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## LPI® Lightning Capturing System: Guardian System 5 for Cat I, Cat II and Cat III Air Terminals

- **Who is LPI®**

Lightning Protection International Pty Ltd (known as “LPI”) is a fully owned Australian manufacturer and supplier of direct strike lightning, surge & transient protection equipment and grounding solutions to a wide range of industries throughout the world.

Key personnel and associates attached to LPI have combined experience of over 70 years in serving customers throughout the world on many types of projects in some of its most lightning prone areas. Our personnel have vast experience in providing direct strike area protection, surge and transient protection and grounding solutions. Our extensive experience has involved risk management, system design, training, certification and installation and commissioning in key industry groups such as:

- Telecommunications & Broadcasting
- Petrochemical, oil & gas
- High rise buildings and hotels – all types of structures
- Sporting centre and grounds – Golf courses, race tracks, stadiums
- Aviation - Civil & Military
- Mining – coal, gold, nickel, iron, copper, bauxite etc.
- Industrial facilities of all kinds
- Defence – communications, surveillance and storage of armaments
- Power generation and distribution
- Rail / transport systems
- Monuments / Ecological sites

- **Product Description**

LPI offers a family of air terminals and accessories. Our product design is based on the most recent advances in the field whilst maintaining proven principles associated with the successes of the past.

LPI's Guardian System 5 provides a purpose-designed package for direct lightning protection.

1. A Family of LPI CAT (**C**ontrolled **A**dvanced **T**riggering) series air terminals.
2. A Fibreglass Reinforced Plastic (FRP) mast, which provides an insulated mast for mounting of LPI CAT series air terminals.
3. A purpose designed LPI High Voltage Shielded Cable (LPI HVSC) specifically designed for the conveying of lightning energy to ground. Alternatively, depending on the local codes and application's other materials such as, Copper flat tape or stranded cable may be used.
4. An LPI Lightning Strike Recorder (LSR), which confirms system efficiency and effectiveness.
5. A grounding system consisting of Earth rods, clamps, Copper tapes and LPI Ground Resistance Improvement Powder (GRIP).

Our LPI Guardian System 5 offers a Terminal in conjunction with a custom designed shielded cable and selected grounding accessories we are confident that we now offer the most effective and advanced lightning protection system available.



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## CAT Terminal

LPI Guardian® CAT series terminals consist of

- A finial with a blunt tip
- An electrically “floating” medium consisting of 4 electrically isolated panels
- A triggering procedure which allows the initiation of an intercepting streamer of energy earlier than any other competing feature within the area requiring protection
- A high voltage connection at the base of the finial

### How does an LPI Guardian® Terminal operate?

1. A Guardian CAT terminal consists of a grounded blunt lightning rod surrounded by an electrically floating medium. Rounded or blunt tips have now been proven to be more efficient than sharp points by producing minimal corona effect. This has been clearly proven in tests conducted at South Baldy Peak in the Magdalena Mountains of central New Mexico, USA. (Source: “The Measurement of Lightning Rod Responses to Nearby Strikes” by C.B. Moore, G.D. Aulich, and W. Rison / May 2001).
2. During the static thunderstorm phase when the electric fields are steady at around 5-15 kV/m and even in the very early stages of leader approach, the medium presents as a relatively low field intensification surface due to the blunt configuration of the finial tip. This restricts the production of "corona" or "point discharge" ions and is critical because excessive production of ions (corona) results in a "space charge cloud" above the air terminal which tends to mask the electric field at the tip of the terminal when the leader eventually approaches within range.
3. The medium is comprised of four separate electrically isolated panels arranged to allow the section facing the step leader to rise in voltage due to a capacitive coupling effect. Because the medium is essentially isolated from ground potential, the electric field increases as the discharge approaches closer to the panel facing the step leader. It then experiences repeated pulsing until this section (panel) rises in voltage to the point when a triggering arc is generated at precisely the right time, which in turn initiates the streamer, which connects with the approaching down leader.
4. This triggering arc creates two key effects, namely:
  - (i) It produces a large number of ions which are needed to initiate an upward leader,

AND

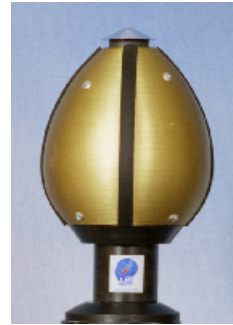
  - (ii) It causes a large snap change in the electric field immediately above the air terminal which provides the necessary "kick" for the inception of an early, stable, propagating upward leader.

The result of such advanced triggering results in the approaching leader being intercepted earlier, which ensures a larger protective area around the Guardian terminal of your choice.



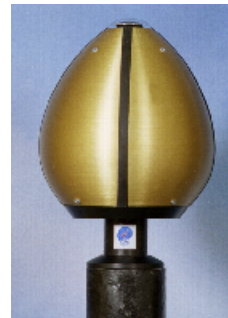
• **Technical Data  
CAT I-G**

Finial Tip: Chrome plated brass tip  
 Sphere Dimensions: 106mm (Diameter), 140mm (Height)  
 Panel Material: Anodised Aluminium  
 Terminal Colour: Gold  
 Weight: 1.8 kg (Approximate)  
 Operation: Spark Gap  
 Insulation Material: UV rated Evoprene  
 Down conductor Connection: Lug connection



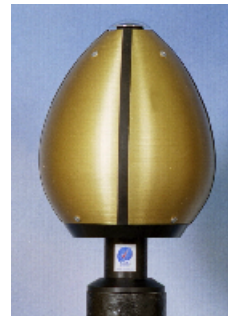
• **Technical Data  
CAT II-G**

Finial Tip: Chrome plated brass tip  
 Sphere Dimensions: 160mm (Diameter) 210mm (Height)  
 Panel Material: Anodised Aluminium  
 Terminal Colour: Gold  
 Weight: 2.8 kg (Approximate)  
 Operation: Spark Gap  
 Insulation Material: UV rated Evoprene  
 Down conductor Connection: Lug connection



• **Technical Data  
CAT III-G**

Finial Tip: Chrome plated brass tip  
 Sphere Dimensions: 210mm (Diameter) 280mm (Height)  
 Panel Material: Anodised Aluminium  
 Terminal Colour: Gold  
 Weight: 3.8 kg (Approximate)  
 Operation: Spark Gap  
 Insulation Material: UV rated Evoprene  
 Down conductor Connection: Lug connection



• **Technical Data  
LSR-1**

Description: Lightning Strike Recorder for lightning strikes or transient events  
 Ordering code: **LPI LSR1**  
 Current sensitivity: 1500A 8/20µs impulse  
 Operating range: Min 1500A, max > 220kA 8/20µs  
 Display: Mechanical 6 digits display (not re-settable). Each digit 0-9. Max reading 999999  
 Dimensions: Not more than 80mm(B) x 82mm(H) x 65mm(D)  
 Mounting: Adjustable stainless steel cable ties to accommodate a cable up to 40 mm dia. cable or 50mm x 5 mm flat tape  
 Weight: Not more than 0.2Kg  
 Construction: Polycarbonate enclosure, clear lid IP 67 rating (IEC 529)  
 Colour: Light grey  
 Operating Temperatures: -15°C to +65°C



## Downconductors

When the Guardian terminal has captured a lightning discharge, it is necessary to convey this very large amount of energy through the structure to the groundmass where it will be dissipated into a grounding system where it will no longer be a threat to personnel, structures or equipment.

LPI's High Voltage Shielded Cable (HVSC) provides a high integrity low impedance method of performing this task with minimal chance of "side flashing".

Our HVSC is particularly effective on structures containing high-density human occupancy and, those which contain sensitive electronic equipment, volatile liquids / gases and other sensitive applications.

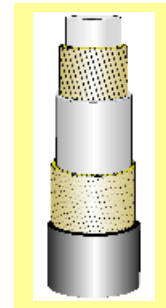
Where installations do not require such high level side flash / induction prevention or minimization, LPI offers conventional downconductors of all types such as copper tape & stranded cables, bare aluminium, galvanized steel cables & tapes or any of the above in PVC insulated form.

## • Technical Data

HVSC Configuration:

7 Layer cable consisting of the following.

- Inner Core
- Concentric Conductor
- Inner Binding Tape
- Insulation Material
- Metallic Screen
- Outer Binding Tape
- Outer Sheath



Concentric Conductor:

Nominal cross sectional area 50mm<sup>2</sup>

Sheath Thickness (Nominal)

3.00mm

Overall Diameter (Approx)

37mm

Weight of Cable

2.050 kg per metre

Electrical Characteristics

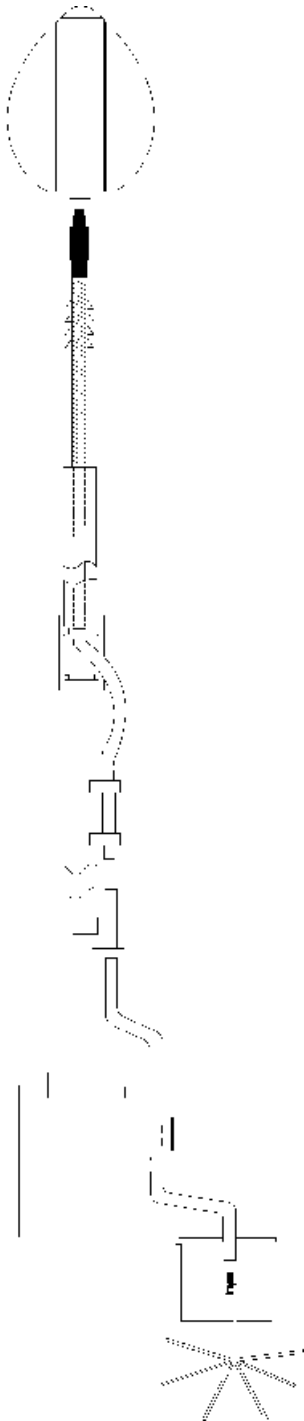
DC Resistance of conductor at 20°C (Max)	Ohm/km	0.387
DC Resistance of screen at 20°C (Max)	Ohm/km	0.448
Insulation resistance at 20°C (Min)	M Ohm-km	7.15
Thermal Short circuit current (1 second)	KA	7.15

## GRIP

LPI's Ground Resistance Improvement Powder (GRIP) provides the ability to dramatically reduce soil resistivity even in soils of the poorest electrical conductivity.

GRIP is comprised of specifically selected compounds, which possess excellent electrical conductivity. When GRIP is mixed with water and poured on the earthing system and surrounding soil the powder and water react to form a gelatinous mass within your earthing system. GRIP will not wash away under seasonal conditions and therefore provides a permanent presence in working to improve and maintain the integrity of your earthing system. Given that GRIP does not wash away the requirement to re-treat the soil as is the case with other enhancing compounds is eliminated.

GRIP is supplied in two packaged sizes to suit your site application. These packaged sizes include kits of 10 Kg and 40 Kg. A 10 Kg kit will comprise two 5 Kg containers; one 5 Kg container holds a copper compound (Copper Sulphate), whilst the other 5 Kg container holds a mix of compounds which assist in the mixing process (Hardener). The 40 Kg kit is comprised of two 20 Kg of the same configuration.

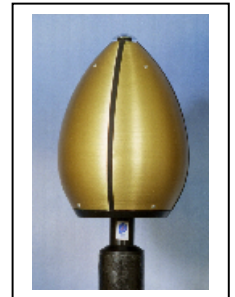


• **Technical Data**

**CAT Terminal**

Ordering Code(s): CAT I - G  
CAT II - G  
CAT III - G

Technology: Controlled Advanced Triggering  
Air Termination: Blunt configured Finial Tip  
Spheroid Material: Anodised Gold Aluminium  
Weight: 2.5kg to 4 kg (Approx)  
Termination: Compressed Lug connection



**High Voltage Shielded Cable**

Ordering Code: HVSC / PM  
Nominal Cross-sectional area: 50mm<sup>2</sup>  
Cable Diameter: 34mm  
Outer Sheath Thickness: 3mm  
Weight of cable: 2 kg/m  
DC Resistance of conductor: 0.387 O/km



**Lightning Strike Recorder**


Ordering Code: LSR1  
Current sensitivity: 1.5KA 8/20µs impulse  
Display: Mechanical 6 digit display  
Mounting: Adjustable stainless steel cable ties  
Construction: IP 65 Polycarbonate enclosure  
Colour: Light grey



• **“LPI Endorsed Product”** – The symbol of assurance of quality and performance.  
• LPI has a policy of continuing product development. Therefore, the above specifications are subject to change without notice.

LPI® - Innovative Lightning and Surge Protection Solutions

 Direct Strike Protection

 Surge & Transient Protection for Power, Data, Communications and RF lines

 Grounding Products & Solutions