



**Caspian Energy Corporation**

*Committed To Deliver Excellence*

# ***LIGHTNING PROTECTION & EARTHING SYSTEMS***

**ENGINEERING | PROCUREMENT | INSTALLATION**

*An ISO 9001:2008 Certified Company*

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## Company Introduction

Caspian Energy Corporation is a well-resourced and full-service project procurement management company serving the Oil, Gas and Petrochemical Industry. The company has associations with renowned manufacturers, major mills and suppliers across Europe, USA, Far East and the Sub-Continent.

Our customers include major Oil and Gas Companies, Refineries, EPC Companies and Contractors.

Caspian Energy Corporation is proud to announce it's capability to provide EPC services for Lightning Protection, Surge Suppression and Earthing now in Kazakhstan. Our group company Dhruva Technologies that was established in New Delhi, India in 1989 specializes in providing such services in India. It became a part of the Caspian Energy Group in year 2010. Caspian Energy Corporation prides in having one of the most competent EPC team for lightning protection and earthing for the oil and gas industry. Our mission is to apply the best engineering practices to provide the most effective solution to meet our customers need. We accomplish this through innovation, continuous improvement and team work.

Our mission is to create value for our customers through timely delivery of best quality products & services.

Our goal is to implement a quality policy to meet and exceed our customers expectations at all times, pursue continuous professional growth and commit to continuous improvement.

## Health, Safety & Environmental Policy

Protection of people and the environment is a core value of Caspian Energy Corporation. It is our vision to create a culture within Caspian Energy Corporation that empowers employees to drive this value into all global operations and achieve excellence in health, safety, and environment (HSE) performance. Caspian Energy Corporation deploys an integrated, enterprise wide behaviour based HSE management system to fulfil our mission and the expectations of our customers, staff, and communities based on the following principles:

- ◆ We require all management and supervisory personnel to provide the leadership and resources to inspire and empower our employees to take responsibility for their actions and for the actions of their fellow employees to create a safe, healthy, secure, and environmentally-responsible workplace.
- ◆ We provide value to customers by tailoring HSE processes to customer needs and requiring all Caspian Energy Corporation employees and subcontractors to deliver projects with agility, personal service, and responsiveness and in compliance with HSE requirements and company standards to achieve health, safety, security, and pollution prevention excellence.
- ◆ We care about the safety and security of every Caspian Energy Corporation employee and expect all employees to embrace our culture, share our core value for the protection of people and the environment, understand their obligations, actively participate, take responsibility, and "walk the talk" on and off the job.



## Our Services

### Lightning Risk Analysis

Our team has extensive experience in evaluating lightning risks as per international recommendation of IEC and NFC. The reports provide the distribution of risks from direct and induced effects of lightning and areas of the facility which may be most exposed. The detailed analysis provides our engineers a platform to take the most cost effective measures to minimize the risks and it also provides our customers a basis to validate the expenses involved in installing a lightning protection system.

### Soil testing, design, supply and installation of Earthing Systems

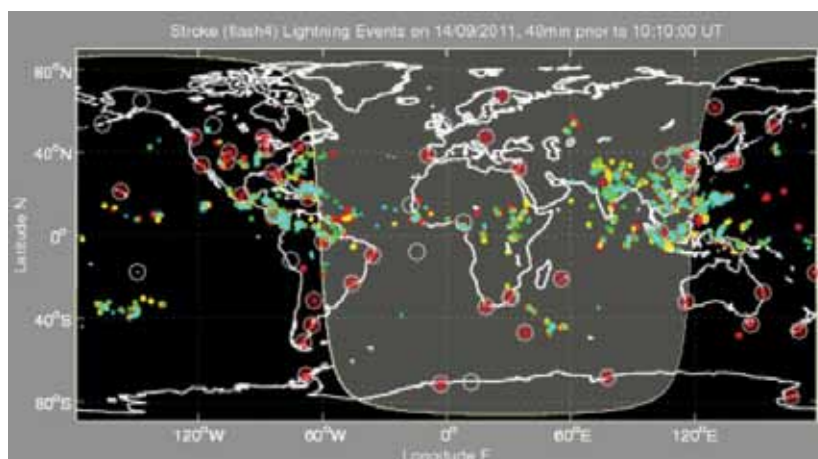
Earthing and Bonding are the foundation for power protection science. All undesired energy is diverted to earth before it electrocutes a person or equipment. A low resistance earth termination, a low resistance path to the earth termination and low resistance potential equalization between metal bodies is all critical at the time of a fault. Our Engineers conduct soil resistance tests, earth system resistance tests, point to point resistance tests and model a single facility wide low resistance and low impedance earthing and bonding system exceeding the requirements of recommended and applicable earthing standards.

### Site Survey, design, supply and installation of External Lightning Protection Systems

External Lightning Protection is designed on a facility to protect it from any direct lightning strikes. International standards and recommendations from IEC, NFC, UNE, UL, IEEE govern on how these systems are designed and installed. The external protection system comprises of an air terminal network, down conductors and earth termination system. Our engineers are UL certified and can custom designs solutions for each project. The team undertakes a detailed risk assessment, develops protection models, deploys a combination of most applicable lightning protection design recommendations and selects the best performing products available in the market to offer an unmatched lightning protection system to our customers.

### Site Survey, design, supply and installation of Internal Lightning Protection Systems

Lightning strikes on a facility or anywhere nearby including those that take place between the clouds create very high electromagnetic pulses which induce transients in power and data cables. The form of transient is very unpredictable – it could be a small spike, a medium energy surge or a steep impulse of varying voltage and carrying varying amount of energy. Electrical, electronic and communication equipment have different levels of immunity towards such transients and protection for them has to be carefully designed. The design is based upon the protection devices capability to handle one or other transient, it's response time, energy handling capability and designed let thru-voltages. Our engineers are well experienced with power protection techniques and evaluate the pattern of power quality to which the electronics is exposed to and risk of lightning induced transients together to select the most appropriate surge protection device and their point of installation.



## Design, supply and installation of Lightning detection and warning systems

Prevention is always better than cure. Lightning and its damages are very unpredictable, even with the best engineered lightning protection systems, risks cannot be brought to zero. Dynamic lightning detection and warning systems become very important to save human life and plan outdoor activities. Our group has installed a number of stationary and mobile lightning detectors for companies having professionals involved in outdoor activities. Our engineers have the capability to create corporate lightning detection and warning networks so data from multiple remote outlets can be monitored at a central location and transmitted where required.



## Engineering, Procurement & Commissioning of Lightning Protection Systems

### **Engineering**

Our team comprises of UL certified engineers that custom design solutions for each project. The team undertakes a detailed risk assessment, deploys a combination of most applicable lightning protection design recommendations and selects the best performing products available in the market to offer an unmatched lightning protection system to our customers.



### **Procurement**

Our team prides in our highly skilled supply chain professionals that schedule and negotiate the procurement process to meet project deadlines and customers budget. Products are sourced world wide and also fabricated in our workshop to meet the customized requirements of our customers.

### **Commissioning**

Our Project Managers and the installation team operate as per the ISO 9001:2008 guidelines of our company to schedule, execute and complete the projects. The team abides with the OSHA stipulations and safety of personnel is the prime objective while on site. We pride in commissioning all projects in time as per design without any accidents.

### **Training, consulting and specification writing**

Our engineers provide on-site technical assessment for evaluating the most accurate lightning protection solution for each customer. Our team also provides specification writing services further to designing an appropriate lightning protection solution.

International lightning protections standards are upgraded annually. Our engineers are always updated with the latest recommendations and provide verification and maintenance services to bring existing lightning protection systems in compliance to the requirements of UL 96A , IEEE 62305 and UNE 21 186.

We provide training and technical seminars internationally.



# Our Products

## i. Lightning Detection and Warning Systems

- ◆ ATSTORM® - Lightning Storm Tracker

## ii. Lightning Air Terminal

- ◆ Protec® ESE - Static Early Streamer Emitting Terminal
- ◆ FlashCaptor® - Electronic Early Streamer Emitting Terminal
- ◆ Protec® FR - Franklin Rod (Conventional Lightning Rod)
- ◆ Protec® PDT - Point Discharge Terminal

## iii. Surge Protection Devices

- ◆ Pro H Series - Parallel mount integrated powerline SPD with integrated frequency filters
- ◆ Pro S Series - Series mount integrated powerline SPD for equipment level protection
- ◆ Pro TSP - Data line terminal Strip Protection SPD
- ◆ Pro RJP - Data line RJ Interface Protector
- ◆ Pro CLP - Coaxial Line Protection SPD

## iv. Earthing & Bonding

- ◆ Pro ACES - Advanced Chemical Earthing System
- ◆ Pro AMES - Advanced Maintenance-free Earthing System
- ◆ Pro ASEM - Advanced Soil Enhancement Material
- ◆ Pro ISG - Isolation Spark Gap

## v. Exothermic Welding



## Lightning Detection & Warning Systems

*Warning means having information in advance that allows the user to start temporary preventive measures before the storm begins. Lightning detection and warning will be complementary to an installed Lightning Protection System (LPS) in certain situations, while in others it will be sufficient to act alone.*

*Beautiful to behold, lightning is not only one of nature's most powerful phenomena, but one of the most common and destructive. That's why we offer a line of state-of-the-art Lightning Detection Systems & Warning Systems that help you to detect and track thunderstorms up to 300 miles away, right from your personal computer.*

### ATSTORM® - Lightning Detector & Warning System

ATSTORM® is a patented technology and a highly innovative purely electronic detector, that measures the electric field in a similar manner to conventional electric field mills but using no motor or mechanical parts. ATSTORM® detects every stage of a storm, from its outset, thus giving a far earlier warning. ATSTORM® is a storm detector that measures the environmental electric field. It is fully automatic, without mobile parts, robust and highly reliable.



- Touch Screen for easy use
- Interface between the sensor and screen

### FEATURES

- ◆ Local detection of every stage of the storm thus allowing sufficient time for taking all the established preventive actions.
- ◆ No mobile parts thus avoiding breakdowns and service interruptions.
- ◆ No special maintenance required.
- ◆ Configurable detection thresholds according to the user necessities.
- ◆ Possibility of universal outputs allowing connection to any alarm device, measuring devices, etc.
- ◆ Supplied with specific control software.
- ◆ Possibility to integrated GSM modem that allow transmitting SMS messages to cell phones with data or alarms.

# Lightning Air Terminals

Lightning Air Terminals are designed to provide protection to structures against physical damage from lightning strikes. They are critically placed on a structure and connected to a lightning conductor and earthing system to safely receive a strike, safely conduct the lightning current to the earthing system and safely dissipate it in the earth. Various technologies are now available for air terminals that allows a lightning protection system to be designed for regular shielding, proactive interception of lightning strikes at early stages and for reducing the probability of a strike on the lightning protection system. Dhruva Technologies offers a full range of most advanced technologies in lightning air terminals.

## Protec® ESE - Static Early Streamer Emitting Terminal

It is a non electronic construction that has been designed to create an upward propagating streamer earlier than conventional air terminals or other objects on the earth. Protec ESE does this by collecting charge during the initial phase of a thunderstorm development and releases the stored charge as soon as the ambient field strength reaches a critical value. This assures emission of strong and consistent upwards streamers to intercept leaders earlier than a convention lightning rod.



### FEATURES

- ◆ Meets NFC 17-102 & UNE 21186 standards
- ◆ Installed in compliance to IEC 62305 and NFC 17 - 102
- ◆ High quality anti-corrosive and conductive coating
- ◆ Low wind resistance and light weight.
- ◆ 5 years replacement warranty
- ◆ With specific control software.
- ◆ Available with 20, 40 and 60  $\mu\text{s}$  delta T

### Triggering Time Gain

The triggering time  $\Delta T$  ( $\mu\text{s}$ ) is defined as the gain at the sparkover instant obtained with a ESE terminal compared with a simple rod terminal exposed to the same conditions.

### Triggering Time Distance Gain

According to NF C 17-102, The triggering time instance gain  $\Delta T$  is associated with a triggering time distance gain  $\Delta L$ .

$\Delta L = V \cdot \Delta T$  where:

$\Delta L$  (m) : gain in lead distance of the sparkover distance.

$V$  (m/ $\mu\text{s}$ ) : the average speed of the downward tracer

$\Delta T$  ( $\mu\text{s}$ ) : gain in sparkover time of the upward leader

### Radius of Protection (Rp) in Metres

Protection Level	H (m)	Pro ESE 20 Rp	Pro ESE 40 Rp	Pro ESE 60 Rp
Level - I (R = 20)	2	13	25	31
	4	25	51	63
	6	32	63	79
	8	33	64	79
	10	34	64	79
Level - II (R = 30)	2	15	28	35
	4	30	57	69
	6	38	71	87
	8	39	72	87
	10	40	72	88
Level - III (R = 45)	2	18	32	39
	4	36	64	78
	6	46	81	97
	8	47	82	98
	10	49	83	99
Level - IV (R = 60)	2	20	36	43
	4	41	72	85
	6	52	90	107
	8	54	91	108
	10	56	92	109



## Flash captor - Electronic Early Streamer Emitter Terminal

It is an electronic based early streamer emitting air terminal with an advance time  $\Delta T$ , determining a protection radius for each protection level. It is equipped with insulation system protector, stepped electrostatic charge accumulator, upward streamer electronic generator and multiple spark-gap. It does not require an external power supply and is completely maintenance free.

### FEATURES

- ♦ Electronic circuit of high voltage impulse emitter and upward streamer generator is located in a watertight stainless steel body of the air terminal and is shielded from the electromagnetic fields
- ♦ Triple insulating system for extreme weather conditions
- ♦ Stepped electrostatic charge accumulator
- ♦ Single discharge tip for effective charge spread
- ♦ Wholly manufactured with stainless steel AISI-316

### RADIUS OF PROTECTION

		FLASHCAPTOR				
		h(m)	15	30	45	60
PROTECTION LEVEL	LEVEL I	2	13	19	25	31
		4	25	38	51	63
		6	32	48	63	79
		10	34	49	64	79
		20	35	50	65	80
	LEVEL II	2	15	22	28	35
		4	30	44	57	69
		6	38	55	71	87
		10	40	57	72	88
		20	44	59	74	89
	LEVEL III	2	18	25	32	39
		4	36	51	64	78
6		46	64	81	97	
10		49	66	83	99	
20		55	71	86	102	
LEVEL IV	2	20	28	36	43	
	4	41	57	72	85	
	6	52	72	90	107	
	10	56	75	92	109	
	20	63	81	97	113	



### TECHNICAL DATA

MODEL	Advance time during the test	Uncertainty of the test (i)	Security factor	Certified Advance Time
FLASHCAPTOR 15	33 $\mu$ s	$\pm 11 \mu$ s	2 x i	15 $\mu$ s
FLASHCAPTOR 30	47 $\mu$ s	$\pm 12 \mu$ s	2 x i	30 $\mu$ s
FLASHCAPTOR 45	59 $\mu$ s	$\pm 11 \mu$ s	2 x i	45 $\mu$ s
FLASHCAPTOR 60	89 $\mu$ s	$\pm 12 \mu$ s	2 x i	60 $\mu$ s

## Protec® FR- Franklin Rod (Conventional Lightning Rod)

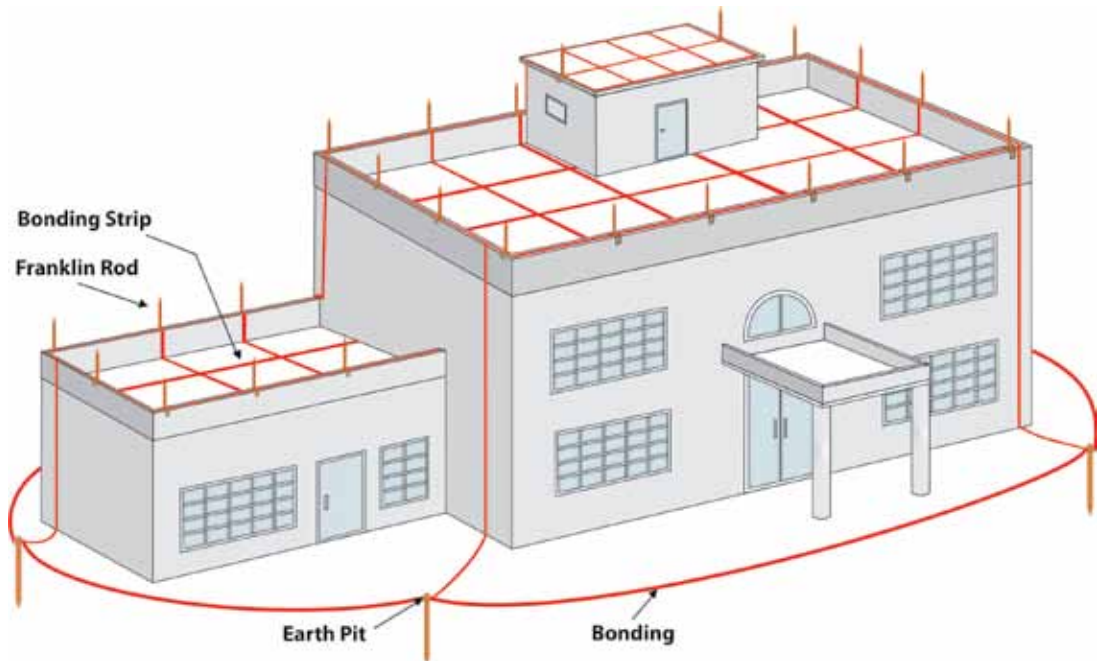
Protec® FR Lightning rods are designed to meet the standards of UL and IEC and provide the most enhanced performance. These are metal rods installed over a structure as preferred points for a lightning strike. These terminals are connected to a network of horizontal and vertical conductors that are terminated to earthing terminals. The network of rods, conductors and earth terminals covers the protected structure in a Faraday Cage. The terminals and conductors are spaced as per the recommendations of IEC.



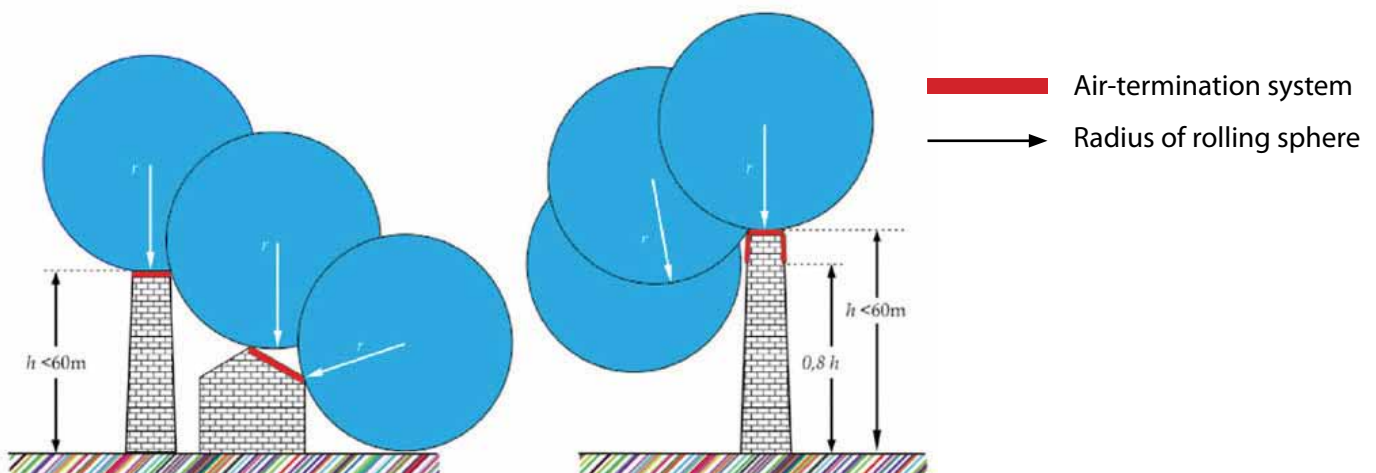
### FEATURES

- ◆ Meets UL and IEC Standard
- ◆ Available in Aluminum, Copper and Stainless Steel construction
- ◆ Special blunt tip for enhanced performance

### Installation of Franklin Rod at Building



### Positioning of Air-termination Systems utilizing Rolling Sphere Method



## Protec® PDT- Point Discharge Terminal

Protec PDT is the latest design in streamer prevention technology. Extensive laboratory tests show that Protec Point Dissipation Terminals (PDT), and the structure on which they are installed, are much less likely to generate streamers than structures with traditional lightning protection systems.

This design of Point Dissipation Terminals has been in existence for more than 25 years. They are characteristic to quickly generate uniform space charge around itself in response to the stress generated by downward leaders. This reduces the field strength around the object to which these terminals are installed and reduces its ability to generate streamers. The lightning leaders are left to look for objects generating streamers. The streamers are installed with a network of roof conductors and down conductors spaced to achieve a IEC 62305 Level I Lightning Protection System. The system is connected to a ground ring radius of which is calculated as per recommendations of IEC 62305.

### Key Features

- ◆ More than 1200 SS 316 Ionizers per terminal
- ◆ High grade stainless steel terminal points
- ◆ Available in aluminum, copper and stainless steel
- ◆ Lightweight and easy to install in compliance to IEC level - I LPS
- ◆ Corrosion resistant

### Applications

- Monopoles, high mast lightning, and externally mounted cameras.
- Communication towers, bridges, petro-chemical storage facilities, and stacks



## Surge Protection Devices (SPDs)

Surge Protection Device provides protection to the electrical and electronic equipment located on the structures against electromagnetic impulses induced from lightning. Transient over-voltages have existed since the creation of electrical networks, the need for protection today is much greater due to advancement in technology that has left electrical & electronic components more sensitive to electromagnetic disturbances.

### ProH Series- Voltage, Current and Frequency transient filter

Protac ProH Series Surge Protection Devices utilize high frequency tracking circuitry (HFTC) and are designed for ac power line protection against frequency, voltage and current transients.



#### Key Features

- ◆ High Frequency Tracking Circuitry (HFTC)
- ◆ Individually fused multichannel suppression modules
- ◆ Available in 30, 60, 90, 150, 200, 240, 300, 400 & 450 kA per phase peak Surge Current Rating (SCR)
- ◆ Voltage protection level (VPR) below 1.2 kV per mode
- ◆ 200kA short circuit current rating (SCCR)
- ◆ Lifetime cycle more than 45impulses of 10kA per phase
- ◆ Integrated All Mode Protection, NEMA4X/IP56 Enclosure
- ◆ Fire proof silicon high temperature connection cables
- ◆ Integrated Thermal & Over-current fusing
- ◆ Anti-shock, anti-vibration thermal encapsulation in high strength dielectric compound
- ◆ Integrated Blue LED per phase monitoring
- ◆ 25 Year Free Replacement Warranty
- ◆ Tested to IEC 61643-11 & UL 1449 3rd edition recommendations, UL1283 noise filter

#### Applications

Ideal to reduce the risk of failure of internal systems arising from Lightning electromagnetic pulses (LEMP), power switching, ground potential rise and radio frequency interference. Installed for Class I, Class II and Class III protection as per IEC 61643 and IEC 62305 within the lightning protection zones not exposed to direct strike to the equipment to which the SPD is installed.

### ProS Series- Equipment Level SPD



The Protec ProS series of surge protective device offers the best equipment level transient protection and noise filter on single phase AC and DC circuits. This product is installed in series to clamp transients to the lowest let-through voltage possible.

#### Applications

Ideal for equipment level protection application, such as UPS, PLC, Fire Alarm Panels, Remote Monitoring Units, Electronic Screens, Security Alarms, Detection and Control Circuits, Toll ways

#### Key Features

- ◆ Installed in series to provide lowest possible let-through voltage
- ◆ Parallel integrated circuitry which does not take the load offline
- ◆ Tested with combination wave and ring wave test impulses for Class III/Type III applications
- ◆ All Mode protection with noise filter
- ◆ Component level Thermal and Current Fusing
- ◆ Thermal conductive encapsulation
- ◆ Lifetime 45 impulses of 5kA per phase
- ◆ Peak surge current rating of 60kA per phase
- ◆ 65kA short-circuit current rating
- ◆ CE, UL1283, UL1449 3rd edition Type III. IEC 61643-11 Type III
- ◆ 25 Year Free Replacement Warranty



## Pro TSP Series- Terminal Strip Protector

The Protec TSP Series products are designed to protect the entry of voltage, current and frequency impulses through the communication and control interfaces. When installed on the system I/O ports, TSP prevent equipment damage and system errors which are a common result of transient surge energies induced onto the communications interface and ground plane.

### Key Features

- ◆ Economical and State-of-the-art technology in data line transient protection
- ◆ Low insertion loss and quick response time
- ◆ High energy loss and handling capability
- ◆ Low let thru voltage
- ◆ Compliant to IEC, UL, CE standard with 5 years warranty



## Pro RJP Series - RJ Interface Protector

The RJ11 and RJ45 interfaces within Local and Wide Area Networks are very sensitive locations and point of entry for surges and impulses into the sensitive communication cards. Protec RJP series products provide transient protection for LAN/WAN interface technologies such as Ethernet 10/100/1000BASE T and Power over Ethernet (PoE) applications. These products are available for application in Telecommunications environments that include ISDN, T1, FT1, DDS and dial up modem.



### Key Features

- ◆ Economical and State-of-the-art technology in data line transient protection
- ◆ Low insertion loss and quick response time
- ◆ High energy loss and handling capability
- ◆ Low let thru voltage
- ◆ Compliant to IEC, UL, CE standard with
- ◆ 5 years services warranty

## Pro CLP Series - Coaxial Line Protector

Protec CLP series surge protection devices are the most cost effective products available. They are designed to protect the CCTV and CATV circuits from induced or coupled transients. Strong electrical magnetic fields induced during lightning events are common cause for damages in security camera and cable TV equipment. Our devices are designed for quick response time, low insertion loss and high energy handling capability to keep the sensitive equipment safe during thunder storms and power outages.

### Key Features

- ◆ Avalanche diode technology
- ◆ Quick Response Time
- ◆ High energy handling capability
- ◆ Low insertion loss
- ◆ Compliant to IEC 61643-21, UL 467 and CE standard
- ◆ 5 years service warranty





## Earthing & Bonding

A well designed earthing system is essential for any electrical installation to avoid the dangers associated with ground potential rise, fault currents, lightning strikes, static charge and stray currents as established in the international earthing standards:

- ▶ India: IS : 3043 Indian Standard CODE OF PRACTICE FOR EARTHING
- ▶ Spain: RBT2002 "Low Voltage Electromechanical Regulation". ITC-18 "Earthing systems
- ▶ Great Britain: BS 7430 "Code of practice for Earthing
- ▶ France: NF C 15-100 "Low Voltage Electrical Installations
- ▶ Germany: DIN VDE 0100 "Earthing arrangements, protective conductors, equi-potential bonding conductors
- ▶ USA: UL 467 "Grounding and bonding equipment"

### Pro ACES - Advanced Chemical Earthing System

Protec ACES Chemical Earthing System has been designed to assure low resistance earth connection at locations with high soil resistance and limited space for installation of earthing systems. These provide a continuous source of electrolytes, low and humid connection with earth at all times.

#### Key Features

- ◆ Single ACES electrode capable of substituting multiple traditional electrodes to achieve the same ohm value
- ◆ Fully welded construction with large surface area for quick current dissipation
- ◆ No risk of smoking electrode
- ◆ Very high current handling capability
- ◆ Assured stable low resistance in all seasons and all soil environments
- ◆ Welded terminal plate
- ◆ Eco-friendly electrolytic content
- ◆ ROHS approved soil enhancement material
- ◆ Copper or Galvanized Steel construction
- ◆ Lockable high endurance poly plastic test well
- ◆ Tape in Pipe & Pipe in Pipe Technology



### Pro ASEM - Advanced Maintenance-free Earthing System

Protec AMES is an economical, maintenance free, low resistance kit for all types of earthing systems. It consists of ground electrode, soil enhancement compound, terminal plate and polyplastic pit cover.

#### Key Features



- ◆ Available in high quality galvanized steel or 250 micron copper clad steel
- ◆ Exothermically welded Terminal Plate
- ◆ Supplied with a Protec Advanced Soil Enhancement Material (Protec ASEM) operates in different temperature range
- ◆ Provides 30% lesser earth resistance as compared to regular 3mtr earth electrode
- ◆ More than 90% of electrode surface in contact with surrounding soil
- ◆ High moisture retention capability and electrical conductivity
- ◆ High Thermal Stability & Corrosion Resistance
- ◆ Eliminates risk of smoking electrodes
- ◆ Eliminates requirement of deep hole electrodes
- ◆ Maintains stable low earth resistance in all seasons
- ◆ Available in standard 3mtr lengths for easy shipping and handling
- ◆ RoHS approved soil enhancement compound
- ◆ 20kA Short Circuit Current Handling Capability

## Pro ASEM - Advanced Soil Enhancement Material

Protec ASEM soil enhancement material is self compacting with high hygroscopic properties. It is thermal insulating with high electrical conductivity. The soil enhancement material increases the electrode surface in contact with soil and reduces the contact resistance between the electrode and soil. It assures a low resistance electrical pathway for current dissipation. The Protec ASEM soil enhancement material has low resistivity, small particle size and high specific gravity.

### Key Features

- ◆ Highly conductive
- ◆ Highly Hygroscopic
- ◆ Insoluble in water
- ◆ Self compacting
- ◆ Very stable to temperature change
- ◆ Non-corrosive
- ◆ ROHS compliant



## Pro ISG - Isolation Spark Gap

Protec Isolation Spark Gap is used for equipotential bonding between bodies that need to exist at independent ground potentials to each other but bond during events such as lightning and static discharge.

### Key Features

- ◆ Available in 50kA and 100kA Peak Surge Current handling capacity
- ◆ Thermal conductive fire proof and water proof resin encapsulation
- ◆ Weather proof enclosure
- ◆ Low let thru voltage
- ◆ Quick response time
- ◆ High energy handling capability
- ◆ High Thermal Stability



## Exothermic Welding

There are many advantages of using exothermic welding. The most important one being that the process produces a molecular joint and not just a mechanical one in between the conductors. It is produced through a starting reactant which provides enough energy to activate the welding reaction. This takes place quickly and safely inside a graphite mold. The mold is designed specifically for a certain union depending on the elements to be welded and the joint type required. Apliweld® guarantees all types of joints, not only copper cable unions but also to weld tapes, brass metallic pieces, stainless steel, steel ground rods covered with copper, etc.

### Key Features

- ◆ Superior electrical conductivity to the conductors themselves.
- ◆ Does not corrode, oxidize or degrade with time and is resistant to galvanic coupling
- ◆ Able to withstand repeated electrical discharges
- ◆ Never increases its resistance and
- ◆ Has greater mechanical and squeezing resistance than the conductors themselves
- ◆ 5 years service warranty



# Customers

## COMMERCIAL

American Express | Finedge India Ltd. | Pluss Polymers | Parikh Group | PASCO | Fortis Hospital | JP Vasant Hotel | Gupta Exim | BK Tyres | Swarn Projects (P) Ltd. | Ashok Leyland | Micromatic Grinding Machine | Torrent Pharma | JBM | Johnson | Mahindra & Mahindra | Hotel Park Plaza | Nelco Ltd. | Teleconvergence Infosystems, Mauritius | Cadence EMAAR Hotel | Raj Vidhya Mandir | Marriot Hotel | Rajiv Gandhi Renewable Energy Center | CIS Hotel Agra | Westin Hotel | ASCOT Hotel | Pearl School of Business | Teleconvergence Infosystems | Suprabhat Engineers | Uppal Business Centre | IRIS Tech Park



## COMMUNICATION

Bharti Airtel | Idea | Vodaphone | Nokia | Essar | Dell | Intelnet Pvt. Ltd. | Tulip Data Centre | Genpect | Star News | Reliance | Dia Com | IT Park, Noida | Indus Towers | Bestech Cyber Park



## GOVERNMENT / MILITARY

Indian Army | Indian Air Force | Delhi Police Public School | Police Telecom HQ (MP) | Power Finance Corporation | Food Corporation of India | Common Wealth Games 2010 | Humanyu Tomb | Mutinee Memorial Gol Gumbad | Bara Lao Ka Gumbad | Quali Khan's Tomb | Bijri Khan's Tomb | GMVN | VSNL | BSNL | MTNL | IRCTC | NTRO | Power Grid Corporation | AIIMS | HQ Northern Command | Orissa State Disaster Management Authority (OSDMA) | Indian Railway MITS, Gwalior

## INDUSTRIES

KEC International | Grazino Industries | Xansa Industries | Mechenzie Industries | TYCO Electronics Systems | Sterling & Wilson | TVS Motors | Shivam Autotech | KEI Industries | Kehin Panhalpha | Roulounds India Banking | Nappino Auto Ltd. | Yes Bank | IBM | Vedanta Group | MMTC | MJ Casting | VOLTAS | INDIAN GRAND PRIX FORMULA-1 BIC | MARUTI-SUZUKI INDIA LTD-GGN | SHIVA NADAR UNIVERSITY



## REAL ESTATE

DLF | Uppal Towers | Ambiance Mall | ACE Buildtech | FIP Mall | Unitech | Infinity Tower | Golcha Trade Centre | Niho Mall | HBN Mall Club | Bestech Hospitality | Kirti Malls | Mahindra Chlorosis | Mahindra World City, Jaipur | Pranayam | Airport Terminal-3 ACB & MLCP building | Huj Terminal | BIRLA HOUSE AT MUSSORIE | Sapphire Mall, Sohna Road

## OTHER CUSTOMERS & CONSUMERS

KSS, AGIP KCO, NCOC, KPO, CNPC, SINOPEC, AGP, Kazakh Oil, KBM, PetroKazakhstan, MSS, Sun Drilling, Aker Solutions, CPP, Kazakhmys Petroleum, Astratar, Max Petroleum, Halliburton

Asia Gas Pipeline, Fluor, Maersk Oil, Enpetrol, Zhaikmunai, Kazmunaigas, CPC (Caspian Pipeline Consortium), Worley Parsons, Petrofac, Karazanbasmunai, Atyrau Refinery, Punjl Lloyd, Lukoil, AGP (Asiagas Pipelile), Saipem, Kazakhstan Petrochemical Industries Inc.







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*Committed To Deliver Excellence*

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