LIGHTNING PROTECTION INTERNATIONAL PTY LTD

LPI EARTHING PRODUCT HAND BOOK

Comprehensive Lightning, Surge Protection & Earthing Solutions

www.lpi.com.au

The LPI story

Lightning Protection International Pty Ltd (LPI) is a fully Australian owned manufacturer and supplier of direct strike lightning protection, transient voltage surge suppression, and earthing / grounding solutions.

For many years, LPI has been providing specialist lightning protection advice to customers in some of the most lightning prone areas of the world. Our personnel have extensive experience in risk management, system design, training, installation, certification, and commissioning of systems in a wide variety of industry groups.

LPI maintains a third party Quality Management System to AS/NZS

ISO 9001:2008.

LPI's range of products and services are exported from its head office and research facility (in Tasmania, Australia) and via regional offices worldwide.

The company has been recognised within Australia for its outstanding export successes and has been awarded several prestigious export awards.

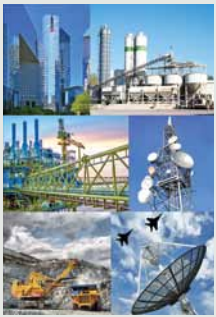
LPI's 4-Step Approach to Lightning Protection

It is the strategic aim of our company to be able to provide a complete packaged solution. LPI has identified 4 key steps when considering the complete approach to lightning protection, ask for our LPI 4 Step approach to lightning protection.

Our system design approach includes:

1. Definition and provision of area protection
2. Creation of a bonded earthing system
3. Protection of mains power lines
4. Protection of signal, data and communication lines

Active in Industry



EXPORT AWARD WINNER

Certified Product Australian Standard

Approvals:

IEEE IEC

bsi. ISO 9001 Quality Management

LPI Earthing Product Handbook

A comprehensive pocket hand book listing the full LPI earthing product range.

Contents

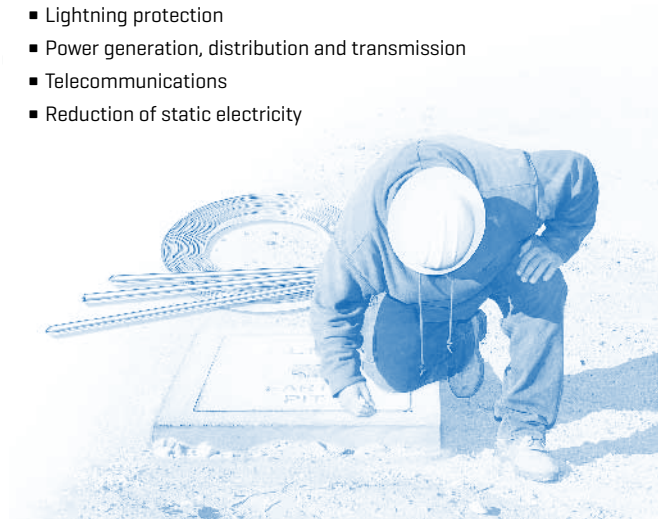
Why earthing is important

The installation and maintenance of an effective low resistance earthing system is essential for any modern facility for three key reasons:

- *Protection of personnel who work within the facility*
- *Protection of equipment so as to minimize down time, service interruptions and replacement costs*
- *Ensures electrical noise reduction which minimizes voltage potentials between interconnected equipment*

The requirement for effective earthing is critical when considering the following applications:

- Lightning protection
- Power generation, distribution and transmission
- Telecommunications
- Reduction of static electricity



The Key Parameters of an Efficent Earthing System

- Excellent electrical conductivity
- Low earth resistance and impedance

In order to achieve a low resistance and impedance earth, all connections should be as short and direct as possible. Maximising the surface contact between the soil and all electrodes and conductors is essential for efficient performance.

- Conductors capable of withstanding high fault currents
- Robust mechanical connections

All connections should be robust to facilitate a long working life.

- High corrosion resistance

Materials chosen for earthing systems should offer an acceptable compromise between cost and longevity. It is essential that compatible metals are used in the installation of an earthing system to minimize corrosion. See our detailed section on corrosion on page 8.

- Equipotential bonding

The elimination of dangerous step and touch potentials is achieved through equipotential bonding of all earths.

The Importance of Low Soil Resistivity

While many factors influence the effectiveness of an earthing system, it is the resistance of the earth itself (earth / soil resistance) which has the greatest influence on the overall impedance of an earthing system. Several factors such as soil composition, moisture content, seasonal weather, mineral content and possible contaminants determine the resistivity of the soil.

Soil types and composition vary greatly from one site to the next.

- Rich dark soils high in organic content are typically good conductors due to the retention of moisture which aids in the dissipation of electric currents.
- Sandy soils are ineffective in retaining moisture content due to the high drainage effect of sand and typically have a higher impedance.
- Rocky ground retains virtually no moisture content and as a result is very high in resistance.

Moisture content is the single largest influence on soil resistivity and in most cases the higher the moisture level of the soil the lower the soil resistivity. The installation of a deep driven earthing electrode which reaches the water table beneath the surface represents an ideal earthing system.

Seasonal weather conditions play a significant role in influencing soil resistivity levels over an extended period of time.

Areas which are subjected to high annual rainfall will typically have lower soil resistivity levels in comparison to areas which are prone to sustained hot temperatures and drought like conditions, which will result in increased soil resistivity levels. Regions where temperatures fall below freezing will see sharp increases in soil resistivity as the moisture content within the soil freezes.

Typical Resistivity Readings for Varying Soil Types

Soil Type	Typical Resistivity Range – ohm-m
Wet lands	2 – 2.5
Rich Organic Soil (Loam & Clay)	4 – 150
Sand	90 – 8500
Sandy Gravel	300 - 500
Rocky Ground	1000+

The Components Required to Achieve an Efficent Earthing System

LPI offers a wide selection of earthing products which are used in the installation of low resistance earthing systems.

Earth Rods, Tapes and Clamps

LPI copperbonded, solid copper and stainless steel earth rods in combination with copper tapes and connecting clamps form the key components of an earthing system, which provides for the safe and efficient transfer of fault currents and lightning energy into the earth mass. See pages 28, 54-57.

Equipotential Earthing

LPI's range of equipotential earth bars and transient earth clamps combine to create a safe equipotential earth plane which serves to protect personnel and equipment. See pages 33-36, 44-47.

Earth Pits

LPI offers a selection of light weight and heavy duty earth pits which are suitable for most types of earthing and lightning protection installations. See pages 43-44.

Earth Enhancing Compounds

Earth enhancing compounds are applied in and around conductors in an earthing system to reduce soil resistivity and lower earth impedance. See pages 37-40.

Chemical Earth Rods

The installation of a chemical earth rod provides for a low impedance earth in locations of high soil resistivity. Ideal for installation in locations where space constraints make it difficult to install extensive earthing systems. See pags 41-42.

Designing for an Earthing System

There are several key factors to consider when planning the design of an earthing system.

- Applicable standards and codes to be followed:

For power system earthing, IEEE 80 and or other similar International codes and standards are widely used. These standards may be mandatory. Some level of expertise is needed to undertake designs to these standards.

For lightning protection / static earths, commonly used standards are IEC62305, AS1768, NFPA 780. These standards are often not mandatory, but provide recommendations.

- Type of facility and the layout of the site with particular consideration given to the available space
- Soil resistivity profile at site
- Influence of seasonal weather conditions on soil resistivity
- Corrosive nature of soil and consequently materials chosen for use
- Expected life of the facility, once again affecting material choices
- Future extensions
- If applicable the status of any existing earthing system
- Step and touch potentials
- Volume of pedestrian traffic
- Finally but most importantly, the quality and compliance of hardware used in the earthing system installation is a major determinant of the reliability of the earthing system. This is why some standards for design also have requirements associated with testing and certification of components. Some applicable testing standards include IEEE 837, and EN 50164

The consequences of a badly designed and installed earthing system not only pose dangers to the safety of site personnel and equipment, but usually presents an expensive and difficult task to remedy after the construction phase has been completed. Often remedial work is substantially more expensive than the initial material costs.

LPI can offer professional advice and / or complete earthing system design to relevant standards. See page 60 for more details.

For more basic earthing system designs, please see our online earthing calculator per details on page 58.

Choice of materials for rods

The materials chosen for earth rods in particular have a great bearing on the service life of the installed earthing system. For this reason the following points need to be given serious consideration.

Mechanically clad rods are almost universally found to be inferior in service life compared to electroplated rods. This is true even in relatively benign earthing conditions. This is true for copper and stainless steel clad rods to much the same extent. Several independent studies around the world have concluded this.

For corrosive environments such as coastal conditions, reclaimed land, acid soils and the like, solid 316 stainless steel rods are recommended.

There are many variants of stainless steel rods in the market place, several key points need to be understood. Solid 304 stainless steel (sometimes known as 18/8) in a buried and corrosive environment will give a poor service life compared to 316 stainless steel. This is due to the differences in chemical composition and consequent grain structure of the steel. 316 stainless steel is used almost exclusively in marine industries for this reason, and is the recommended choice of material for earth rods in corrosive environments.

Beware that some earth rods are sold as stainless steel when in fact they are a thin stainless steel cladding on a steel earth rod which will provide negligible improvement to service life in corrosive earthing situations compared with a plain mild steel rod.

The next most cost effective option in corrosive soils is solid copper rods which will be more resistant to corrosion than an electroplated rod, and will handle heavier fault currents for the same diameter than stainless steel or electroplated rods.

Electroplated copper rods are the most cost effective choice for non corrosive benign soil conditions.

Earth Rods

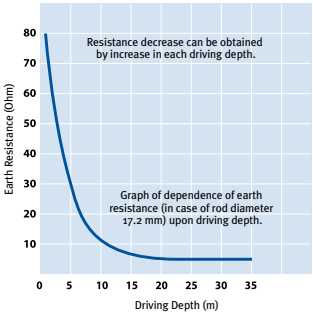
Earth rods are commonly utilized as the principle earth electrode in the design and installation of an earthing system.

LPI offers a selection of copperbonded steel, solid copper and stainless steel earth rods which are manufactured to meet International Standards such as UL 467.

The copperbonded steel cored rod is the most commonly used type of earth rod due to its overall combination of strength, corrosion resistance, low resistance path to earth and cost effectiveness. The LPI copperbonded rods are manufactured by bonding a copper layer to a steel core through an electrolytical process that ensures a perfect and even bonding between the steel and copper.

The rod finishing is free of imperfections or peeling. The copper layer, whose minimum thickness is 254 microns (10 mils) is individually and rigorously controlled by a modern set of electronic gauges.

Solid copper and stainless steel earth rods offer a high level of corrosion resistance suitable for installation in aggressive soil conditions.



Dependence of earth resistance upon driving depth.

Cost Effective Earth Rods

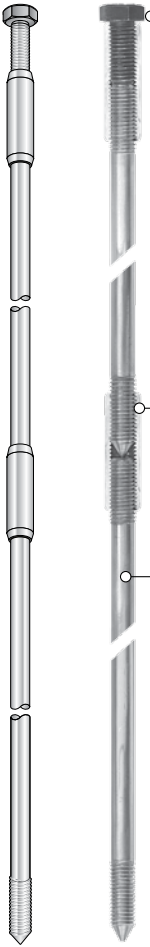
There are many factors to consider when choosing the most cost effective earth rod for your application.

- Copperbonded earth rods typically have a life expectancy of + 30 years in benign (ie non corrosive) soil conditions. Substantially less life can be expected in corrosive or wet conditions.
- Stainless Steel and Pure copper earth rods are typically used in corrosive or continually wet applications.
- Increasing the diameter of the earth rod plays a minor role in lowering earth resistance. By doubling the diameter of the rod a 10% improvement in earth resistance is gained with a 350% increase in the cost of the rod.
- Where space constraints restrict the installation of an extensive earthing system, deep driven rods provide a cost effective solution in achieving a low resistance earth, but depending on the configuration may still provide a high impedance level.

Copper Rods – A Question of Quality

The life expectancy and performance of an earthing system can be influenced by the type and quality of the copper earth rod that is installed. The following photo shows two copper earth rods which have both been subjected to the same pressure load test.

The lower rod in the photo below, is an LPI copperbonded rod which is free from cracking or tears to the outer sheath following the pressure test. The copperclad rod on top shows clear evidence of cracking and tearing to the outer sheath. The installation of earth rods involves driving the rod into the ground, it is this process where inferior quality copper rods are likely to be damaged resulting in cracks or tearing to the outer sheath which will significantly reduce its serviceable life and placing the integrity of the whole earthing system at risk.



Driving Stud

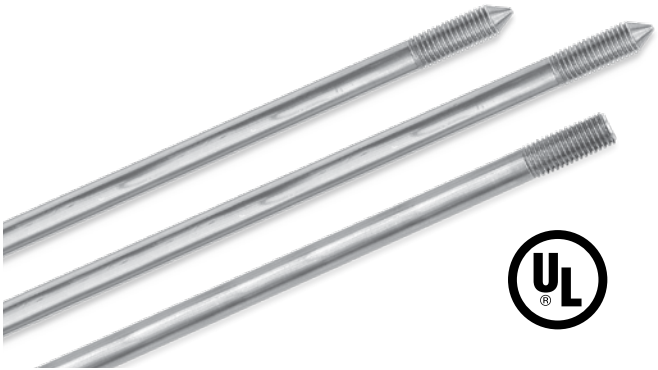
High tensile steel driving stud which can be used many times over and is suitable for power hammering.

Coupling

Whether connecting rod to rod or driving stud to rod the high strength copper alloy coupling is counter bored to protect the earth rod threads from damage and subsequent corrosion.

Earth Rod

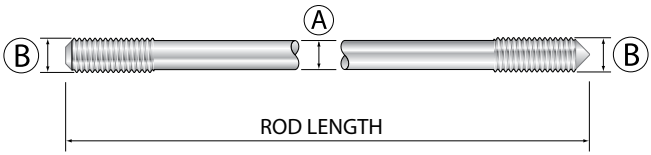
Copperbonded earth rods are made from high tensile low carbon steel and each rod is manufactured by molecularly bonding 99.9% pure electrolytic copper to the low carbon steel core in accordance with national and international standards such as UL 467. Threads are rolled onto the rod ensuring an even copper covering which eliminates the risk of chipping whilst driving.

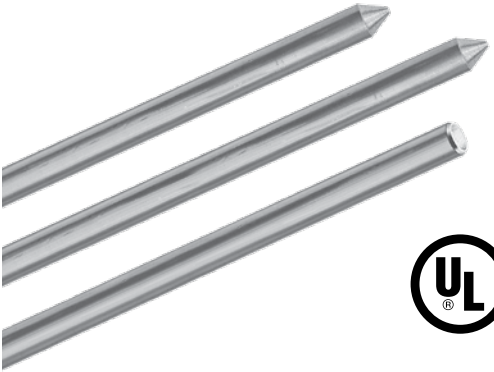


Threaded Copperbonded Earth Rods - CBER

Earth Rod Length (m)	Rod Diameter (mm) A.	Thread Diameter (Inches) B.	Thread Diameter (mm) B.	Weight per rod (Kg)	Bundle Size	Ordering Code
1.2	14.3	5/8" UNC	15.3	1.54	10	CBER1214
3.0	14.3	5/8" UNC	15.3	3.84	10	CBER3014
1.2	17.3	3/4" UNC	19	1.92	10	CBER1217
3.0	17.3	3/4" UNC	19	5.73	10	CBER3017

- *Standards: UL 467*





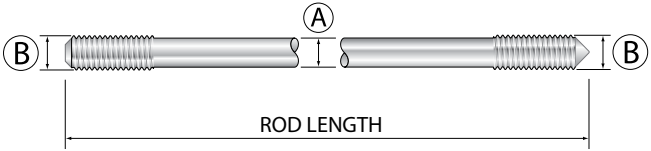
Unthreaded Copperbonded Earth Rods - UTCBER				
Earth Rod Length (m)	**Rod Diameter (mm)**	**Weight per Rod (kg)**	**Bundle Size**	**Ordering Code**
1.5	12.7	1.52	10	UTCBER1512
1.5	14.3	1.92	10	UTCBER1514
2.4	14.3	3.07	10	UTCBER2414
3.0	17.3	5.73	10	UTCBER3017

- *Standards: UL467*

Solid Copper Earth Rods

LPI's range of solid copper earth rods are manufactured from hard drawn copper and are best installed in highly corrosive conditions such as soils containing excessive salt content. All solid copper rods manufactured by LPI are supplied with an external thread.

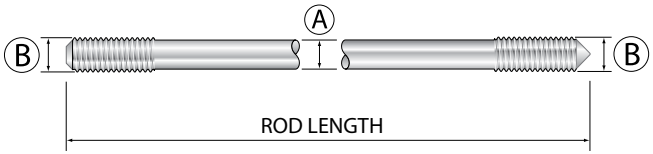
Solid Copper Earth Rods					
Earth Rod Length (m) (mm) A.	Rod Diameter (Inches) B.	Thread Diameter	Weight per Rod (kg)	Bundle Size	Ordering Code
1.2	14	5/8" UNC	2.15	10	SCER1214
1.8	14	5/8" UNC	3.20	10	SCER1814
3.0	14	5/8" UNC	5.30	10	SCER3014
1.2	19	¾" UNC	3.40	10	SCER1219
1.8	19	¾" UNC	5.10	10	SCER1819
3.0	19	¾" UNC	8.50	10	SCER3019



Solid Stainless Steel Earth Rods

LPI's solid stainless steel earth rods are manufactured using 316 grade stainless steel and are highly resistant to corrosion. Stainless steel rods are best used for earthing installations where the problem of galvanic corrosion may take place between dissimilar metals buried in close proximity to each other. All solid stainless steel earth rods manufactured by LPI are supplied with external threads.

316 Solid Stainless Steel Earth Rods					
Earth Rod Length (m)	**Rod Diameter (mm) A.**	**Thread Diameter (Inches) B.**	**Weight per Rod (kg)**	**Bundle Size**	**Ordering Code**
1.2	15.8	5/8" UNC	1.50	10	SSER1215
1.8	15.8	5/8" UNC	2.70	10	SSER1815
3.0	15.8	5/8" UNC	3.50	10	SSER3015
1.2	19	¾" UNC	1.95	10	SSER1219
1.8	19	¾" UNC	3.0	10	SSER1819
3.0	19	¾" UNC	4.9	10	SSER3019



Fittings for Threaded and Unthreaded Rods

Fittings for Threaded Earth Rods - LEH & PH

Description	Weight Kg	Ordering Code
Coupling for Threaded Earth Rod 5/8"	0.13	LEH-58R
Coupling for Threaded Earth Rod 3/4"	0.13	LEH-34R
Driving Stud for Threaded Earth Rod 5/8"	0.10	PH-58
Driving Stud for Threaded Earth Rod 3/4"	0.15	PH-34

- *Couplings are manufactured using high strength copper alloy*
- *Driving Studs are manufactured using high strength carbon steel*
- *Copper alloy LEH & PH suitable for use with Solid Copper Rods.*
- *Standard: UL 467*

Fittings for Unthreaded Earth Rods - LEHC

Description	Weight Kg	Ordering Code
Compression Coupling for Unthreaded Earth Rod 12 mm	0.13	LEHC-12R
Compression Coupling for Unthreaded Earth Rod 14 mm	0.13	LEHC-58R
Compression Coupling for Unthreaded Earth Rod 17 mm	0.13	LEHC-34R

- *Couplings are manufactured using high strength copper alloy*
- *Standard: UL 467*

Fittings for Stainless Steel Earth Rods

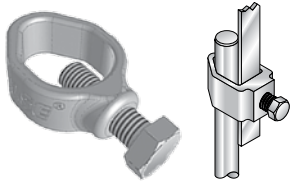
Description	Weight Kg	Ordering Code
Coupling for Threaded Stainless Steel Earth Rod 5/8"	0.11	LEH-58-SS
Coupling for Threaded Stainless Steel Earth Rod 3/4"	0.15	LEH-34-SS
Driving Stud for Threaded Stainless Steel Earth Rod 5/8"	0.35	PH-58
Driving Stud for Threaded Stainless Steel Earth Rod 3/4"	0.35	PH-34

- *Couplings are manufactured using high strength copper alloy*
- *Driving Studs are manufactured using high strength carbon steel*
- *Copper alloy LEH & PH suitable for use with Solid Copper Rods.*
- *Standard: UL 467*

LPI offers a wide selection of mechanical clamps suitable for use with a combination of rod sizes and conductors or tapes. LPI clamps provide the ability for the user to install a conductive and mechanically secure connection between earth rods and conductors whilst limiting the effects of corrosion.

Rod to Tape Clamp

LPI's rod to tape clamp is suitable for clamping earth rods to tape. The rod to tape clamp is manufactured from high strength copper alloy.

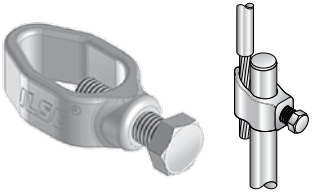


Rod to Tape Clamp			
Suits:	14-19 mm Rods, 17 mm Rods, Tape 25 x 3 mm		
Material:	UNS C84400 (high strength copper alloy)		
Mass	**Box Qty.**	**Ordering Code**	**Description**
90 g	50	RTC253	Rod to Tape Clamp, 25 x 3 mm Tape

• All Rod Clamps supplied with 316 stainless steel fasteners.

Rod to Cable Clamp

LPI's rod to cable clamp is suitable for clamping earth rods to cable. The rod to cable clamp is manufactured from high strength copper alloy.

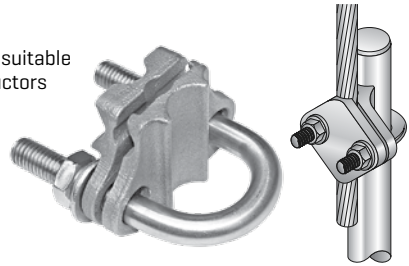


Rod to Cable Clamp			
Suits:	14-19 mm Rods, 17 mm Rods, Cable 35 mm^2 - 120 mm^2		
Material:	UNS C84400 (high strength copper alloy)		
Mass	**Box Qty.**	**Ordering Code**	**Description**
90 g	50	RCC35120	Rod to Cable Clamp, 14 x 17 mm Rods 35-120 mm^2 Cable

• All Rod Clamps supplied with 316 stainless steel fasteners.

U-Bolt Rod Clamp

LPI's U-bolt rod clamps are suitable for connecting round conductors to an earth rod. All U-bolt clamps are manufactured from high strength copper alloy.



U-Bolt Rod Clamp

Suits: 14 -16 mm Rods, Cable 35 mm^2 - 120 mm^2
Material: UNS C84400 (high strength copper alloy) Fastener - 316 S/S

Weight	Box Qty.	Ordering Code	Description
160 g	10	UBRC35120	U-Bolt Rod Clamp, to suit 14-16 mm Rods and 35 mm^2 - 120 mm^2 cable

Suits: 14-19 mm Rods, Cable 35 mm^2 - 120 mm^2, Tape 25 mm x 3 mm
Material: UNS C84400 (high strength copper alloy) Fastener - 316 S/S

Weight	Box Qty.	Ordering Code	Description
250 g	10	UBRCT35120	U-Bolt Rod Clamp, to suit 14-19 mm Rods and 35 mm^2 - 120 mm^2 cable or 25 mm x 3mm Tape

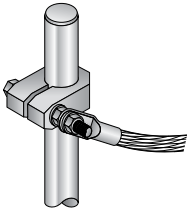
Suits: 14-19 mm Rods, Cable 120 mm^2 - 300 mm^2
Material: UNS C84400 (high strength copper alloy) Fastener - 316 S/S

Weight	Box Qty.	Ordering Code	Description
320 g	10	UBRC120300	U-Bolt Rod Clamp, to suit 14-19 mm Rods and 120 mm^2 - 300 mm^2 cable

• All clamps supplied with 316 stainless steel fasteners

Split Connector Clamp Type B

Suitable for connecting threaded and unthreaded rods to cable via a lug clamp.

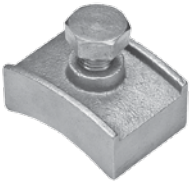


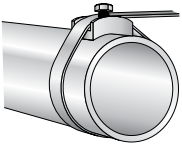
Split Connector Clamp - Type B		
Thread Diameter	**Weight Kg**	**Ordering Code**
5/8" UNC	0.15	SCGB58
3/4" UNC	0.15	SCGB34

- *Gunmetal casting to BS 1400*
- *Other clamp types available upon request*

Watermain Pipe Bond

The watermain pipe bond is designed for the bonding of metallic water main pipes and copper tape to the earthing or lightning protection system.

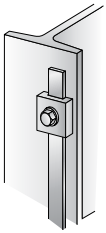




Watermain Pipe Bond	
Ordering Code	**WPB25**
Description:	Watermain Pipe Bond
Material:	Gunmetal
Tape Size:	25 mm x 3 mm

B-Bond

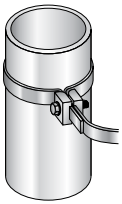
The B-Bond is for bonding of flat copper tape to steel structures.



Watermain Pipe Bond	
Ordering Code	**BB25**
Description:	B-Bond
Material:	Gunmetal
Tape Size:	25 mm x 3 mm
Bolt Size:	M10

RWP Bond

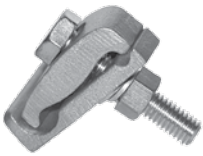
The RWP bond is for the bonding of flat copper tape to rainwater pipes and handrails.

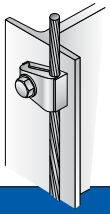


RWP Bond	
Ordering Code	**RWP25**
Description:	Rain Water Pipe Bond
Material:	Gunmetal
Tape Size:	25 mm x 3 mm

Tower Earth Clamp

The Tower Earth Clamp is used for bonding of copper cables or wires to steel structures.





Tower Earth Clamp	
Ordering Code	**TEC120**
Description:	Tower Earth Clamp
Material:	Gunmetal
Conductor Size:	70 -120 mm^2
Channel Thickness:	Up to 10 mm

Earth Boss

The Earth Boss is designed for welding to steel structures such as tanks and vessels.

Earth Boss - Mild Steel		
Ordering Code	**EB3035**	**EB5012**
Description:	Earth Boss	Earth Boss
Material:	Mild Steel	Mild Steel
Fastners:	316 Stainless Steel	316 Stainless Steel
Length:	30 mm	50 mm
Diameter:	35 mm	50 mm
Thread Diameter:	M12	M12
Weight:	0.30 kg	0.60 kg

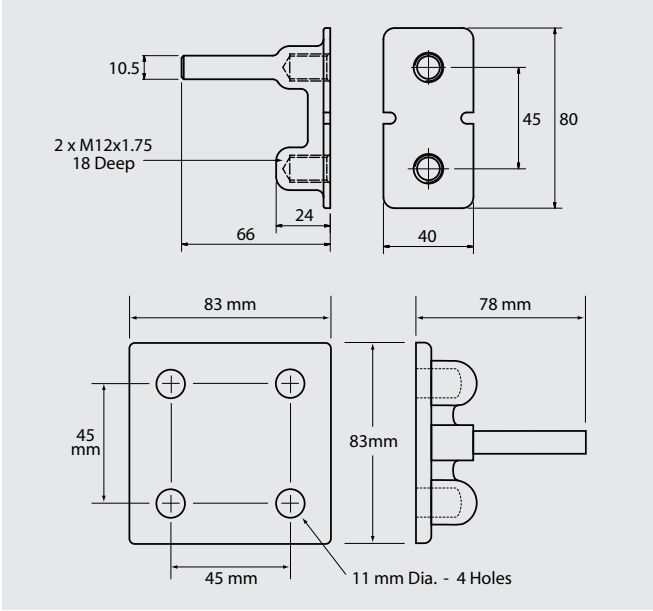
Earth Boss - 316 Stainless Steel	
Ordering Code	**EB5010-SS316**
Description:	Earth Boss
Material:	316 Stainless Steel
Fastners:	316 Stainless Steel
Length:	50 mm
Diameter:	50 mm
Thread Diameter:	M12
Weight:	0.80 kg

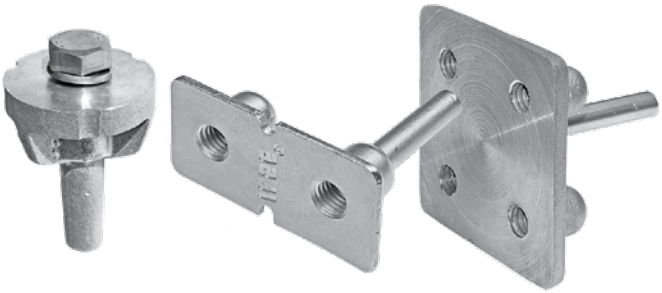
• *Other sizes available upon request*

Earth Points

LPI earth points are designed for use in reinforced concrete foundations and offer a convenient earth system connection point. Earth points supplied with tails allows for earthing to the building frame (foundations or rebar) in a safe and simple method.

The use of LPI earth points enables the installer to locate the complete earthing system within the structure and provides a location free from possible damage or unauthorised disconnection. LPI earth points are manufactured from a copper alloy and provide a current carrying capacity equal to that of the conductor or stud. Earth points will not corrode or loosen over time.





Earth Points						
Number of Holes	**Thread**	**Weight**	**Stem Diameter**	**Material**	**Description**	**Ordering Code**
1	M12	300 g	11 mm	UNS-C38000 (High Strength Copper Alloy)	Earth Point, 1 Hole, M12	EP1M12
2	M12	190 g	10.5 mm	UNS-C38000 (High Strength Copper Alloy)	Earth Point, 2 Hole, M12	EP2M12
4	M12	340 g	10.7 mm	UNS-C38000 (High Strength Copper Alloy)	Earth Point, 4 Hole, M12	EP4M12

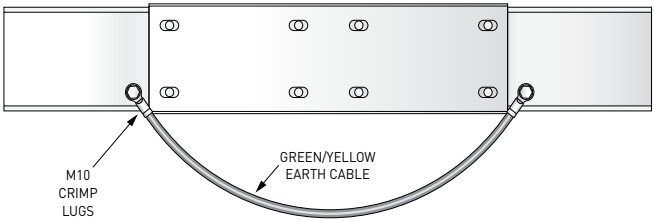
Earth Points

Number of Holes	Thread	Weight	Rebar Detail	Description	Ordering Code
1	M12	810 g		EP1M12 with pre-welded 500 mm PVC insulated 70 mm² Cable	EP1M1257T
1	M12	860 g	100 mm length x 10 mm diameter Rebar	EP1M12 with pre-welded 500 mm PVC insulated 70 mm² Cable and Rebar	EP1M1257TR
2	M12	700 g		EP2M12 with pre-welded 500 mm PVC insulated 70 mm² Cable	EP2M1257T
2	M12	750 g	100 mm length x 10 mm diameter Rebar	EP2M12 with pre-welded 500 mm PVC insulated 70 mm² Cable and Rebar	EP2M1257TR
4	M12	950 g		EP4M12 with pre-welded 500 mm PVC insulated 70 mm² Cable	EP4M1257T
4	M12	1000 g	100 mm length x 10 mm diameter Rebar	EP4M12 with pre-welded 500 mm PVC insulated 70 mm² Cable and Rebar	EP4M1257TR

- *Other cable sizes available upon request*

Bonding Cables

LPI offers an extensive range of cable earth bonds and flexible tinned copper braids for the electrical earthing of cable ladder, conveyors, handrails, metal cladding, water pipes, fences and gates.



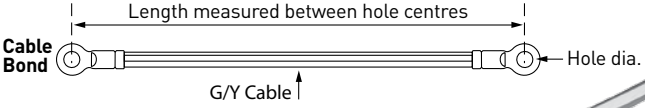
Ordering Information

LPI Ordering Code: ESXXX-YY

XXX = Cable Length

YY = Cable Diameter

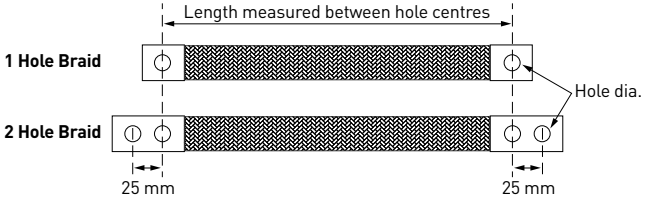
All bonding cables supplied with M10 Crimp Lug and M10 stainless steel fasteners.

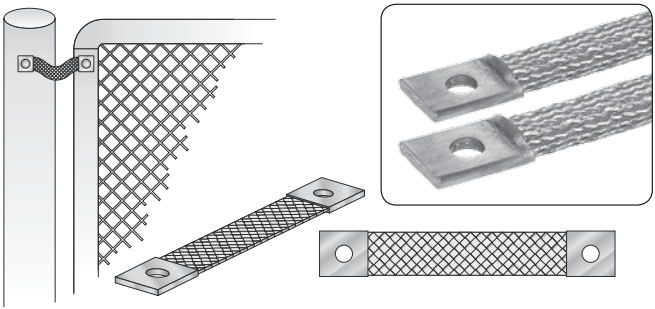


Flexible Braids

Tinned Copper Flexible Braids

Length	Material	Weight	Hole Size	Ordering Code	Description
200 mm	Tinned Copper Braid	90 g	Ø13 mm	FL5TFC200C	Tinned flexible connector, 25 x 3.5, 200 mm long
300 mm	Tinned Copper Braid	120 g	Ø13 mm	FL5TFC300C	Tinned flexible connector, 25 x 3.5, 300 mm long
400 mm	Tinned Copper Braid	150 g	Ø13 mm	FL5TFC400C	Tinned flexible connector, 25 x 3.5, 400 mm long





EPR Safety Mat

EPR Safety Mat Features

- Mitigation of EPR hazards to personnel from lightning discharges and other fault currents injected into the ground
- Unique three-layer design and technology to redistribute surface potential gradients
- High degree of portability and deployment (easily unrolled and rolled up)
- Can be easily joined to create a safety mat of any desired size

LPI's new EPR Safety Mat

Electrical discharge events present a significant hazard to equipment and assets via earth potential rise and can cause injury or death to animals and humans. Particularly hazardous electrical discharge events include lightning strikes and electric power system faults.

- The EPR safety mat provides a simple means for mitigating these hazards via its unique three-layer design as shown in Figure 1
- The central, electrically-conductive layer rapidly equalises the electrical potential across the mat
- The upper layer insulates the asset from the electrically-conductive layer
- The lower layer, is a special electrically-conductive elastomer that protects the central layer and provides electrical continuity to that layer, as shown in Figure 1

All of the layers are highly flexible and hence enable the mat to be rolled and unrolled as required, as shown in Figure 2. An additional product option is available that enables mats to be joined electrically, to create longer ones as required. See Figure 3

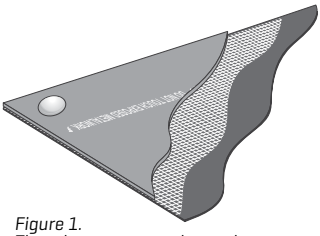


Figure 1.
Three layer construction and corner eyelet of the EPR safety mat.

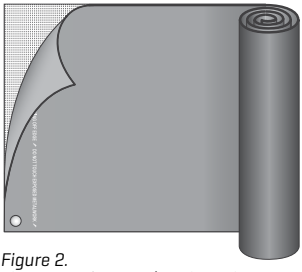


Figure 2.
The EPR safety mat's unique three-layer design and rollability for ease of portability.

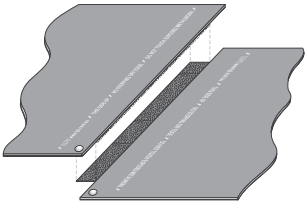


Figure 3.
The EPR safety mat can easily be rolled and unrolled as required, and can be joined together in multiple sections.

EPR Safety Mat

Specifications	
Ordering Code:	EPRSM-1MB
Description:	Earth potential rise safety mat 1 m x 1.5 m, complete with bonding kit
Material:	1 – NBR-PVC rubber (non-conductive) 2 – Stainless steel (316L) 3 – NBR-PVC rubber (conductive)
Finish:	1 – Coarse fabric, non-slip (top layer) 2 – Fine wire mesh (middle layer) 3 – Medium fabric, non-slip (bottom layer)
Colour:	Royal blue
Nominal Thickness (total):	3.2 mm
Standard Width:	1.5 metres
Standard Length:	1 metre
Weight:	< 7 kg per lineal metre
Markings:	35 mm embossed labelling 100 mm from each edge, bright yellow lettering
Standards:	IEC 61111, IEEE Std. 81, ENA EG1

Accessories	
Bonding Kit	Electrical connection kit for bonding the EPR safety mat to adjacent equipment. Kit comprises: 2 metre single core flexible conductor with black insulation and heavy duty spring clamp.
Joining Kit	Mechanical connection kit for electrically joining two or more mats.
Packaging Fasteners	Fastening straps for securing rolled mat. Supplied as: 2 x Velcro straps.

EPR Safety Mat

Ordering	
Product Order Code	EPRSM - 1MB
Product Description	Earth potential rise safety mat 1 m x 1.5 m complete with bonding kit

Customised EPR Safety Mat

To customise your safety mat:

EPRSM - XMBJ

X = Mat length

B = Bonding kit

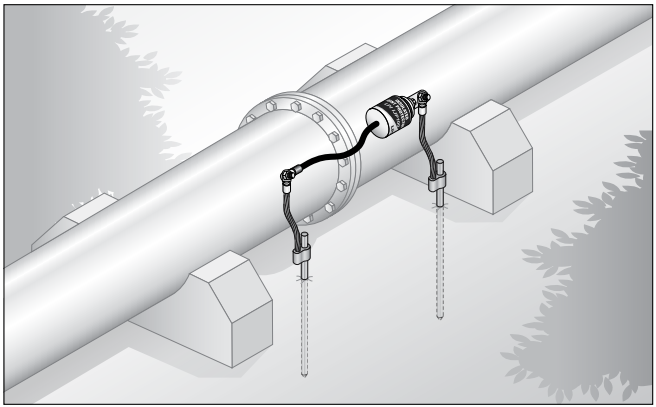
J = Joining kit

Notes

- Nominate length of Mat "X"
- Include "B" in product code if bonding kit is required
- Include "J" if joining kit is required

Insulated Joint Protector

LPI's insulated joint protector (IJP100) is designed for protection of insulated joints in oil or gas pipelines. With long lengths of insulated pipeline, induced voltages in the pipes caused by local lightning or power line fault activity can be in the order of tens of kilovolts. For protection against insulated joint break down, LPI developed the IJP100 which is connected directly across the insulated joint. In its inactive state the IJP presents an effective open circuit (10^{10} Ω) across the joint. Should the insulated joint voltage exceed the breakdown voltage of 350V, the IJP will immediately conduct to safely pass the surge current to ground and thus bypassing the insulated joint. After conducting, the IJP will automatically reset to its inactive state.

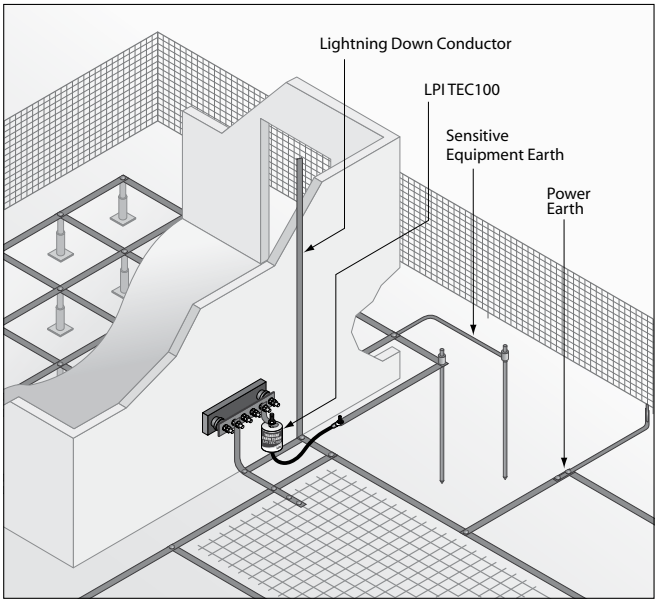


Insulated Joint Protector

Insulated Joint Protector	
Ordering code:	**IJP100**
Application:	Protection of pipeline insulated joints
Rated DC Sparkover Voltage (100V/s):	400 V - 750 V
Impulse sparkover voltage (1kV/μs):	$<$1.5kV
Max. Discharge current (Imax):	150kA 8/20μs
Max. Discharge current (Iimp):	100kA 10/350μs
Nominal Discharge current (In):	75kA 8/20μs
Insulation resistance (at 100 Vdc):	$>$ 1 G Ohms
Capacitance (at 1 MHz):	5pF
Charge:	50As
Specific Energy:	2500kJ/ Ohms
Operating Temperature:	-40ºC to +90ºC
Dimensions:	56 mm (L) x Ø45.2 mm
IP Rating:	IP 66
Weight:	320 g

Transient Earth Clamp

LPI's transient earth clamp (TEC100) prevents earth potential differences by operating only under transient conditions to effectively clamp all connected earths together. Under normal conditions, the TEC100 presents an effective open circuit. Once the earth potential difference exceeds the breakdown voltage of the TEC100, conduction immediately occurs and the earth potentials are equalised. The TEC100 is a self-restoring device and has a life of over ten thousand operations.



Transient Earth Clamp

Transient Earth Clamp	
Ordering code:	**TEC100**
Application:	Prevents earth potential differences
Rated DC Sparkover Voltage (1kV/μs):	350 V - 750 V
Impulse sparkover voltage (1kV/μs):	$<$1.5kV
Max. Discharge current (Imax):	150kA 8/20μs
Max. Discharge current (Iimp):	100kA 10/350μs
Nominal Discharge current (In):	75kA 8/20μs
Insulation resistance (at 100 Vdc):	$>$ 1 G Ohms
Capacitance (at 1 MHz):	5pF
Charge:	50As
Specific Energy:	2500kJ/ Ohms
Operating Temperature:	-40ºC to +90ºC
Environment rating:	IP 66
Dimensions:	56 mm (L) x Ø45.2 mm
Mounting:	M8 stud 200 mm flying lead with Ø 13 mm lug
Weight:	320 g

Earth Enhancing Compound

Due to varying soil conditions from one site to the next the installation of earthing conductors alone are typically insufficient in achieving a low resistance earth.

The application of earth enhancing compounds around the conductors in an earthing system aids significantly in achieving the desired low level resistivity levels required for an effective earthing system.

LPI RESLO-20

LPI RESLO-20 is a low resistance, non corrosive earth enhancing compound which is supplied in easy to handle 20 Kg bags.

Recommended Bags of RESLO-20 required for backfilling typical trench installation

Width of Trench (mm)	Length of Trench - 5m	Length of Trench - 10m
300	1	2

Recommended Bags of RESLO-20 required for backfilling Earth Rod installation

Diameter of Hole (mm)	Depth of Hole - 1800 mm	Depth of Hole - 2400 mm	Depth of Hole - 3000 mm
75	1	1	1
125	1	1	2
175	2	2	3

Earth Enhancing Compound

Benefits:

- Significantly reduces earth resistance
- Long lasting treatment with no maintenance required
- Effective under varying soil conditions
- Minimal seasonal changes in resistance values
- Easy to handle and install
- Environmentally friendly
- Does not adversely affect soil
- Ordering Code – RESLO-20
- RESLO-20 solidifies and does not wash away
- No maintenance required
- Independently tested by Australian University

GRIP

LPI GRIP (Ground Resistance Improvement Powder) is a premium product designed to dramatically reduce soil resistivity in the poorest soil conditions.

When GRIP is mixed with water and poured onto the earthing system and surrounding soil the powder and water react to form a gelatinous mass which will not reduce, contract or separate from the surrounding earthing system.

Earth Enhancing Compound

- Ordering Code – GRIP-10 and GRIP-40
- Premium enhancing compound specifically designed for use in difficult sites which contain excessive sand or rocky ground
- Available in 10 Kg or 40 Kg Kits
- Does not wash away
- Hydroscopic by nature
- Not affected by seasonal rains or floods
- Non corrosive
- Safe and easy to handle

Recommended 10 kg Kits of GRIP required for backfilling typical trench installation

Width of Trench (mm)	Length of Trench - 30 m in Good Soil Conditions	Length of Trench - 30 m in Poor Soil Conditions
300	1	4

Recommended 10 kg Kits of GRIP required for backfilling Earth Rod installation

Diameter of Hole (mm)	Depth of Hole - 1800 mm	Depth of Hole - 2400 mm	Depth of Hole - 3000 mm
75	1	1	1
125	1	1	2
175	2	3	3

SRIM

LPI SRIM is a carbon based earth enhancing compound which is supplied in 20 kg bags. Designed for use in all soil conditions SRIM offers an economical solution to improve and maintain the integrity of any earthing system.

STANDARDS COMPLIANCE: IEC 62561-7

- Ordering Code – SRIM-20
- Carbon based earth enhancing compound
- Supplied in 20 kg bag
- Effective in all soil conditions
- Very low resistivity
- Non corrosive
- No maintenance required
- Does not dissolve or leach away with time

Recommended Bags of SRIM required for backfilling typical trench installation

Width of Trench (mm)	Length of Trench - 5 m	Length of Trench - 10 m
300	1	2

Recommended Bags of SRIM required for backfilling Earth Rod installation

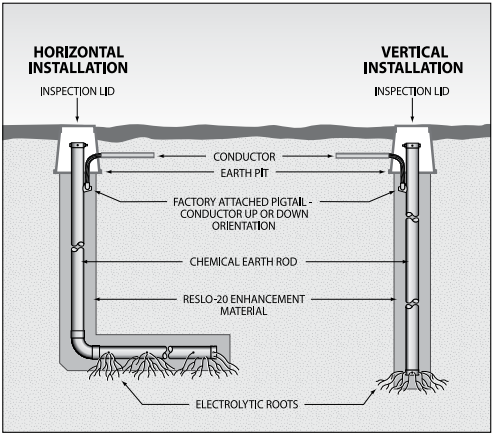
Diameter of Hole (mm)	Depth of Hole - 1800 mm	Depth of Hole - 2400 mm	Depth of Hole - 3000 mm
75	1	1	1
125	1	1	2
175	2	2	3

Chemical Earth Rods

LPI's chemical ground rod provides a low impedance earth to effectively dissipate lightning and electrical fault currents. The chemical ground rod is ideal in situations where space is restricted and normal lightning earths such as radial and grid type systems cannot be installed.

The LPI chemical ground rod is combined with LPI's RESLO and mineral salts to provide a maintenance free earthing installation, which provides a low resistance earth. The chemical ground rod provides extended reliable service due to its robust design. This includes a 63.5 mm (Dia) copper tube, used in conjunction with mineral salts and RESLO.

- 2m or 3m x 63.5mm Copper tube
- 70mm cable (Pigtail)
- Mineral salts
- LPI® RESLO



Chemical Earth Rods

Chemical Ground Rod: ChemRod				
Ordering Code	**CHEMROD2M**	**CHEMROD3M**	**CHEMROD 2MHORIZ**	**CHEMROD 3MHORIZ**
Length:	2 m	3 m	2 m	3 m
Installation Type:	Vertical	Vertical	Horizontal	Horizontal
Diameter:	63.5 mm			
Copper Composition:	99.9% minimum			
Standard:	Australian standard AS1432			
Melting Point:	1083ºC			
Specific Heat Capacity:	0.385 kJ (kg.K)			
Electrical Conductivity (Annealed):	75-90% I.A.C.S.			
Wall Thickness:	1.6 mm			
Copper:	Hard-drawn			
Cap:	Removable type with air breather holes			
Drainage Holes:	4.5 mm diameter, provided every 40 cm for the length of the rod			
Mineral Salts:	Pre-filled from factory with non-hazardous natural electrolytic salts			
Pigtail:	70 mm stranded copper cable, Pre-welded at factory to allow for connection to earthing system			
Weight:	12 kg (CHEMROD) 40kg (RESLO)	17 kg (CHEMROD) 60kg (RESLO)	14.8 kg (CHEMROD) 60kg (RESLO)	19.8 kg (CHEMROD) 80kg (RESLO)

Earth pits provide a secure and user friendly access point for maintenance purposes and the periodic measuring of electrical resistance of a buried earthing system.

In order to complete routine measurements of electrical resistance simply remove the lid from the installed earth pit and connect a lead from the resistance meter to the earthing conductor.

LPI® Polymer Earth Pit

LPI® polymer earth pit provides the user with a light weight pit which offers a high weight carrying capacity.

Polymer Earth Pit	
Ordering Code	**EPIT-P**
Description:	Polymer earth pit
Material:	Polymer
Dimension:	250 mm (top) x 180 mm (base) x 210 mm (deep)
Weight:	1.9 kg
Strength:	Withstand up to 5 tonnes

Earth Bond Inspection Pit

The LPI® earth bond inspection pit is a multi-purpose earth pit and bonding point which can be installed internally within a structure or externally to a structure. The earth bond inspection pit consists of a rectangular heavy duty earth pit and a six-way earth bar mounted internally.

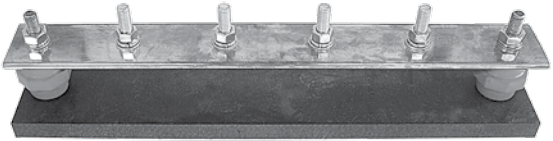
This product is ideally suited as a central bonding point for all earths at site or, alternatively, as a reference bonding point for selected earths. Initially designed for use in conjunction with a chemical ground rod at a roadside telecommunication base station site, this product provides the installer with a variety of options with respect to bonding and earthing applications.

Earth Bond Inspection Pit	
Ordering Code	**EBOND-INSPIT-A**
Description:	Earth bond inspection pit
Material:	Plastic
Earth Bar:	6 connection point
Dimension:	435 mm (top) x 300 mm (base) x 310 mm (deep)
Earth Bar Dimension:	280 mm (L) x 50 mm (W) x 8 mm (H)
Weight:	5.5 kg
Colour:	Green
Strength:	Withstand 1 tonne

Earth Bars and Disconnect Links

Correct bonding is essential to create an equipotential earth plane between service earths and equipment under fault or transient conditions. The equipotential plane ensures that voltage differentials are not created between earths under fault conditions and ensures the safety of all personnel and equipment.

LPI offers a wide selection of earth bars and disconnect links which provide a single point earthing and bonding location. All earth bars and disconnect links are supplied with a plastic "non-corrosive" base suitable for exposed installation.

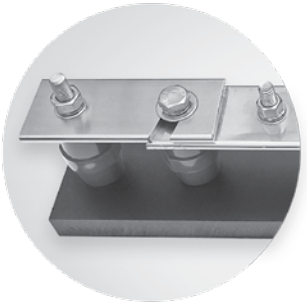


Base and Overall Dimensions

Description	Overall Length mm	Width mm	Height mm	Weight kg	Ordering Code
6 Way	400	80	98	2.10	EB400
8 Way	500	80	98	2.60	EB500
10 Way	600	80	98	3.20	EB600
12 Way	700	80	98	3.70	EB700
14 Way	800	80	98	4.20	EB800
16 Way	900	80	98	4.70	EB900
18 Way	1000	80	98	5.20	EB1000
20 Way	1100	80	98	5.80	EB1100

Earth Bars with Single Disconnect Link

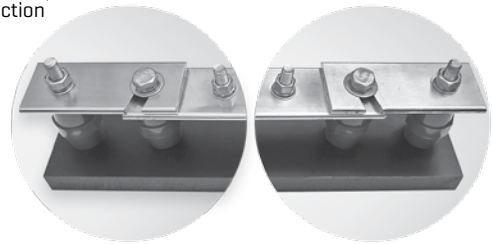
The LPI® earth bar with single disconnect link provides the user with the ability to establish a temporary break in the connection to earth, allowing for inspection and testing of the earthing system.



Base and Overall Dimensions					
Description	**Overall Length mm**	**Width mm**	**Height mm**	**Weight kg**	**Ordering Code**
Single	125	80	98	0.60	DL-1251
6 Way	475	80	98	2.80	DL-4751
8 Way	575	80	98	3.40	DL-5751
10 Way	675	80	98	4.00	DL-6751
12 Way	775	80	98	4.60	DL-7751
14 Way	875	80	98	5.20	DL-8751
16 Way	975	80	98	5.70	DL-9751
18 Way	1075	80	98	6.30	DL-10751
20 Way	1175	80	98	6.90	DL-11751

Earth Bars with Twin Disconnect Link

The LPI® earth bar with twin disconnect link provides the user with the ability to establish a temporary break in the connection to earth, allowing for inspection and testing of the earthing system.



Base and Overall Dimensions

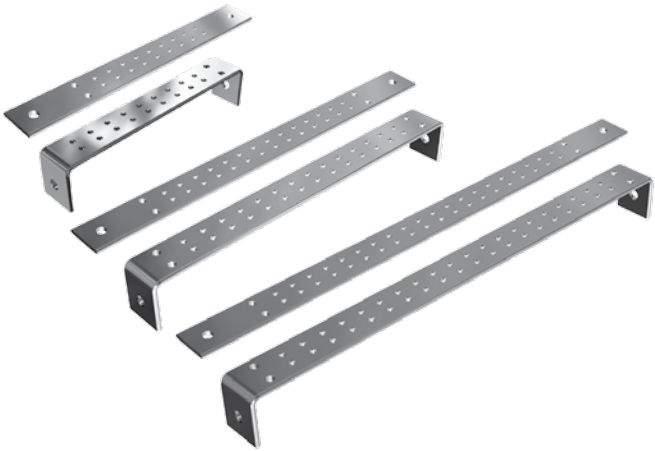
Description	Overall Length mm	Width mm	Height mm	Weight kg	Ordering Code
6 Way	550	80	98	3.30	DL-5502
8 Way	650	80	98	3.90	DL-6502
10 Way	750	80	98	4.50	DL-7502
12 Way	850	80	98	5.10	DL-8502
14 Way	950	80	98	5.70	DL-9502
16 Way	1050	80	98	6.30	DL-10502
18 Way	1150	80	98	6.90	DL-11502
20 Way	1250	80	98	7.50	DL-12502

Earthing for Telecommunications

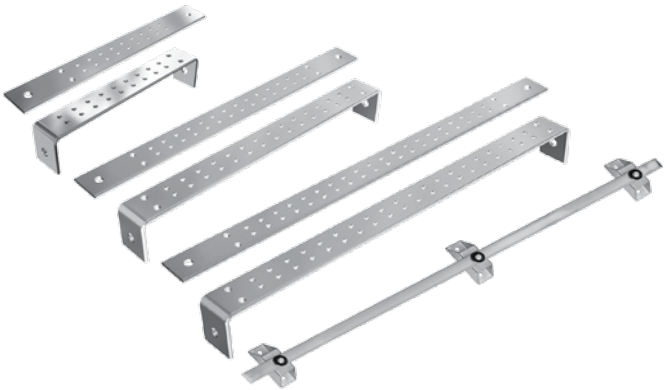
LPI offers an extensive range of earthing products which are used extensively within the telecommunications and broadcasting industry.

- Earth rods & fittings – refer to pages 12-17
- Mechanical clamps – refer to pages 18-22
- Copper conductors – refer to pages 54-56
- Flexible braid – Refer to page 28
- Earth pits – Refer to pages 43-44
- Earth enhancing compounds – refer to pages 37-40

Feeder Earth Kits	
FEKIT-12-TC	Feeder earthing kit, tinned copper, 1.2 m tail, suit Ø ½" cable
FEKIT-78-TC	Feeder earthing kit, tinned copper, 1.2 m tail, suit Ø 7/8" cable
FEKIT-114-TC	Feeder earthing kit, tinned copper, 1.2 m tail, suit Ø 1¼" cable
FEKIT-158-TC	Feeder earthing kit, tinned copper, 1.2 m tail, suit Ø 15/8" cable



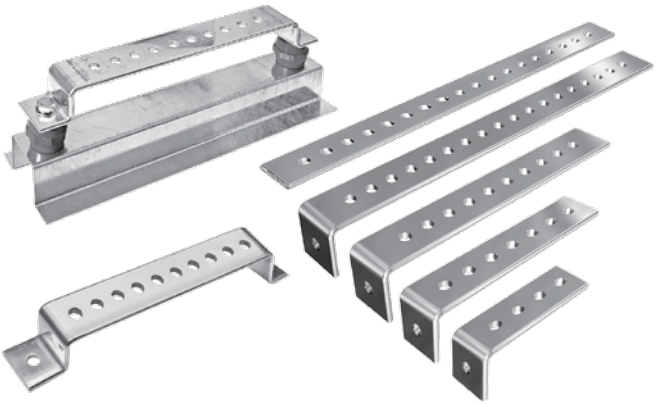
Optus Earth Bars - Copper	
Ordering Code	**Description**
EB300-THST-OPT-830	Earth bar, copper, 300 mm nominal, two hole, straight, tinned, per DRG OSD-830
EB300-THBT-OPT-830	Earth bar, copper, 300 mm nominal, two hole, bent both ends, tinned, per DRG OSD-830
EB450-THST-OPT-830	Earth bar, copper, 450 mm nominal, two hole, straight, tinned, per DRG OSD-830
EB450-THBT-OPT-830	Earth bar, copper, 450 mm nominal, two hole, bent both ends, tinned, per DRG OSD-830
EB600-THST-OPT-830	Earth bar, copper, 600 mm nominal, two hole, straight, tinned, per DRG OSD-830
EB600-THBT-OPT-830	Earth bar, copper, 600 mm nominal, two hole, bent both ends, tinned, per DRG OSD-830



Optus Earth Bars - Aluminium	
Ordering Code	**Description**
EBA300-THST-OPT-830	Earth bar aluminium, 300 mm nominal, two hole, straight, tinned, per OSD-830
EBA300-THBT-OPT-830	Earth bar aluminium, 300 mm nominal, two hole, bent both ends, tinned, per OSD-830
EBA450-THST-OPT-830	Earth bar aluminium, 450 mm nominal, two hole, straight, tinned, per OSD-830
EBA450-THBT-OPT-830	Earth bar aluminium, 450 mm nominal, two hole, bent both ends, tinned, per OSD-830
EBA600-THST-OPT-830	Earth bar aluminium, 600 mm nominal, two hole, straight, tinned, per OSD-830
EBA600-THBT-OPT-830	Earth bar aluminium, 600 mm nominal, two hole, bent both ends, tinned, per OSD-830
ISEB1320	Internal earth bar, 1320 mm with mounting
ISEB1500	Internal earth bar, 1500 mm with mounting

NBN Earth Bars

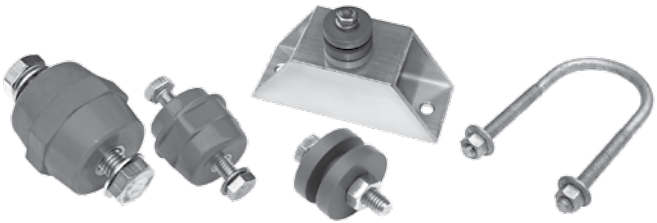
Ordering Code	Description
EB315-THST-NBN-21	Earth bar, copper, service (SEB) for NBN, 315 mm Nom. two hole, straight, tinned, per NBN-21
EB275-STEB-NBN-21C	Earth bar for NBN lattice tower, slotted mounting holes, straight tinned copper, per NBN-21C
EB425-MPEB-NBN-31B	Earth bar, monopole tower for NBN, straight tinned copper, per NBN-31B
EB300-FEB-NBN-21C	Earth bar, feeder (FEB) suit 300 mm cable ladder for NBN, tinned copper, bent both ends, per NBN-21C



VHA Earth Bars	
Ordering Code	**Description**
EB350-VHA	Earth bar, VHA type 1, shelter mounted, single hole, bent, tinned, per DRG STD-E300 Rev 6
MC-ASSY-024	Earth bar only, unmounted VHA type 1, single hole, bent, tinned, per DRG STD-E300 Rev 6
EB600-SHST-VHA	Earth bar, VHA, shelter mount, single hole, straight, tinned
EB600-SHBT-VHA-E300	Earth bar, VHA type 3, suit 600 ladder, single hole, bent, tinned, per DRG STD-E300 Rev 6
EB450-SHBT-VHA-E300	Earth bar, VHA type 4, suit 450 ladder, single hole, bent, tinned, per DRG STD-E300 Rev 6
EB300-SHBT-VHA-E300	Earth bar, VHA type 5, suit 300 ladder, single hole, bent, tinned, per DRG STD-E300 Rev 6
EB150-SHBT-VHA-E300	Earth bar, VHA type 6, suit 150 ladder, single hole, bent, tinned, per DRG STD-E300 Rev 6

Telstra Earth Bars

Ordering Code	Description
EB450-SHST-TEL	Earth bar, copper, Telstra 450 mm, single hole, straight, tinned
EB600-SHST-TEL	Earth bar, copper, Telstra 600 mm, single hole, straight, tinned

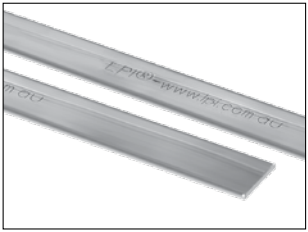


Earth Bar Accessories

Ordering Code	Description
EB-INSU-OPT-M6	Insulator & fastener kit, M6 x 25 pair for earth bar
EB-INSU-OPT-M8	Insulator & fastener kit, M8 x 35 pair for earth bar
EB-INSU-OPT-M10	Insulator & fastener kit, M10 x 50 pair for earth bar
EB-INSS-NBN-21	Insulated shelter support kit, 1 off 40 x 40 Alu SHS, buttons & hardware per DRG NBN-STD-0021
EB-INBFS-NBN-21	Insulated base frame support kit, buttons & hardware per DRG NBN-STD-0021

Bare Copper Tape

- Greater surface contact with the soil
- Pure electrolytic copper
- Low impedance

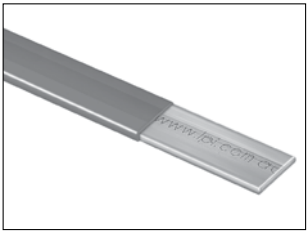


Copper Tape			
Conductor Size (mm)	**Weight per Metre / Kg**	**Standard Coil Size (Metre)**	**Ordering Code**
25 x 3	0.67	50	FL6T253C

- *Alternative sizes are available for both soft drawn tape and hard drawn copper bar. Contact LPI for more information.*
- *LPI embossed tapes are available in selected sizes.*

PVC Insulated Copper Tape

- High conductivity copper tape
- PVC covered copper tape

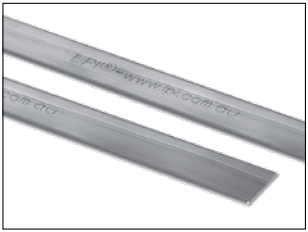


PVC Insulated Copper Tape			
Conductor Size (mm)	**Weight per Metre / Kg**	**Standard Coil Size (Metre)**	**Ordering Code**
25 x 3	0.77	50	PVCCT253

- *Alternative sizes are available. Contact LPI for more information.*

Tinned Copper Tape

- High conductivity copper tape
- Ideal for highly corrosive soil conditions

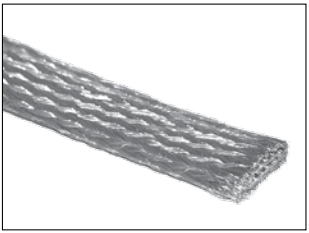


Tinned Copper Tape			
Conductor Size (mm)	**Weight per Metre / Kg**	**Standard Coil Size (Metre)**	**Ordering Code**
25 x 3	0.67	50	TCT253

• *Alternative sizes are available. Contact LPI for more information.*

Flexible Copper Braid

- Manufactured from high conductivity copper wire
- Suitable for earth bonding of gates, metal doors and fences where flexibility is required.

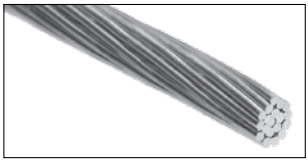


Flexible Copper Braid			
Overall Size (mm)	**Weight per Metre / Kg**	**Standard mm^2**	**Ordering Code**
25 x 3	0.32	36.5	FCB253

• *Alternative sizes are available. Contact LPI for more information.*

Bare Stranded Copper Conductor

- Soft drawn stranded copper cable to BS 6360

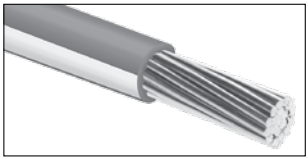


Stranded Copper Cable			
Cross Sectional Area mm²	**Stranding no. / mm Ø**	**Weight per metre / kg**	**Ordering Code**
35	7/2.52	0.32	SCC35
70	19/2.14	0.62	SCC70
95	19/2.52	0.86	SCC95
120	37/2.03	1.09	SCC120

• Alternative sizes are available. Contact LPI for more information.

PVC Covered Stranded Copper Conductor

- PVC Covered soft drawn stranded copper cable to BS 6004
- Colour – Green and Yellow



PVC Covered Stranded Copper Conductor			
Cross Sectional Area mm²	**Stranding no. / mm Ø**	**Weight per metre / kg**	**Ordering Code**
35	7/2.52	0.41	PVCSCC35
70	19/2.14	0.73	PVCSCC70
95	19/2.52	1.00	PVCSCC95
120	37/2.03	1.16	PVCSCC120

• Alternative sizes are available. Contact LPI for more information.

Copper C Connectors

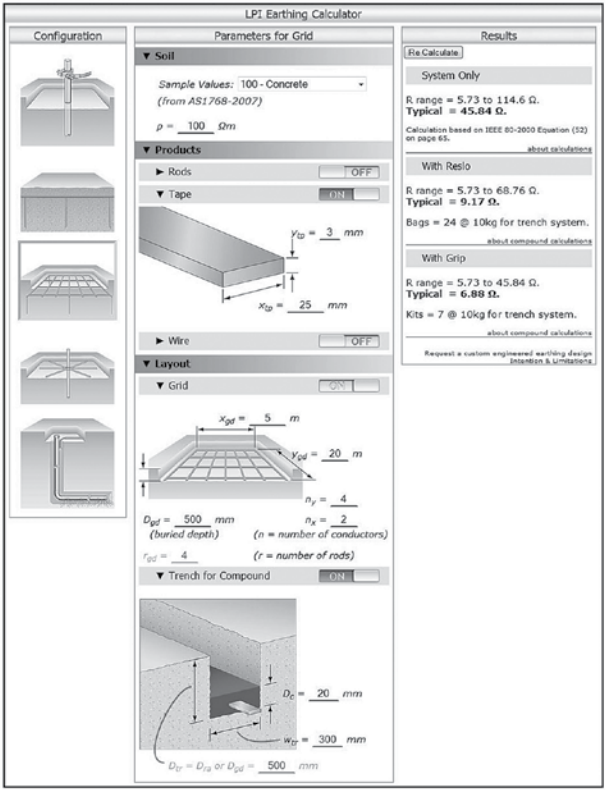
The LPI C connector range are manufactured from high purity copper profiles. The C connectors are specifically designed for applications requiring corrosion resistant and high current jointing or tapping of buried copper earth grids. C connectors are designed to allow for cable connections to be formed without the need to cut the main cable.

C Connectors		
Ordering Code	**Conductor Range**	
	Run	**Tap**
SACC 35-35	10-35 mm^2	10-35 mm^2
SACC 70-35	35-70 mm^2	10-35 mm^2
SACC 70-70	35-70 mm^2	35-70 mm^2
SACC 120-120	95-120 mm^2	95-120 mm^2
SACC 150-70	95-150 mm^2	0-70 mm^2

• *Contact LPI for appropriate crimp dies*

Earthing Calculator

LPI offers a comprehensive, user friendly, online earthing calculator which estimates earth system resistance based on IEEE and other international earthing/grounding standards.



Working left to right, select the earthing system configuration, then edit the dimensions and other parameters. Results are given for the theoretical best-case scenario (as per the standard) as well as likely real-world values as typically seen in the field.

Access the LPI Earthing Calculator

Follow these simple steps to gain access:

Go to www.lpi.com.au and visit the Product and Services Page to access the LPI Earthing Calculator.

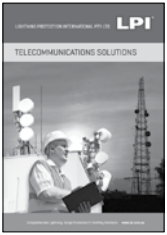
Earthing Design and Testing

LPI's team of engineers have extensive experience in providing consultancy services for earthing design and testing across a broad range of industry sectors.

- Extensive consultancy and survey experience
- Remote site visits through to desk top design
- Soil resistivity measurements and interpretation
- Soil resistivity modelling including multi layer and complex soil structures
- Earthing system design and analysis – substations and transmission lines and industrial facilities across all industry sectors
- Specialised earthing system design for higher frequencies (under lightning and transient conditions)
- Design optimisation to achieve electrical safety for personnel and equipment (EPR, step and touch voltages) in compliance with international standards
- Earthing system measurements
- Computation of fault current distribution in power system networks
- Equipotential bonding and static discharge
- Capacitive, inductive and conductive interference studies including EMC anaylsis and mitigation for pipelines, telecommunication cables and railways
- Use of CDEGS software for all modelling and computations

Additional LPI Literature

Together with the products and systems shown in this catalogue, LPI also has available a number of publications covering their entire range of Lightning Protection and Surge and Transient Protection products and systems. If you would like further information on any of these products, please contact Lightning Protection International Pty Ltd or your nearest LPI Distributor, or visit: **www.lpi.com.au**

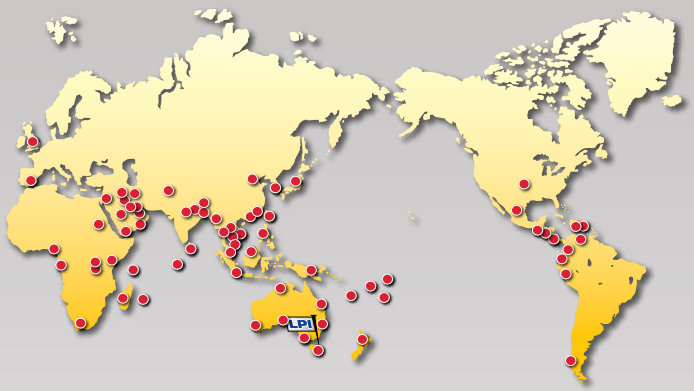


Notes

Notes

Disclaimer

- LPI maintains a policy of on-going product development
- Specifications are subject to change without notice
- Application detail, illustrations and schematic drawings are representative only and should be used as guides.
- It should be noted that 100% (100 percent) protection for direct strike lightning, lightning detection and surge and transient protection equipment is not possible and cannot be provided due to the lightning discharge process being a natural atmospheric event.



LPI Head Office Customers

LPI proudly services customers from the following countries:

- Afghanistan
- Australia
- Bahrain
- Bangladesh
- Bhutan
- Brunei
- Burundi
- Cambodia
- Chile
- China (PRC)
- Colombia
- Dominican Republic
- Ecuador
- El Salvador
- Fiji
- Gabon
- Guatemala
- Haiti
- Hong Kong
- India
- Indonesia
- Iran
- Iraq
- Japan
- Jordan
- Kenya
- Kuwait
- Laos
- Macau
- Madagascar
- Malaysia
- Maldives
- Mauritius
- Mexico
- Myanmar
- Nepal
- New Zealand
- Nicaragua
- Nigeria
- Oman
- Papua New Guinea
- Peru
- Philippines
- Qatar
- Rwanda
- Samoa
- Saudi Arabia
- Seychelles
- Singapore
- South Africa
- South Korea
- Spain
- Sri Lanka
- Sudan
- Taiwan
- Thailand
- Tonga
- UAE
- United Kingdom
- USA
- Vanuatu
- Venezuela
- Vietnam
- Yemen

LPI®

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