
25 x 3.5mm	12	300	SENFCBB253530*
25 x 3.5mm	12	400	SENFCBB253540*

Replace * with T for tinned finish

Other sizes are available, contact your local agent for details

Tower Earth Clamps are used to bond copper cable or wire to steel structures. The products are made from gunmetal castings.



Single



Double

TOWER EARTH CLAMPS

Cable Size	Bolt Size	Double	Single
16-70mm²	M10	SENTECD016	SENTEC016
70-120mm²	M12	SENTECD070	SENTEC070
25-50mm²	M10	SENTECD025	SENTEC025
120-185mm²	M12	SENTECD120	SENTEC120
185-240mm²	M12	SENTECD185	SENTEC185

Torque to (BS EN 62561-1:2012)12Nm

Bi Metallic Connector are used to bond dissimilar metals to earthing systems.



BI METALLIC CONNECTOR

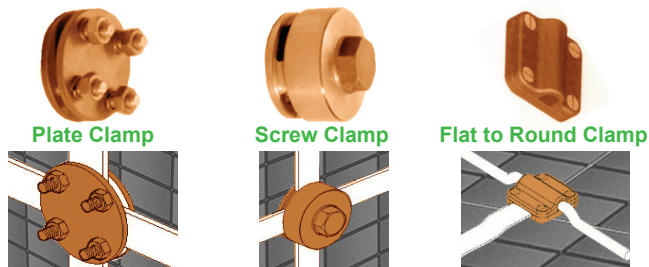
Tape Size	For Tape	Cable Size	For Cable
25 x 3mm	SENBMCT253	8mm	SENBMCT08
Copper Tape to Aluminium Cable Combination			
25 x 3mm		8mm	SENBMCT2508
Aluminium Tape to Copper Cable Combination			
25 x 3mm		8mm	SENBMCT2508

Torque to (BS EN 62561-1:2012)12Nm



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Tape Clamps are used to serve as a disconnecting link between the earth system and down conductors.



TAPE CLAMPS

Conductor Size	Clamp Type	Catalogue
26 x 12mm	Plate Clamp	SENTCP256
26 x 8mm	Screw Clamp	SENTCS253
8mm/35-50mm ²	Flat to Round	SENSTC25308
10mm/70-95mm ²	Flat to Round	SENSTC25310

Torque to (BS EN 62561-1:2012) 12Nm

Square Clamps are used to connect tape to tape and tape to conductor.



TAPE CLAMPS

Tape Size	Oblong Clamp	Square Clamp
25 x 3	SENCO253	SENSTC253
25 x 6	SENCO256	SENSTC256
31 x 3	SENCO313	SENSTC313
31 x 6	SENCO316	SENSTC316
38 x 3	SENCO383	SENSTC383
38 x 6	SENCO386	SENSTC386
50 x 3	SENCO503	SENSTC503
50 x 6	SENCO506	SENSTC506

Torque to (BS EN 62561-1:2012) 12Nm

Oblong test or junction clamps are used to connect two strips together or for testing purposes.

Plate Type Test clamps are used to achieve a disconnecting link between the down conductor system and the earthing.

Screw down Test Clamps are used to enable easy access to the conductors that are enclosed within them. The Sentri screw down clamp covers are easily removable, and the earthing system can be accessed thereafter.

Tape Clips

Tape clips are available in various sizes and in Non Metallic versions as well to suit different sizes of down conductors.



TAPE CLIPS

Tape Size	DC Clip	PVC DC Clip	Tape Clip
20 x 3	SEND203 ^	SENPD203 ^	SENTC203 ^
25 x 3	SEND253 ^	SENPD253 ^	SENTC253 ^
25 x 6	SEND256 ^	SENPD256 ^	SENTC256 ^
31 x 3	SEND313 ^	SENPD313 ^	SENTC313 ^
31 x 6	SEND316 ^	SENPD316 ^	SENTC316 ^
38 x 3	SEND383 ^	SENPD383 ^	SENTC383 ^
38 x 6	SEND386 ^	SENPD386 ^	SENTC386 ^
50 x 3	SEND503 ^	SENPD503 ^	SENTC503 ^
50 x 6	SEND506 ^	SENPD506 ^	SENTC506 ^

Replace ^ with P for pvc coated copper tape

Adhesive type (with base) add A on PVC DC Clip part number

Manufactured to BS 1400 LG2 (for copper) & to BS1490 LM6 (for aluminium)

Cable Clamps facilitate the interconnection of cables for different configurations.



CABLE CLAMP

Conductor Size	Square Clamp	Tee Clamp	Jointing Clamp	Test Clamp
8mm/35-50mm ²	SENCSC08#	SENCEC08#	SENCJC08#	SENCSC08#
10mm/70-95mm ²	SENCSC10#	SENCEC10#	SENCJC10#	SENCSC10#
120mm ²		SENCEC12#	SENCJC12#	
8mm – 25x3mm				SENCTC08#
10mm – 25x3mm				SENCTC10#

Torque to (BS EN 62561-1:2012) 12Nm

Replace # with A for aluminium finish



Cable Test Clamp

Square Cable Clamp

Cable Saddle

CABLE CLAMP

Conductor Size	Cable Test Clamp	Square Cable Clamp	Cable Saddle
35mm ²	SENCETC035	SENSCC050	SENHCS050*
50mm ²	SENCETC070	SENSCC050	SENHCS050*
70mm ²	SENCETC070	SENSCC095	SENHCS095*
95mm ²	SENCETC095	SENSCC095	SENHCS095*
120mm ²		SENSCC120	SENHCS120*
150mm ²			SENHCS150*
185mm ²			SENHCS185*
240mm ²			SENHCS240*

Torque to (BS EN 62561-1:2012) 12Nm

Replace * with B for brass finish

Earth Pits

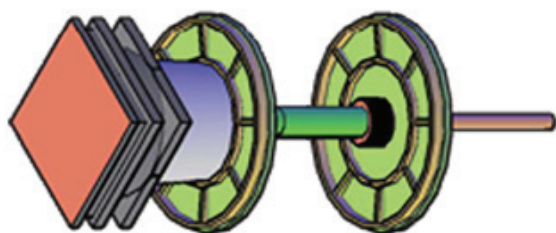
Earth pits are available in Concrete and light weight versions. Earth pits are used to allow connection between down conductors and earthrods. The Sentri Earth Pit allows the enduser/installer to examine the connection between the down lead and the earth rod. For heavy load areas, a concrete earth pit is recommended. Sentri earth pits are strong and can take loads in excess of 5 Tons.



EARTHING ENCLOSURES		
Material	Weight	Catalogue
Concrete	25 Kg	SENEEC
Plastic with Concrete Lid	8.25kg	SENEEPC
Plastic Enclosure	1.30 kg	SENEEP

Earth Rod Seal

Earth Rod Seals are used in areas where the waterproof membrane within basements of buildings need to be protected against damage. The kits are supplied to suit different earth rods, and are capable of withstanding pressures upto 6 bar.



EARTH ROD SEAL			
Size	Type	Single Flange	Double Flange
5/8"	Copper bonded	SENESSF58	SENESDF58
3/4"	Copper bonded	SENESSF34	SENESDF34
15mm	Solid Copper	SENESSF15	SENESDF15
20mm	Solid Copper	SENESSF20	SENESDF20

Earth Points

Sentri Earth Points are used to provide an earthing point when cast in concrete. In such cases, the reinforcement is used as an earth path, and connected to the earthing system. Earth points are available in single hole, two hole and four hole versions.



EARTH POINTS		
Size	Type	Catalogue
1	Single plate	SENEPS1☼
2	Single Plate	SENEPS2☼
2	Double Plate	SENEPD2☼
4	Single Plate	SENEPS4☼

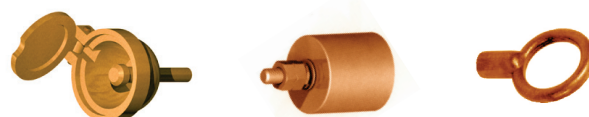
Torque to (BS EN 62561-1:2012)12Nm

Replace ☼ with P05 for 500mm length pre-welded tail, P10 for 1000mm length, P15 for 1500mm length. For double pre-welded tail, mention D instead P.

Contact local distributor for pre-welding, as it is done locally based on customer requirements.

Earth Support

The Sentri Earth support is used to connect earth leads to steel vessels, and tanks, and such structures. The base is welded to the steel structure, and provides a convenient earthing receptacle.



Static Earth Receptacle Earth Boss Eye Bolt

EARTH BONDING ACCESSORIES		
Size	Type	Catalogue
	Static Earth Receptacle	SENER01
5/8"	Eye Bolt	SENEB58
3/4"	Eye Bolt	SENEB34
M10	Earth Boss	SENEB10

Manufactured to BS970 230 M07



Glazing Bar Hold Fast Back Plate Hold Fast

Size	Type	Catalogue
12mm	Glazing Bar Hold Fast	SENGBHF#
	Back Plate Hold Fast	SENBPHF#

Replace # with A for aluminium finish



Sentri®

Earth Rod Seal

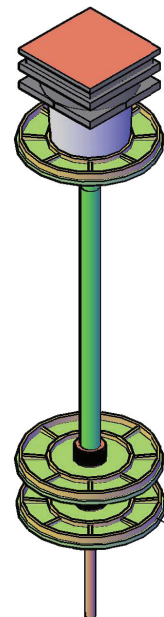
In buildings where there are limitations of the foot print of the structure, the earthing system falls within the building precincts. The earthing system has to therefore be mounted in the basement or must pass through the building foundation and puncture the water proofing system. In such situations, there is a danger of water seepage through the waterproofing membrane and potential flooding of the basement area, whilst ensuring that the earthing system is intact.

The Cupra Earth Rod Seal is used in such situations. The Earth Rod seal uses a double flange at the waterproof membrane level, and a single flange at the earth pit level. The earth pit is connected to the waterproof membrane via a PVC tube. The seal at the earth pit is capable of withstanding water pressure of upto 6 bar without damage.

The earth seal assembly is completely manufactured from non corrosive components, rendering excellent performance under corrosive ground water conditions.

Cupra Earth Rod Seal- Dependable

- **Simplified Parts, simplified design.**
- **Lightweight, yet strong and durable.**
- **Corrosion free parts and long life.**
- **Relatively maintenance free.**
- **Conforms to the requirements of BS EN 62561 – 5**
- **Fits all sizes of earth rods.**
- **Double Flange Design ensures complete protection**



EARTH ROD SEAL ACCESSORIES			
Size	Type	Single Flange	Double Flange
5/8"	Copper bonded	SENESSFA58	SENESDFA58
3/4"	Copper bonded	SENESSFA34	SENESDFA34
15mm	Solid Copper	SENESSFA15	SENESDFA15
20mm	Solid Copper	SENESSFA20	SENESDFA20

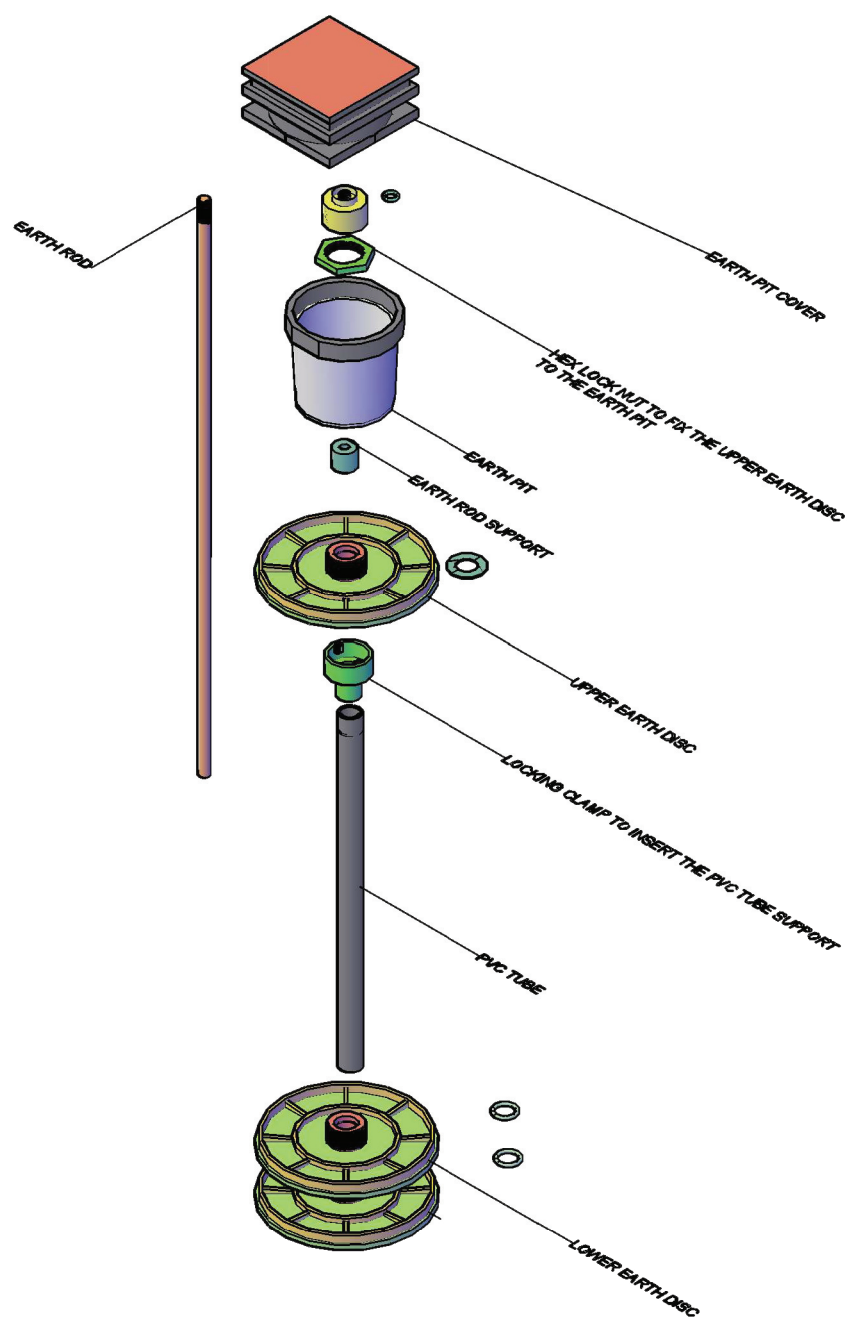
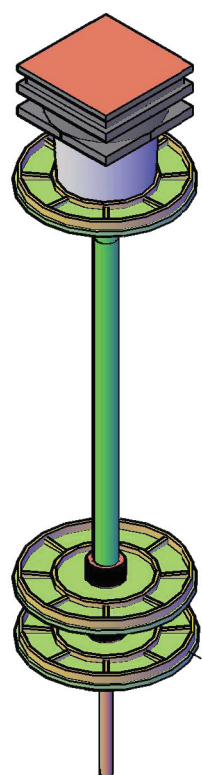
The above table covers the accessories of Earth Rod Seal, related only to earth Rod, such as Earth Rod Support and gaskets.

EARTH ROD SEAL FLANGE		
Type	Single Flange	Double Flange
Common	SENESSFF	SENESDFF

The above table covers the flange set of Earth Rod Seal, upper, lower flange, pipe, pipe support etc. such as Earth Rod Support and gaskets.



Sentri®





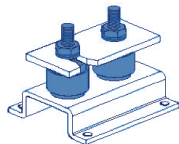
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Earth Bar Accessories

Insulators are supplied with or without bolts or nuts. These are thereafter used to support and put in place earth bars and disconnectors. The puddle flange is used to penetrate lightning conductors through roof surfaces.



Insulator



Disconnecting Link



Puddle Flange

INSULATORS

Size	Description	Catalogue
M10	Insulator with studs and nuts	SENINS1
M10	Insulator	SENINS2
	Disconnecting Link	SENEBDL
	Puddle Flange	SENPFC#



Earth Pit Bar



Strike Pad

Product	Size	Catalogue
Earth Pit Bar	5 Hole	SENEB285H5
Earth Pit Bar	7 Hole	SENEB285H7
Strike Pad		SENSP#

Replace # with A for aluminium finish

Earth Bars And Disconnectors

Earth bars are used for bridging in earth pits, and additionally find application in disconnectors. Earth bars are designated by the number of connections that are present.

Sentri disconnectors are available upto 20 way, and are supplied in single and twin disconnecting versions.

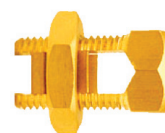
EARTH BARS /DISCONNECTORS							
Standard Earth Bars			Single Disconnectors		Twin Disconnector		
No of Ways	Description	Catalogue	Description	Catalogue	Description		Catalogue
6	6 way standard	SENEB6W	6 way standard with Single Disconnector	SENEB6W1	6 way standard with Twin Disconnector		SENEB6W2
8	8 way standard	SENEB8W	8 way standard with Single Disconnector	SENEB8W1	8 way standard with Twin Disconnector		SENEB8W2
10	10 way standard	SENEB10W	10 way standard with Single Disconnector	SENEB10W1	10 way standard with Twin Disconnector		SENEB10W2
12	12 way standard	SENEB12W	12 way standard with Single Disconnector	SENEB12W1	12 way standard with Twin Disconnector		SENEB12W2
14	14 way standard	SENEB14W	14 way standard with Single Disconnector	SENEB14W1	14 way standard with Twin Disconnector		SENEB14W2
16	16 way standard	SENEB16W	16 way standard with Single Disconnector	SENEB16W1	16 way standard with Twin Disconnector		SENEB16W2
20	20 way standard	SENEB20W	20 way standard with Single Disconnector	SENEB20W1	20 way standard with Twin Disconnector		SENEB20W2

Waterpipe Ground clamp

These clamps are used to connect pipe systems to the ground metal.



Pipe Size	Conductor Size	Catalogue
½" – 1"	2.58-7.40mm	SENWPGC10
1¼" – 2"	2.58-7.40mm	SENWPGC20
2½" – 4"	2.58-7.40mm	SENWPGC40



Split Bolt



One Hole Cable Clip

Size mm²	Split Bolt	One Hole Cable Clip
6	SENSPB006	SENOHC006#
10	SENSPB010	SENOHC010#
16	SENSPB016	SENOHC016#
25	SENSPB025	SENOHC025#
35	SENSPB035	SENOHC035#
50	SENSPB050	SENOHC050#
70	SENSPB070	SENOHC070#
95	SENSPB095	SENOHC095#
120	SENSPB120	SENOHC120#
150	SENSPB150	SENOHC150#
185	SENSPB185	SENOHC185#
240	SENSPB240	SENOHC240#
300	SENSPB300	SENOHC300#
400	SENSPB400	SENOHC400#
500	SENSPB500	SENOHC500#

Replace # with A for aluminium finish



Earth Bar



Sentry®

Conductors

Copper Tape

Sentry Copper tape is available in bare and coated versions. The tapes are manufactured from high conductivity annealed copper and are available in different sizes and versions as shown in the tables.



Tape to
BS EN 13601 (BS1432)

Colour	Code	Reference
Black	BK	
Green	GR	
Grey	GY	
Stone	ST	
White	WH	
Brown	BR	

Replace + with I for insulated/pvc coated copper tape
Replace * with required colour code for insulated/pvc coated copper tape



Tape to
BS EN 13601 (BS1432)

COPPER TAPE

Width	Thick	Packing	Unit weight kg.	Catalogue
12	1.5	30m	0.17/m	SEN+CT1215*
12	3	30m	0.33/m	SEN+CT1230*
12.5	1.5	100m	0.17/m	SEN+CT12515*
12.5	3	100m	0.33/m	SEN+CT12530*
20	1.5	30m	0.27/m	SEN+CT2015*
20	2.5	30m	0.45/m	SEN+CT2025*
20	3	30m	0.53/m	SEN+CT2030*
25	1.5	30m	0.33/m	SEN+CT2515*
25	3	50m	0.67/m	SEN+CT2530*
25	4	30m	0.89/m	SEN+CT2540*
25	6	30m	1.33/m	SEN+CT2560*
30	2	30m	0.53/m	SEN+CT3020*
30	3	50m	0.80/m	SEN+CT3030*
30	4	40m	1.07/m	SEN+CT3040*
30	5	40m	1.33/m	SEN+CT3050*
31	3	30m	0.83/m	SEN+CT3130*
31	6	30m	1.65/m	SEN+CT3160*
31.5	4	40m	1.13/m	SEN+CT3154*
38	3	30m	1.02/m	SEN+CT3830*
38	5	30m	1.69/m	SEN+CT3850*
38	6	30m	2.03/m	SEN+CT3860*
40	3	50m	1.06/m	SEN+CT4030*
40	4	30m	2.03/m	SEN+CT4040*
40	5	25m	1.78/m	SEN+CT4050*
40	6	30m	2.12/m	SEN+CT4060*
40	6.3	25m	2.24/m	SEN+CT4063*
50	3	30m	1.33/m	SEN+CT5030*
50	4	30m	1.77/m	SEN+CT5040*
50	5	20m	2.22/m	SEN+CT5050*
50	6	20m	2.66/m	SEN+CT5060*
50	6.3	20m	2.80/m	SEN+CT5063*

TINNED COPPER TAPE

Width	Thick	Packing	Unit weight kg.	Catalogue
12.5	1.5	30m	-	SENCTT12515
20	2.0	30m	0.36/m	SENCTT202
25	3.0	30m	0.67/m	SENCTT253
25	6.0	30m	1.33/m	SENCTT2560
30	2.0	30m	0.53/m	SENCTT302
30	2.0	75m	0.53/m	SENCTT302-75
31	3.0	50m	0.83/m	SENCTT313
38	5.0	30m	1.69/m	SENCTT385
50	6.0	20m	2.68/m	SENCTT506



Sentri®



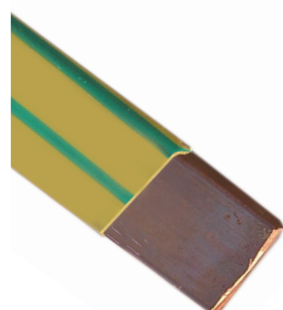
Tape to
BS EN 13601 (BS1432)
PVC Colours to
BS 6746



Tape to
BS EN 13601 (BS1432)



Tape to
BS 2898; 1350



Tape to
BS 2898; 1350
PVC Colours to
BS 6746



Tape manufactured to the
requirements of BS 2874

LSF COATED COPPER TAPE

Dimensions mm x mm	Colour	Packing	Unit weight kg.	Catalogue
25 X 3.0	Green	50m	0.77/m	SENCTL253
25 X 6.0	Green	40m	1.53/m	SENCTL256
50 X 6.0	Green	20m	2.95/m	SENCTL506

LEAD COATED COPPER TAPE

Width mm	Thick mm	Packing	Unit weight kg.	Catalogue
25	3.0	50m	0.77/m	SENLC253

BARE ALUMINIUM TAPE

Width mm	Thick mm	Packing	Unit weight kg	Catalogue
12.5	1.5	50m	0.05/m	SENBAT12515
20	3	50m	0.16/m	SENBAT2030
25	3	50m	0.21/m	SENBAT253-50
25	6	50m	0.41/m	SENBAT2560
30	3	50m	0.25/m	SENBAT3030
40	6	50m	0.67/m	SENBAT4060
50	6	50m	0.81/m	SENBAT5060

PVC COATED ALUMINIUM TAPE

Width mm	Thick mm	Colour	Packing	Unit weight kg.	Catalogue
12.5	1.5	Black	50m	0.09/m	SENATPBL12515
20	3	Black	50m	0.25/m	SENATPBL203
25	3	Black	50m	0.30/m	SENATPBL253
25	3	Brown	50m	0.30/m	SENATPBN253
25	3	Grey	50m	0.30/m	SENATPGY253
25	3	Stone	50m	0.30/m	SENATPST253
25	3	White	50m	0.30/m	SENATPWH253
25	3	Green	50m	0.30/m	SENATPGR253

PLAIN COPPER BARS

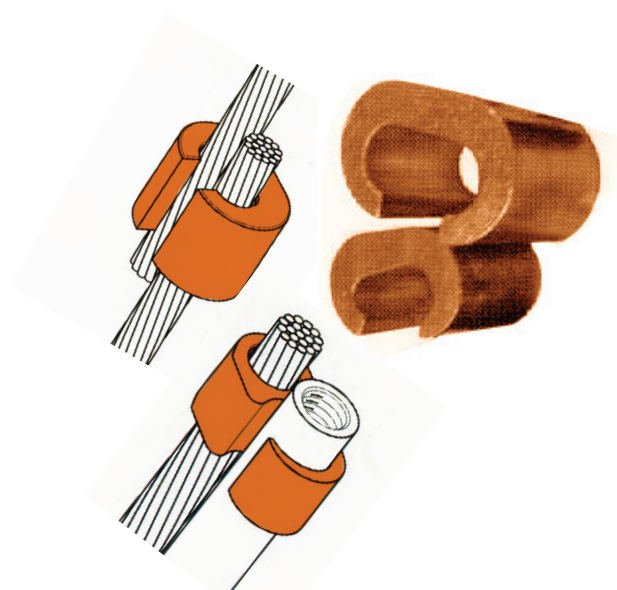
Dimensions mm	Packing	Unit weight kg.	Catalogue
20 X 3	1	0.53/m	SENHDB2003
25 X 3	1	0.67/m	SENHDB2503
25 X 6	1	1.33/m	SENHDB2506
38 X 6	1	2.03/m	SENHDB3806
50 X 6	1	2.67/m	SENHDB5006
50 X 10	5	4.45/m	SENHDB5010
75 X 6	1	4.00/m	SENHDB7560
100 X 6	1	5.38/m	SENHDB10060



Sentri®

Compression Connectors

Compression connectors are available in standard C type and six type configurations. These connectors are used in areas when exothermic welding is not possible for access or for other reasons. In addition to the C Type and 6 Type connectors, a whole selection of compression lugs are available from Sentri. Please ask for our Kompessor® catalogue from Sentri.

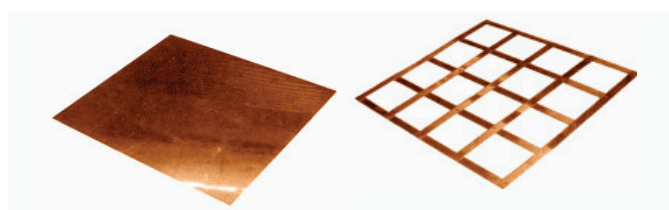


Copper Plates And Lattices/grids

Copper plates are used when it is not feasible to use earth rods. This could be due to a number of reasons such as access or soil conditions.

However, the cost of such copper plates can be prohibitive, and this could be achieved using lattice or grid plates, in combination with soil conditioning agents.

The copper plates and lattice grid is manufactured from pure electrolytic copper.



C CONNECTORS

Principal Conductor	Secondary Conductor	Catalogue
6	6	SENC 6-6
10	10	SENC 10-10
16	16	SENC 16-16
25	10	SENC 25-10
25	25	SENC 25-25
35	35	SENC 35-16
35	25	SENC 35-35
70	25	SENC 70-25
50	50	SENC 50-25
50	35	SENC 50-50
70	70	SENC 70-35
70	35	SENC 70-70
95	35	SENC 95-35
95	95	SENC 95-70
95	120	SENC 95-95
120	120	SENC 120-120
150	120	SENC 150-120
185	95	SENC 185-95

SIX CONNECTORS

Principal Conductor	Secondary Conductor	Catalogue
16-35mm ²	16-35mm ²	SEN6CC1
50-120mm ²	25-35mm ²	SEN6CC2
50-120mm ²	50-70mm ²	SEN6CC3
50-120mm ³	95-120mm ²	SEN6CC4
120-240mm ²	25-35mm ²	SEN6CC5
120-240mm ²	95-120mm ²	SEN6CC6
120-240mm ²	185-240mm ²	SEN6CC7

COPPER PLATES

Dimensions	Weight	Catalogue
600x600x1.5	5.00	SENC P6615
600x600x3.0	9.60	SENC P6630
900x900x1.5	11.50	SENC P9915
1000x2000x2.0	35.60	SENC P10202
900x900x3.0	21.63	SENC P9930

manufactured to BS2874 C101 / 103

COPPER LATTICES AND GRIDS

Dimensions	Weight	Catalogue
600x600x3.0	3.98	SENLG6630
900x900x3.0	7.20	SENLG9930
8800x2000x3	54.00	SENLG88203
3000x1000x2	5.00	SENLG30102
2000x1000x3	5.40	SENLG20103
2000x1000x2	4.00	SENLG20102

manufactured from Copper to BS EN 13601



Sentri®

Sentri GroundImprover®

Earthing systems and their set up varies in accordance with different environmental conditions such as soil and climate. Factors such as shape, dimension and materials used in such systems influence the components and methodology of the system.

Zero electrical resistance or any measurement close to it is ideal for any earthing system. The generally acceptable resistance levels in various environments according to international standards are as follows.

- Substations (Less than 5 ohms)
- Telecommunication towers (Less than 3 ohms)
- Computer centers (Less than 2 ohms)

In areas with poor soil conductivity, such as rocky ground and stony soil, achieving a proper earthing system in order to reach the required electrical resistance is not easy access with conventional methods. Therefore, in such conditions it is recommended to apply alternative materials in order to overcome this difficulty. These materials are able to improve the earthing systems even in a bad environmental condition for earthing systems.

Sentri GroundImprover® is one of the most exquisite products which can be used in all soil conditions without threatening the green environment.

Sentri GroundImprover® is a Carbon Based earthing backfill compound consisting of highly conductive materials, which increase the earthing systems efficiency and is most useful for areas where the soil resistance is high.

Ideal applications of Sentri GroundImprover® are as follows:-

- Rocky ground
- Stony soil
- Mountain tops
- Moist sandy soil
- Moist gravel
- Dry gravel
- Areas with moisture Variation

Installation Instructions

In all methods first mix the contents of each Sentri GroundImprover® package with Portland cement equal to 10% of the total GroundImprover® content (1.5Kg cement per package) and add 3-4 liters of water to the mixture.

Trench Installation:

- Dig a trench with a minimum width of 10 cm and depth of 75 cm or more if the frost line is deeper.
- Mix the GroundImprover® with 3-4 litres of water per bag and fill in the bottom of the trench with at least 5cm of GroundImprover® mixed evenly
- Place the round or tape conductor on top of the layer of GroundImprover®
- Pour enough GroundImprover® on the conductor to completely cover it with at least 5 cm of GroundImprover®.
- Full the trench with about 15cm of soil above the GroundImprover®.
- Pour enough soil to completely fill in the trench.

Ground Rod Installation:

- Dig a hole with a diameter off 15cm extending to a depth of 15cm less than the length on the ground rod
- Drive the ground rod into the hole to a depth of approximately 15cm if possible, ensuring that the top of the rod is around 15cm below grade. Any exothermic welding or clamp connections to the ground rod should be made at this stage.
- Mix the Sentri GroundImprover® with 3-4 litres of water per bag and fill the hole with this mixture covering the ground rod completely. Using appropriate devices ensure that the GroundImprover® is properly compacted.
- Fill the rest of the hole with the removed soil.

Plate/mesh Installation:

- Dig a hole with a diameter 30cm more that the length of the plate or mesh. Dig till moisture table is reached.
- Connect the conductor to the plate/mesh at at least two points with preferably exothermic welding.
- Mix the Sentri GroundImprover® with 3-4 liters of water per bag and fill the bottom of the hole with at



Sentry®

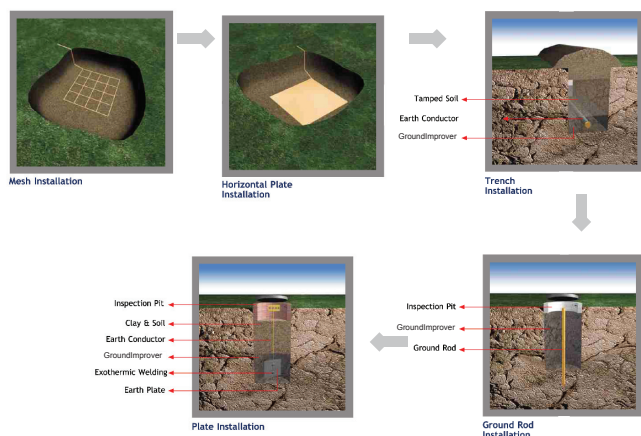
least 20cm of GroundImprover®.

- Place the plate/mesh horizontally on the GroundImprover®.
- Pour 20cm of GroundImprover® on the plate/mesh taking care to completely cover it.
- Fill the rest of the hole with clay and soil that was removed from the hole to about 50cm from grade level.

Sentry GroundImprover® Specifications:-

- Carbon-Base Backfill Material
- Resistivity 10-20 ohms centimeters (Approximately 20 times less than bentonite)
- Non-corrosive to earth conductors due to lack of chemicals (salt, etc) in its compound
- Resistant to erosion by surface waters
- High capability of water absorption
- Maintenance free and no need to recharge chemical additives (salt, etc)
- Permanent characteristics
 - Near constant electrical resistance over time
 - Easy to install and less time consuming
 - Reduced earthing conductors consumption and dimension of earthing systems
 - Applicable to different types of earthing systems (rod, mesh, wire, plate)
 - Environmental friendly
- Package dimensions : 55 x 35 x 15 Cm.
- Package weight :15 Kg
- Package material : (water resistant)

Soil resistivity depends on its composition, amount of moisture and its temperature. The chart illustrates the resistivity of some types of soil:



Part Number : SENG1

Soil	Resistivity in Ohm meter
Swampy terrain	A few units up to 30
Silt	20-100
Humus	10-150
Humid peat	5-100
Soft clay	50
Compact clay	100-200
Clay sand	50-500
Silicious sand	200-3000
Bare stone soil	1500-3000
Grass covered stony soil	300-500
Soft limestone	100-300
Compact limestone	1000-5000
Cracked limestone	500-1000
Schist	50-300
Mica Schist	800
Granite and sandstone depending on alteration	1500-10000
Granite and sandstone little altered	100-600



Sentri®

Exothermic Welding

Exothermic welding is a process where an electrical joint is made using chemicals. The process involves placing cables within a mould and igniting chemicals that are placed within the chamber. The resultant exothermic reaction creates an electrically continuous joint, shaped in the form of the mould of the housing. The chemicals used for the connection are copper oxide and aluminium, and the moulds are manufactured from graphite allowing repeated usage over extended period of time.

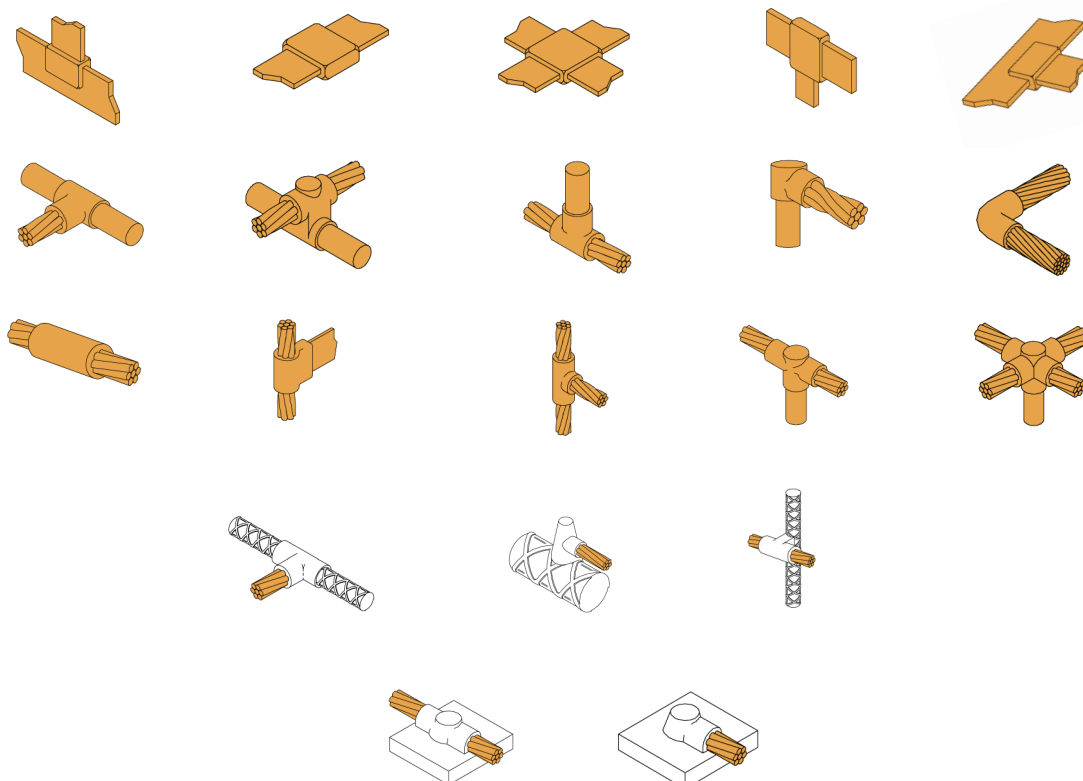
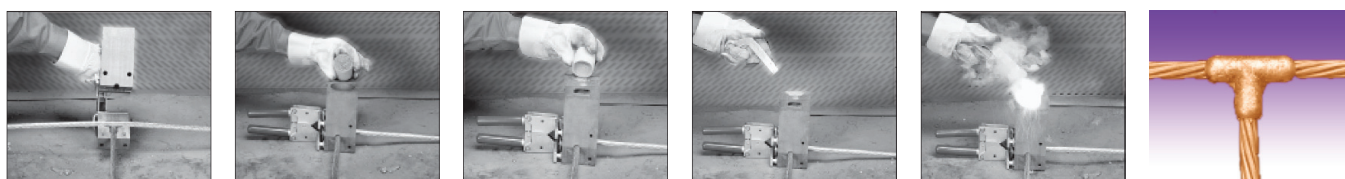
The Sentriwelder® is portable and lightweight. This is the ideal solution for onsite weld connections. The benefits of a Sentriwelder® connection are as follows.

Being a permanent connection, this is not subject to mechanical tightening torques etc.

Connections have a high copper content, and are therefore highly conductive. As the cross sectional area is higher, the current carrying capability is higher. Moreover, the conductor would be destroyed before the Sentriwelder® joint is damaged.

Repeat usage is possible, as the connections are durable.

The connections are shown below. Please contact your local distributor for further details.



Lightning Protection System

What is Lightning?

When charge within clouds are discharged to ground, a passage is formed from the cloud to earth, and the excess charge present within the clouds is discharged to earth. A bright flash accompanies this discharge, and high decibel levels are achieved in the form of thunder.

During thunderstorms, there are at least 6000 lightning strikes per minute. Assuming a 30% strike rate, this translates into 900 deaths every minute of a thunderstorm. While this is not the case, the following aspects about lightning are considered valid.

- When struck by lightning, people do not glow or “fry to a crisp” but the heart and breathing are often affected.
- Only about 30% of people struck actually die, and the incidence of long-term disability is low, particularly when appropriate first aid is applied promptly.
- If your clothes are wet, you are less likely to be seriously injured if struck, as most of the charge will conduct through the wet clothes rather than your body.
- Average lightning bolts carry a current of 10,000 to 30,000 amps. An average radiator draws 10 amps in comparison.
- Lightning can, and often does, strike more than once in the same place.

Lightning can occur with both positive and negative polarity. An average bolt of negative lightning carries an electric current of 30 kA, and transfers fifteen coulombs of electric charge and 500 MJ of energy. Large bolts of lightning can carry up to 120 kA and 350 coulombs. An average bolt of positive lightning carries an electric current of about 300 kA; about 10 times that of negative lightning.

The voltage involved for both is proportional to the length of the bolt. However, lightning leader development is not just a matter of the electrical breakdown of air, which occurs at a voltage gradient of about 1 MV/m. The potential gradient inside a well-developed return-stroke channel is on the order of hundreds of V/m due to intense channel ionization, resulting in a true power output on the order of 1 MW/m for a vigorous return stroke current of 100 kA. The average peak power output of a single lightning stroke is about one trillion

watts—one terawatt, and the stroke lasts for about 38 microseconds.

Lightning rapidly heats the air in its immediate vicinity to about 20,000 °C about three times the temperature of the surface of the Sun. The sudden heating effect and the expansion of heated air gives rise to a supersonic shock wave in the surrounding clear air. It is this shock wave, once it decays to an acoustic wave that is heard as thunder.

The return stroke of a lightning bolt follows a charge channel about one cm wide. Different locations have different potentials and currents for an average lightning strike. In the United States, for example, Florida experiences the largest number of recorded strikes in a given period during the summer, has very sandy soils in some areas, and electrically conductive water-saturated soils in others. As much of Florida lies on a peninsula, it is bordered by the ocean on three sides. The result is the daily development of sea and lake breeze boundaries that collide and produce thunderstorms.

NASA scientists have found that electromagnetic radiation created by lightning in clouds only a few miles high can create a safe zone in the Van Allen radiation belts that surround the earth. This zone, known as the “Van Allen Belt slot”, may be a safe haven for satellites in middle Earth orbits, protecting them from the Sun’s intense radiation.

The Lightning Strike density varies from region to region. The density depends on the number of days of rain, thunderstorms, and other related factors.

Lightning can occur within clouds, or between two clouds. In certain cases, the discharge can run for a few kilometers, intermittently appearing between gaps in the clouds as muted flashes. The cloud to cloud discharges are due to opposite charged clouds coming together and forming a complete and continuous path, neutralizing the charge present within the charged clouds.

Lightning Protection System

A lightning protection system is essential to any structure. The objective of a lightning protection system is to protect the structure. By protecting the structure, personnel within the structure are also protected in the event of a lightning strike. The Lightning Protection System captures the lightning downstreamer and discharges the resultant high



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current levels to ground, through the shortest path, within the shortest time.

The Lightning protection system is therefore responsible for preferential capture of the downstream discharge of high current, through the path established between the charged clouds and earth. A Lightning Protection System (LPS) therefore has to present a low value of resistance to ensure that it is the preferred path to ground for the discharge. The failure of the LPS will result in the Lightning striking the building in preference and thereby damaging the structure or aspects within the structure.

However, a lightning protection system in itself cannot protect equipment from the secondary effects of lightning, such as overvoltages and transients. This can only be protected by using surge protectors, or transient protectors. A combination of surge protectors and a lightning protection system is essential to achieve a comprehensive lightning protection system that protects the structure and all internal electronic and electrical equipment.

Methodology and Implementation

There are various methods to implement an LPS within a structure. The method depends on various factors including standards employed, budgetary constraints, earthing conditions, architectural considerations, lightning strike density, and the capability to fix an LPS on the building, amongst other factors.

If British Standards are employed, a faraday cage concept may be applied to the structure under protection. This involves taping the entire structure with copper tape, thereby providing various areas for preferential capture of the Lightning Strike, and its passage to the ground.

If however, French Standards are preferred, a capture head is placed at a point on the roof of the project, and this provides a zone of protection for the building. The area falling within the zone of protection is safeguarded against Lightning Strikes, as the capture head acts as the preferential path, allowing the Lightning Strike its safest path to ground.

Cost Implications

In the French Standard there is a single active capture head that is used to capture the Lightning strike. There are probably a maximum of two down leads that are used to discharge the generated over-current to earth. The French standard calls for lesser amount of copper.

However, in the British Standard the entire building is taped and a Faraday Cage is formed around the building. This calls for greater use of copper, and the related costs of material and implementation, are higher. There are however, ways to reduce copper usage, such as the use of rebars, and structural steel for earthing and dissipation to earth. This does not find favour with purists who swear by the use of copper tape.

Earthing Conditions

If earthing conditions are not conducive to a single or twin down lead seen in a French system, multiple earth rods and connections to earth may be necessitated, which may lead to increased usage of copper and earth rods.

Architectural Considerations

In modern buildings that have attractive facades, architectural considerations do not allow for the run of copper tapes along the external surface in an exposed fashion. PVC coated copper tape, colour matching, the usage of re-bars, are some of the solutions provided to overcome such objections.

Lightning Density

In lesser dense areas of lightning strike, clients are willing to take risks to avoid Lightning Protection Systems. However, this may increase the premium in case of building insurance, and may also render claims in the unlikely event of a lightning strike invalid.

The Lightning Density impacts calculations to determine compliance to the requirements of EN 62305. In areas where Lightning strikes are far lesser, the probability value is lesser and therefore for the same level of protection, the risk calculations indicate a lesser value than those where there are more strikes.

Capability to Fix LPS Components

In the event of roof top difficulties, or other restrictions to fix LPS components, appropriate steps are taken to ensure that these are resolved. For instance in the case of Steel Roofed Sheds, restrictions are imposed to puncture the roof. In such cases, copper tape is secured using appropriate bases on the roof.

Other Cases

The British Standard does not allow for protection of open areas. This can be achieved using Capture heads conforming to French Standards. The capture heads ionize the air in the vicinity of the capture head, and allow the safe passage of Lightning discharge current to earth.



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62305- An overview

EN 62305 is the new standard for lightning protection. The standard defines the parameters for installing a lightning protection system, irrespective of whether the method adopted conforms to the British conventional Faraday cage system, or the French active system. The application of the system to the relevant standards, and its implementation, are discussed in EN 62305. When applied in the British Concept, the EN 62305 standard is prefixed with BS and the standard is read as BS EN 62305 in the British context.

As the product offering of Cupra stretches across both standards, it is worthwhile understanding what 62305 standards call for and its application in designing a Lightning Protection System.

The standards are split into four distinct parts. Each part deals with a specific aspect of the Lightning Protection conundrum. The various parts involved in the standard are mentioned below in brief.

Cupra regional offices worldwide have the capability to design a Lightning Protection System of your choice (active or passive) in line with the requirements of 62305, BS 6651 and NFC 17102. This unified European Standard is now the norm for determining the need for, and implementation of a Lightning Protection System.

Part 1

The first part introduces the standard and the other relevant parts of the standard. The process of designing a Lightning Protection System in accordance with the other aspects of the standard are also laid out and defined in this part.

The different types of strikes and the damages associated with these strikes are defined and the parameters laid out. When these damages happen to the structures, the

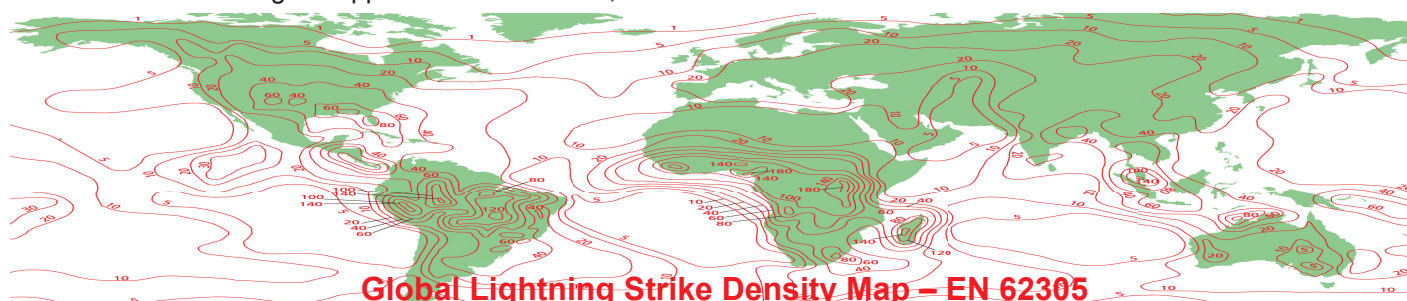
associated loss, be it life, loss of service, loss of value and loss of heritage are computed and determined. On this basis, the risk of loss of various parameters is again defined, and the need to protect a structure against lightning strikes is defined. Thus Part 1 of the standard defines the various terminologies that get introduced over the different parts of 62305.

Different levels of protection are defined for structures. For a lower numerical level of protection, the physical protection of the structure is higher. The level of protection is determined by the extent of protection desired for the structure under consideration. For each level of protection, the lightning current is also defined. The first part therefore is an introduction to the different terminologies and the other parts of EN 62305.

Part 2

EN 62305 Part 2 deals more with the actual calculation of the risk involved rather than the actual protection to be considered for a specific structure. In this section, a risk assessment is made, and on the basis of the risk assessment, a decision on the level of protection is taken. In any installation that needs protection, there are various risks such as Risk of loss of Human Life, risk of loss of service to the public, risk of loss of cultural heritage, risk of loss of economic value. The standard defines the tolerable risk based on studies carried out. Each risk is evaluated and measured against the tolerable risk. If the calculated risk is less than the tolerable risk, protection is not necessary. However, if the risk calculations indicate a risk value in excess of the tolerable risk, appropriate steps are taken to implement a Lightning Protection System.

The calculations to determine risk can be arduous, and Cupra are well equipped to provide you with a full calculation and solution to justify your risk assessment and associated steps to reduce risk in the form of a Lightning Protection System.



Part 3

This section of EN 62305 deals with steps taken to protect the structure against Lightning Structures. This directly relates to the requirements of BS 6651 or NFC 17102. Having defined the various levels of protection, the appropriate system that complies with risk reduction requirement is implemented. An LPS level I provides better protection than a class IV LPS. Various factors are to be taken into consideration while determining the LPS. The LPS system typically has an Air Termination System, a down conductor system, and an earth termination system. Components used in the system have to comply with the relevant requirements of EN 50164. Conformance to these standards will ensure product performance in the event of a lightning strike.

When the system being designed is in line with British Standards, the relevant methods of determining the application of an LPS such as Rolling Sphere Method, Protective Angle Method, Mesh Method(Faraday cage) are used. The system is thereafter checked to ensure that there are no areas that are left unprotected.

If Active Systems are used, the Zone and radius of protection are calculated based on data provided by the manufacturer, and applied to determine the area of protection. Once the LPS is in place, the risk calculations are reapplied to determine if the risk is within tolerable levels.

Part 3 details the dos and don'ts of the use of natural components, and various parameters that are normally seen within buildings. A detailed understanding of this part of the standard is therefore essential during the implementation of LPS in accordance with EN 62305.

Additionally, factors such as potential flashovers between down-leads and metallic components of a structure are discussed, and protection means and methods are discussed in this section. Various methods employed to protect a structure are noted, and the installer can adapt the method best suited, and within their constraints of cost, local regulations and standards.

Part 4

In the event of Lightning Strikes to a structure, transient currents are generated. This enters the electrical and electronics within structures. The structure under consideration is split into various zones depending on the extent of exposure to the effects of Lightning. The zones are defined as areas that are external(take the direct impact of the Lightning Strike) and Internal(partial exposure to Lightning Strikes). When the area to be protected is of a critical nature, the protection level applied to this zone is higher. In other words, the decision to protect, and the nature of protection is dependent on the criticality of the area with respect to the rest of the area. In normal new build structures, the application of an external Lightning Protection System will suffice; however if Lightning Protection is to be applied to an existing building, the inclusion of Surge Protection Devices is the best option.

EN 62305 Part 4 deals with the design, installation, maintenance and testing of a Lightning Electromagnetic Impulse protection system for electrical electronic systems. In earlier standards such as BS 6651, the application of such LEMPs was treated as an Annexure. However, in EN 62305, this is treated as an integral part of the protection schemes provided for the structure and read in tandem with LPS solutions.



The Faraday Cage Concept

The faraday cage concept is employed to protect the building in a lightning strike situation. In this concept, the entire building is taped on all sides in specific grids to provide preferential capture paths for the Lightning Strikes. When Lightning strikes any specific grid, it is taken down to ground in the quickest time to prevent damage.

Generally copper tape of size 25 x 3 mm is used to prepare the grid. However, in case of architectural and other considerations, 8mm diameter solid copper conductor is used to prepare the Faraday Cage around the structure to be protected.

The size of the grid is determined by the calculations of risk, and the level of protection desired as per the calculations determined from 62305 standards. The greater the risk, the higher the level of protection required (numerical value reduces) and smaller the size of the grid.

Once the conductor and grid size is chosen, appropriate fixings are chosen to fix the conductor along the walls of the structure. There are various options available such as DC clips, 3 way links, 4 way links, through links, etc which have been described earlier in the catalog. These can be fixed to the various finishes normally seen in modern day buildings such as stone, metal, concrete etc.

The first point of capture is an air rod. These are used to enable preferential capture of the Lightning discharge in the protected area. The lightning phenomenon results in huge currents being generated due to the large potential difference that exists between the charged clouds and earth, which is at zero potential. The large currents that are captured by the air terminals are transmitted to ground via the path of least resistance. If the reinforcement bars of the structure are used as down conductors, the overall electrical resistance of the rebar system should not be greater than 0.2 ohms.

A lightning protection system thus is a combination of air terminals and copper tapes, combined with a quick and easy path to ground. In addition to this, the usage

of surge protection devices ensures that the potential damage that could be caused to electrical and electronic devices within structures, is eliminated. During the determination of a lightning protection design, the following factors have to be taken into consideration.

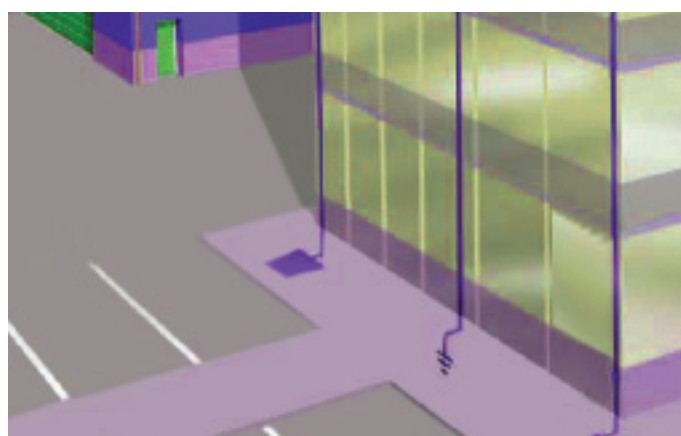
Earthing Systems

The earthing network for a lightning protection system should have a resistance of less than ten ohms to be rendered effective. It may be necessary to use a combination of earth rods to achieve the required level of earth resistance. The earth rods are spaced at least at a distance equivalent to the driven length.

Once the soil resistivity is known, it is possible to calculate the number of earth rods that are needed to achieve a particular resistance value. If the required resistance value is not reached, various solutions such as increasing the number of rods, deeper rod depths, interconnection of rods, and larger diameter rods can be used.

The usage of copper plates and lattice grids ensures the optimum resistance levels. GroundImprover® can also be used to reduce resistivity levels in tough soil conditions. The building formwork is also used at times to ensure that the potential difference during lightning conditions between the earth system and the building is eliminated.

All Lightning Protection systems should be tested frequently to ensure that they are in a good condition. This is a good practice and Sentri Systems are well equipped to ensure that the customer can get a good system that can repeatedly handle lightning conditions with excellent results.





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Surge Protection Devices

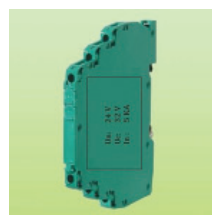
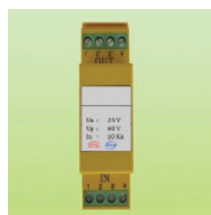
Section 4 of EN 62305 deals with the provision of Surge Protection Devices to protect against the effects of indirect lightning strikes and high-energy direct lightning strikes. Indirect Lightning Strikes can result in voltage transients that can cause immense disruption to the electrical and data network. Spikes in voltage can distort data, and even corrupt hard drives to an irreversible extent.

- Direct lightning strikes are protected by lightning current or equipotential bonding SPDs (Mains Type 1 SPDs & Signal/Telecom SPDs to Test Category D)
- Indirect lightning strikes and switching transients are protected by transient overvoltage SPDs (Mains Type 2 and Type 3 SPDs and Signal/Telecom SPDs to Test Category C)

In a direct strike, the overvoltage that is seen at the entrance to the structure is significantly high. In an indirect strike, however, the voltage seen at the equipment may not be as high as that seen in a direct strike. However, if the equipment being protected in the event of a strike is of a critical nature, the presence of a Surge Protection Device is essential to ensure continuity and stability of service.

SPD's should not impede or stop current from entering the structure. The SPD's should also not stop data from entering the building, or corrupt it.

Coordinated SPDs simply means a series of SPDs installed within a structure, from the equipotential bonding or lightning current SPD at the service entrance through to the overvoltage SPD at the final terminal end, for the protection of the tertiary equipment, that



complement each other such that all LEMP effects are completely nullified. This essentially means the SPDs at the interface between outside and inside the structure will deal with the major impact of the lightning discharge ie the partial lightning current from an LPS and/or overhead lines. Any resultant overvoltage will be controlled to safe levels by coordinated downstream overvoltage SPDs.

A coordinated set of SPDs should effectively operate together as a cascaded system to protect equipment in their environment. For example the lightning current SPD at the service entrance should sufficiently handle the majority of surge energy, thus leaving the downstream SPDs to control the overvoltage. In others words, the SPDs work in tandem with each other, as a 'coordinated' protection to the structure and its constituents. Poor coordination could mean that an overvoltage SPD is subjected to an excess of surge energy placing both itself and connected equipment at risk from damage. Furthermore, voltage protection levels or let-through voltages of installed SPDs must be coordinated with the insulation withstand voltage of the parts of the installation and the immunity withstand voltage of electronic equipment.

SPD's from Sentry Cupra are in line with EN 61643-1, NFC 61-740 and conforming to EN 62305. SPD's are available for Mains Line application, telecom application, and other applications such as TV, data etc.

For more details on the SPD range from Cupra, please contact your local distributor, or the regional office of Cupra.



Air Terminals And Fixings

Air terminal rods are tapered to ensure preferential capture in the case of lightning strikes. Rods are available in various lengths and are supplied with locknuts. Sentri Air terminal rods are manufactured from copper.



AIRTERMINAL RODS		
Rod Diameter	Length	Catalogue
10	500	SENATR1005#
10	1000	SENATR1010#
15	500	SENATR1505#
15	1000	SENATR1510#
15	2000	SENATR1520#
20	500	SENATR2005#
20	1000	SENATR2010#
20	2000	SENATR2020#

Replace # with A for aluminium finish

Air Terminal Base

The Sentri Air Terminal Base is manufactured from gunmetal.



For Tape



For Cable



For Cable (Multi direction)

AIRTERMINAL ROD BASE		
Rod Diameter	Type	Catalogue
10	Vertical	SENATBCV10#
10	Horizontal	SENATBCH10#
15	For Tape	SENATBCT15#
15	For Cable	SENATBCC15#
20	For Tape	SENATBCT20#
20	For Cable	SENATBCC20#

Replace # with A for aluminium finish

Multi Points

Multiple points are manufactured from copper and are used in conjunction with Air Terminals.



Ridge Saddle

Ridge saddles are fixed on the roof network of the lightning protection system. Ridge saddles are applied in areas where there are uneven levels. These are used to fix the air terminals.



Rod Brackets

Rod brackets are manufactured from copper or aluminium. The brackets are used to provide an offset for air rod fixings. Sentri Rod Brackets are used when it is not possible to fix rods on wall surfaces using ridge saddles or other means.



Rod To Tape Coupling

Air Terminal fixings are fixed to rod brackets, and the other end is secured to Copper Tape that goes to the ground earth system.



AIR TERMINAL FIXINGS					
Rod Diameter	Threading	Rod Bracket	Rod-Tape Coupling	Ridge Saddle	Multiple Point
15	16	SENTRBC15#	SENRTCC15#	SENTRSC15#	SENMPCC15#
19	20	SENTRBC20#	SENRTCC20#	SENTRSC20#	SENMPCC20#

Replace # with A for aluminium finish



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Early Streamer Emission Concept

In the Early Streamer Emission or Active Capture Head system, the concept is based on the presence of an upward streamer that goes up from ground to meet the downward streamer. This creates a continuous path to earth thereby allowing the Lightning current to be discharged to ground, in quick time.

The ESE capture head equipped with an electronic device that generates a high voltage under storm conditions. This ionizes the air in the vicinity of the ESE device, as a result of which positive and negative ions are present in the area. When the field increases during storm conditions, and increased wind load on the ESE device, the presence of ionized air attracts the downward streamer towards the ESE device.

In the ESE system, as the air in the vicinity is ionized, the system can provide a discharge path for positive and negative lightning. As the downward streamer is met by the upward streamer, the discharge time during a lightning strike using an ESE system is faster. This is also the reason why an ESE system is called an Active System, while the Faraday Cage system is referred to as a Passive System.

As the ESE system covers an area unlike the conventional Faraday Cage system which protects the structure it binds, the ESE system can be used to provide cover and protection over open areas and fields.

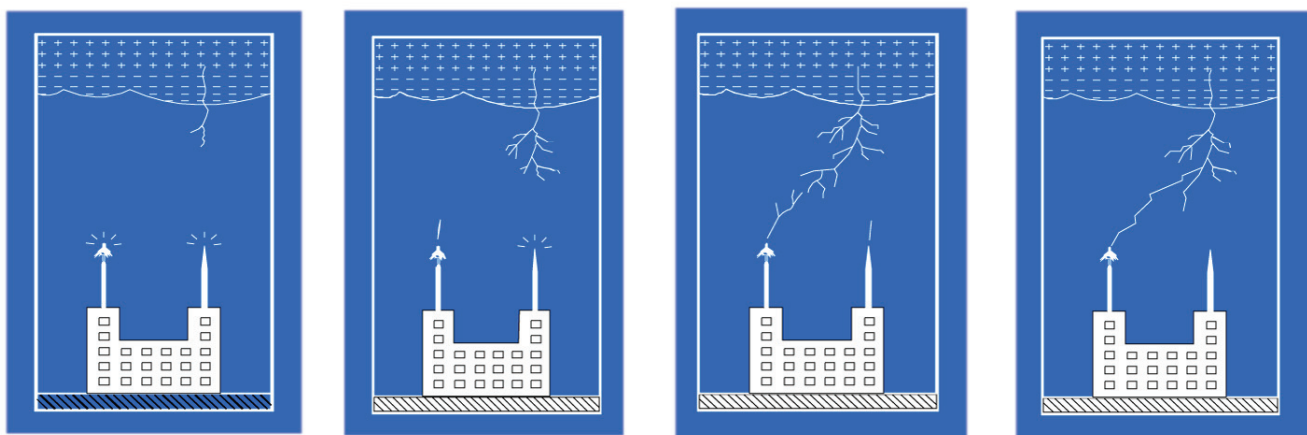
The following components make up the system.

The ESE device is the first point of contact for the downward streamer. In the ESE concept, there is no alternative to the active device. However a selection of active devices is available to allow the customer to choose amongst various options available.

The discharge current is passed to ground through down conductors. One or two down conductors are used in the ESE concept. Generally 25 x 3 flat copper tape is used. Round conductors may also be used for transmission of the discharge current.

Fixings such as DC clips and 4 way disconnecting links are used, as in the British System to secure the tape as it comes down to earth. A test link is used at the base for testing the system, and determining the function of the ESE device. The test link is also useful to check the earthing resistance values, which is necessary to ensure that the system is working in good condition.

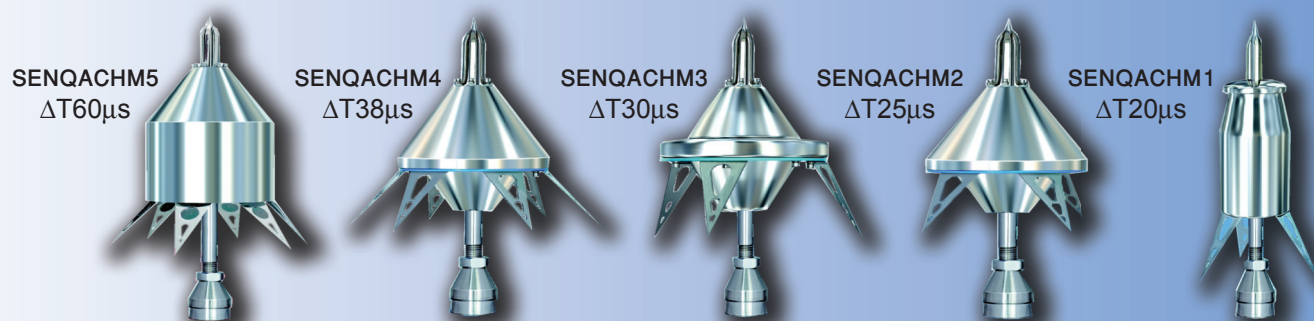
Earth rods are placed in various methods, at a single point, as multiple earth rods or single earth rods as the case may be. The Earth rods are laid out in a single pattern, as a single earth rod, or as triple earth rods, in an inline fashion, tripod, etc. The total earth resistance should not exceed 10 ohms, in line with norms, now ratified by EN 62305.



Comparison of the Early Streamer Emission Device (left) with Conventional Air Terminal Rod

QUICKESE Active Capture Head System

QUICKESE from Cupra is a range of active capture heads that provides superior performance conforming to the French Standard NFC 17 102. The range can be installed in accordance with the requirements of EN 62305. QUICKESE comes in a choice of five active heads, each with a different level of protection and cover. The choice of product is determined by the project requirement, the level of protection needed and the budget of the end user.



The Key Benefits of the QUICKESE Active Range are as follows:-

- 5 Models to choose from, offering customised solutions for each application.
- Operation independent of external power supply, and does not need human intervention
- Total Reliability even in extreme climatic conditions
- The system activates when the electrical field intensity rises (during lightning discharge conditions)
- Cost effective and greater reliability due to active components

How does the System work?

Ionisation of the field surrounding the Capture Head is achieved using electrodes located within the device. The ionisation process is controlled by appropriate devices that generate high voltage and ionise the ambient air.

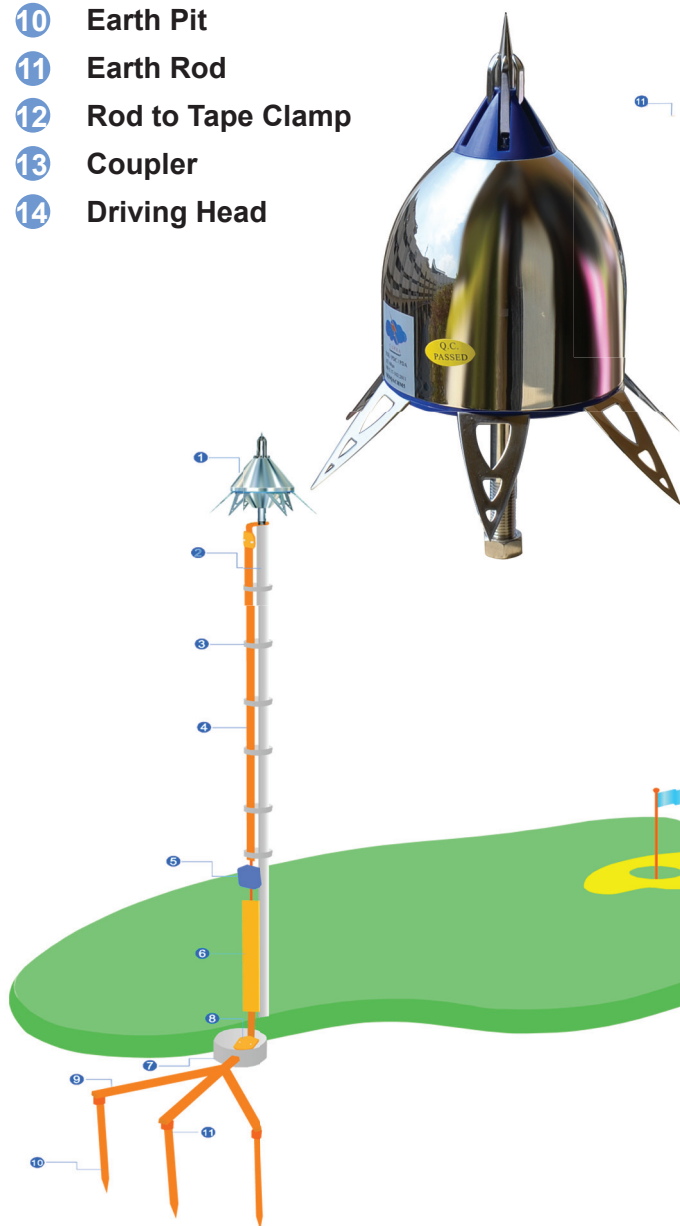
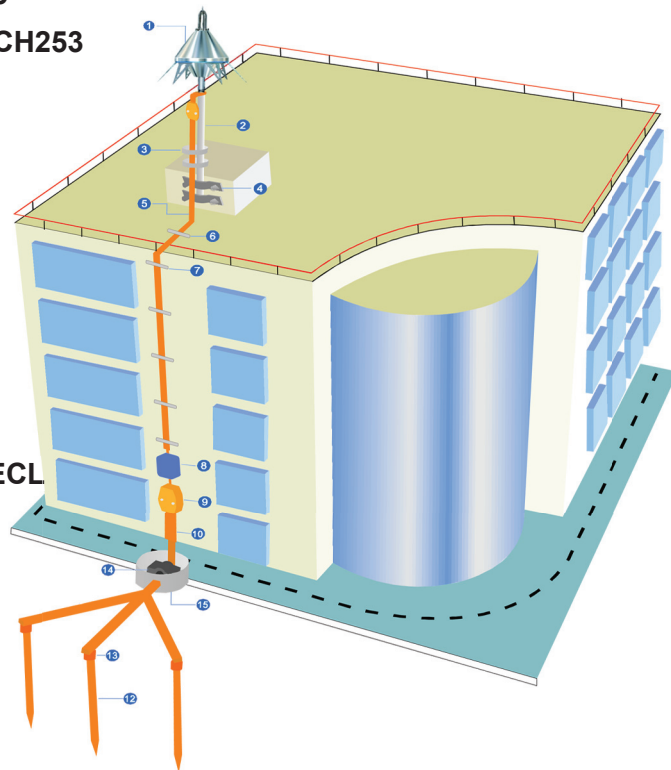
During storm conditions, there is a tendency for the charge laden clouds to present a downward leader. This downward leader increases the electrical field in its path.

The QUICKESE Active Capture Head System from Cupra produces an upward leader, in turn, that meets the downward leader as it descends to ground from the cloud. Due to the upward leader being generated ahead of conventional systems, the QUICKESE Active Capture Head System from Cupra ensures the preferential capture of the downward leader in storm conditions, and its safe discharge to the ground.



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- 1 **QUICKESE Active Capture Head - SENQACHM5**
- 1A **Copper Tape to Capture Head Holder – SENCTCH253**
- 2 **Elevation Pole – SENEPS60**
- 3 **Tape Clamping Collar – SENCTCC253**
- 4 **Side Mounting Brackets – SENSSWS**
- 4A **Adjustable Pipe Clamp – SENSSPC**
- 5 **25 x 3mm Bare Copper Tape - SENCT2530**
- 6 **25 x 3mm DC Clip – SENDC253**
- 7 **25 x 3mm Tape Clip – SENC253**
- 8 **Lightning Flash Counter – SENLFC**
- 9 **Lightning Flash Counter Enclosure – SENLFCECL**
- 10 **Earth Pit**
- 11 **Earth Rod**
- 12 **Rod to Tape Clamp**
- 13 **Coupler**
- 14 **Driving Head**



QUICKESE Active Capture Head SENQACHM2

- 1 **Self Standing Mast**
- 2 **Lightning Collar**
- 3 **Copper Conductor**
- 4 **Lightning Flash Counter**
- 5 **Protection Oversheath**
- 6 **Inspection Housing**
- 7 **Test Clamp**
- 8 **Copper Earthing**
- 9 **Earth Rod**
- 10 **Rod to Conductor Clamp**
- 11

Key Components

The Key components making up a LPS conforming to French Standard NFC17-102:2011 are as follows:-

1. Active Capture Head (Various versions)
2. Down Conductor
3. Lightning Flash Counter
4. Inspection Housing
5. Test Clamp
6. Earth rods

The Components as applied in various situations have been illustrated in the previous page. The same concepts can be extended to tower buildings, and any structures that need protection.

The key advantage of the QUICKESE Active Capture Head system is that protection can be provided for open areas.

The availability of suitable capture heads ensures that golf courses, parks and open spaces can afford

protection against lightning, especially in tropical areas, where storms can be sudden and swift.

The area of protection R_p of the QUICKESE Active Capture Head Device from Cupra can be calculated in line with the French Standard NFC 17-102:2011 that states:-

$$R_p = \sqrt{h(2D-h) + \Delta L(2D+\Delta L)}$$

Where

h = Height of the Lightning Air Terminal above the surface to be protected

D = 20m, 30m, 45m or 60m according to the required level (I, II, III or IV)

L = $V(m/s) \times T(s)$.

Based on the values calculated and the values of T as per the chosen Active Capture Head Device, the radius of protection can be calculated.

		SENQACHM1	SENQACHM2	SENQACHM3	SENQACHM4	SENQACHM5
LEVEL I PROTECTION D=20m	2m	15	17	19	21	31
	4m	22	22	28	35	47
	6m	30	34	38	46	63
	8m	37	42	47	56	78
	10m	38	43	48	57	79
LEVEL II PROTECTION D=30m	2m	18	20	24	25	35
	4m	28	29	34	40	52
	6m	36	39	44	52	70
	8m	44	49	54	62	88
	10m	47	52	55	66	90
LEVEL III PROTECTION D=45m	2m	20	23	26	30	39
	4m	31	34	38	45	58
	6m	41	46	50	60	78
	8m	51	57	63	72	97
	10m	54	60	66	75	98
LEVEL IV PROTECTION D=60m	2m	22	26	28	33	43
	4m	35	39	42	50	64
	6m	46	52	56	66	85
	8m	58	64	71	81	106
	10m	62	68	74	84	109

Lightning Flash Counter:

Lightning Flash Counter (LFC) is designed for easy mounting on a down conductor to effectively count the number of lightning strikes captured by the E.S.E Air Terminals or surge protectors. LFC measures lightning strikes by the induction of current and does not require the use of any external power source.

Technical Data:

Power Supply	3V battery, Type CR123A, Exchangeable
Min count current	> 1KA, rise time 8~10μs
Sequence of impulse	> 1s
LCD indicator	4-digit(0~9999)
Inductive line	1m long Twisted-pair
Service life of battery	≥ 2.5 years (Do NOT pull the Insulated part before use)
Enclosure material	Black thermoplastic, UL94-V0
Installation	Mount on 35mm Din rail or inside waterproof box
Dimension	1.5 mods
Part Number	SENLFC

Lightning strike counter Installation:

LFC should be installed at a position along the down conductor length where it can be easily accessed for inspection. The LFC lightning strike counter shall be installed at any point along the down conductor (copper cable/tape) in a safe point secured in a enclosure provided.

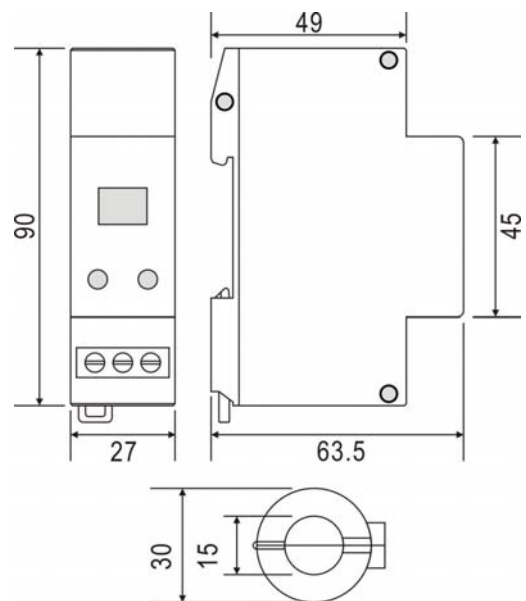
When installing the Lightning Counter the following should be considered:

Lightning counter should be mounted away from areas where damage may occur due to theft, vandalism or nearby operations. It can be enclosed in a security enclosure but the display should be kept visible to allow for the checking of recorded strikes.

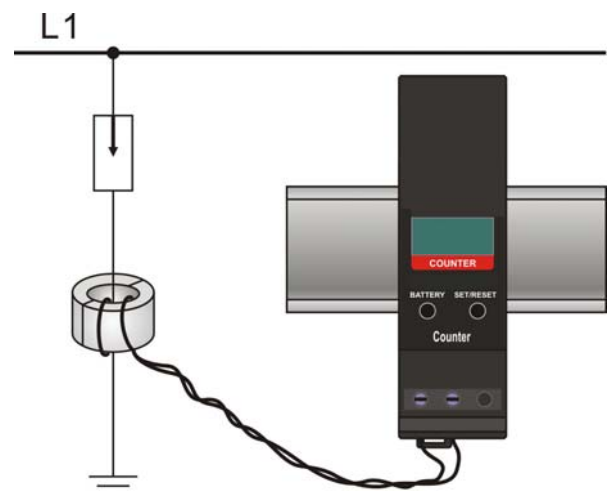
LIGHTNING FLASH COUNTER



LFC DIMENSION DETAILS

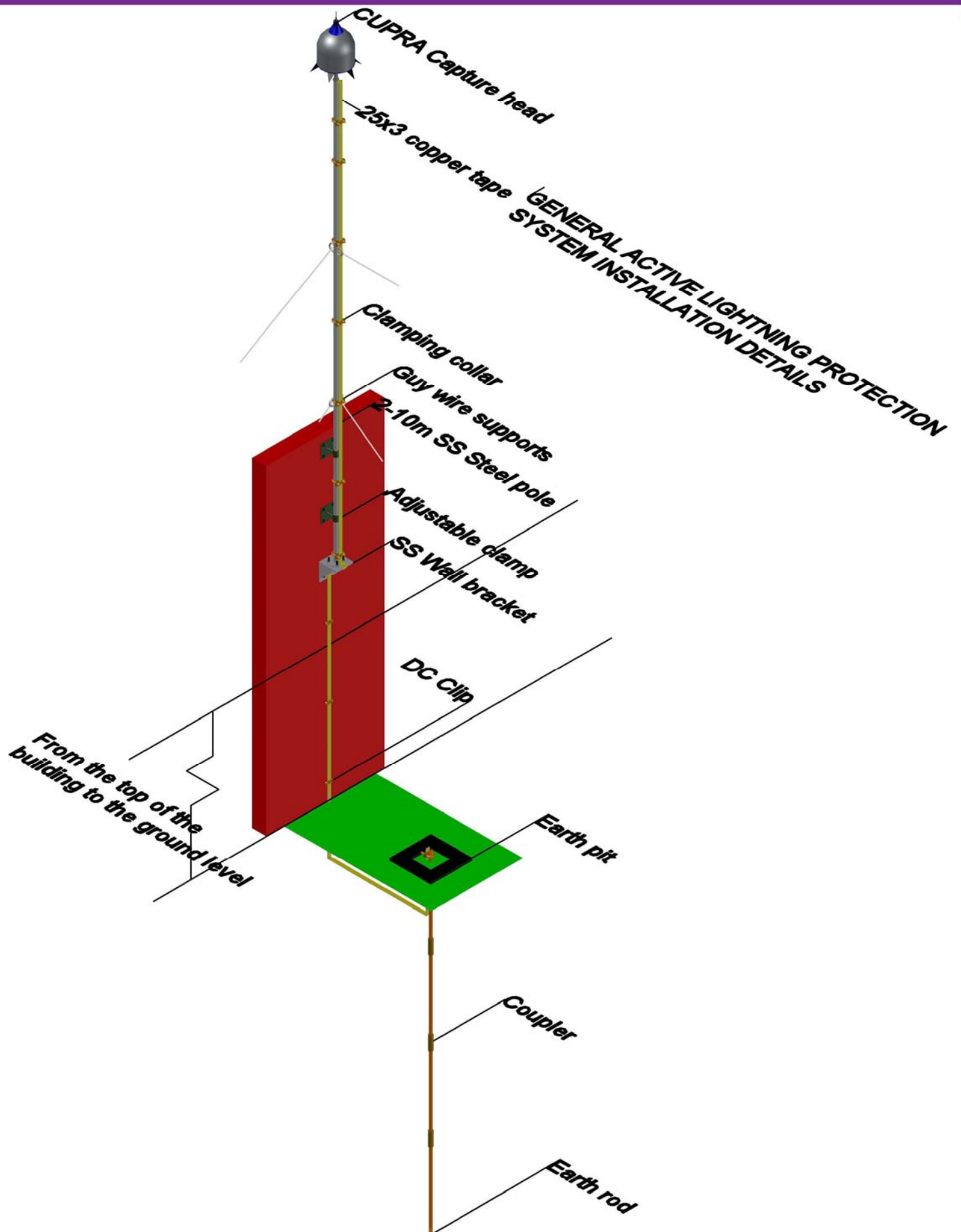


LFC INSTALLATION METHOD





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Enclosures

LFC should be installed at any point on the down conductor length where it can be easily accessed for inspection.

Enclosures protect the Lightning flash counters from any physical damage or water seepage into the counter; Enclosures could be customized as per the requirements.

Part Number : SENLFCENC



Copper Tape to Capture Head Holder

Capture Head Holder generally connects the Cable or Tape used to terminate with the capture head. Double plate used to terminate the cable or tape with the capture head.

Part Number : SENTCTCH253



Elevation Pole

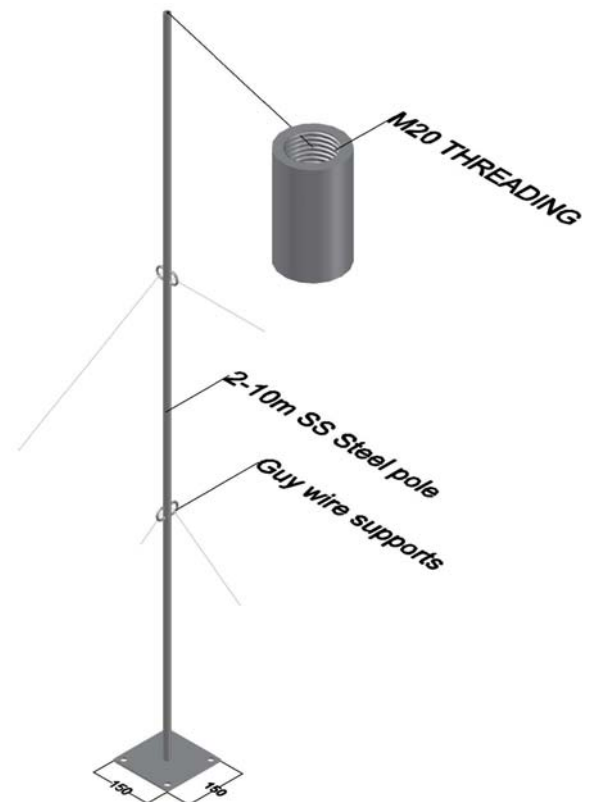
Elevation Pole is the pole to increase the height to make sure to cover the protection area

Thickness	= 3mm
Diameter	= 25mm (first 1mtr)
Diameter	= 27mm
Base	= 125 x 125mm
Fixing Centre	= 100 x 100mm
Threading	= 20mm (Top Inside)
Height	= varies from 2-10mtr

Base of pole is standard, however this could be customized based on the pole height and wind load calculation. Height will be determined based on the level of protection and the required position of capture head.

Elevation poles taller than 4metres will be supported with guy wire supports. Guy wires are recommended to pulled and tied from four different sides so that the pole stays stable.

Part Number : SENEPSS**



Tape Clamping Collar

Tape Clamping Collar is modified Type E double plate U Bolt clamp.

Copper tapes are secured with elevation pole using this clamp.

The down conductor can be copper tape or cable, both versions of down conductors are secured using the same clamp.

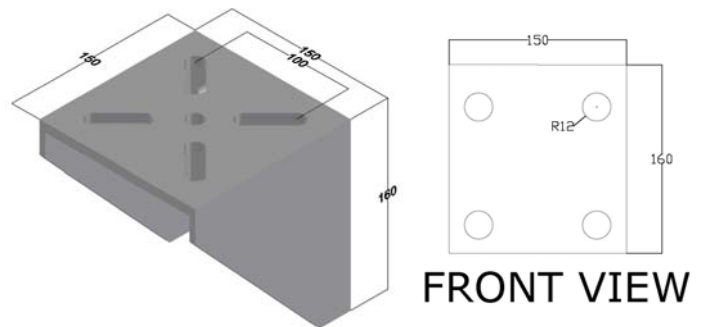
Part Number : SENCTCC253



Side Mounting Brackets

Side Mounting Brackets is the wall bracket to fix the elevation pole on a wall at a particular height.

Thickness	= 6mm
Top size	= 150 x 150mm
Fixing centre	= 100mm
Back size	= 160 x 150mm
Fixing centre	= 100mm

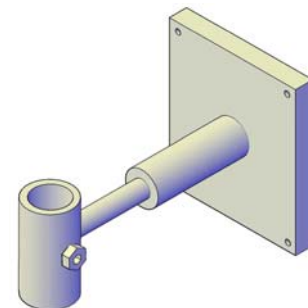


Part Number : SENSSWS

Adjustable Pipe Clamp

Adjustable Pipe Clamp serves as an extra support from the wall to hold the elevation pole. One/Two adjustable pipe clamps are recommended to be used for the bottom 2 metres of the pole depending upon the pole location.

Part Number : SENSSPC





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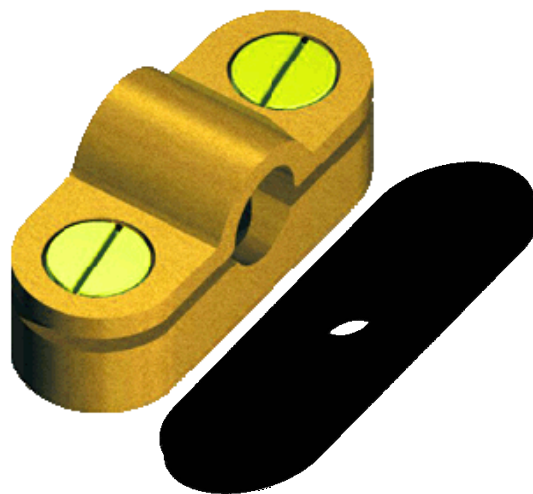
Cable Saddle with Gasket

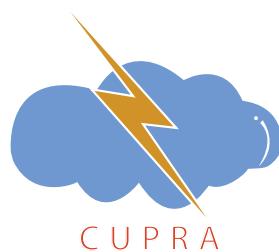
Cable saddle with gasket to facilitate the straight run of cable on the metal structures/surfaces.

Gasket ensures protection towards bi-metallic corrosion, when the saddle is fitted on metal surfaces.

Part Number: SENHCSGS*

* to be replaced with the required size, eg. For 35mm² cable SENHCSGS035





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