Zeus ESE Technology

ZEUS

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ESE

Early Streamer Emission

Your best protection against lightning for the tropical area

PT ZEUS PRIMA GARDA®

website : www.zeusprima.com

Version-004 2021-Feb-14

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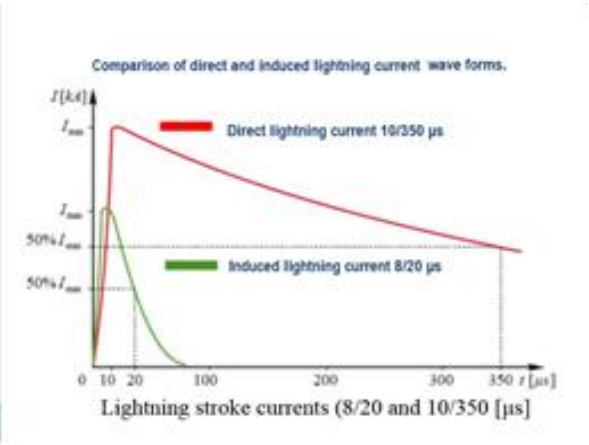
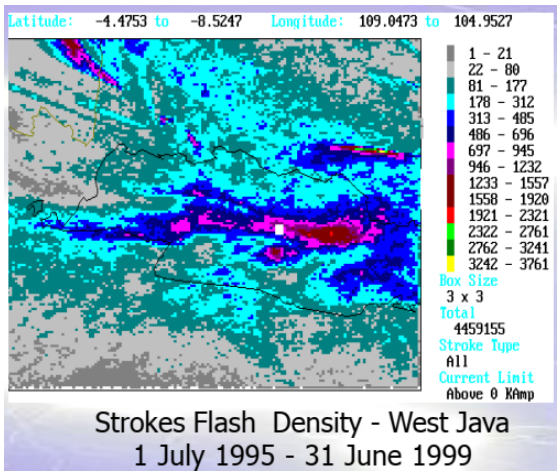


Lightning stroke currents (8/20 and 10/350 [µs]

ZEUS CVT-ESE has been succesfully tested at **CPRI Centre Power Research Institute Bangalore India** for the lightning current withstand test against simulated (8/20us) waveform current. At the ITB LRC facility the test of Zeus Air Terminal is conducted with intensity of natural lightning it can be reached ≥220 kA which is higher than the value of maximum lightning protection level (LPL I: 200 kA (10/350 µs) waveform described in the **IEC 62305-1 Standard**



Strokes Flash Density - West Java
1 July 1995 - 31 June 1999

Typical formation of lightning

Indonesia has the highest thunderstormdays in the world.

The main feature of the ZEUS CVT - ESE Streamer Emission (ESE) technology is producing of the continuous upward leader before any other object within its protected area. The standards define this characteristic using a parameter called advance time (ΔT): expressed in microseconds compares between the emission time of a ZEUS CVT-ESE streamer air terminal and a simple rod air terminal measured.

The ZEUS CVT-ESE Early Streamer Emission has been designed through long period field test on natural lightning to meet all criteria necessary for the controlled emission of a streamer. It is not effective to launch the streamer too early because the ambient field will not sufficient enough to convert the streamer to the upward leader and the streamer propagation will terminate.
The ZEUS CVT- ESE will initiate a upward leader to capture the lightning strike and will enhance greater protection radius than conventional air terminal, The ZEUS CVT-ESE shall channeling the lightning impuls & energy to the right path and safely dessipate the energy to the ground

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ITB-LRC Lightning Research Centre ±2030 mt in West Java Indonesia, the ZEUS CVT-ESE has been tested against (10/350µs) Natural Lightning waveform which is the intensity can reach much higher than the kA simulated current at the test laboratory

The ESE Early Streamer Emission based om International; Standard **NFC 17-102**. The ESE is a technology containing a device streamer emission component that uses the atmospheric gradient to store energy. This subsequently emits high frequency pulses to the atmospheric which creates a prority channel for the lightning discharge or known as the upwards leader. Zeus ESE air Terminal has the protection radius (Rp) which is calculated using the International Standard NFC 17-102. (July 1995). Following Tabel Radius Protection (Rp) of ZEUS ESE is the results of calculation by using the formula :

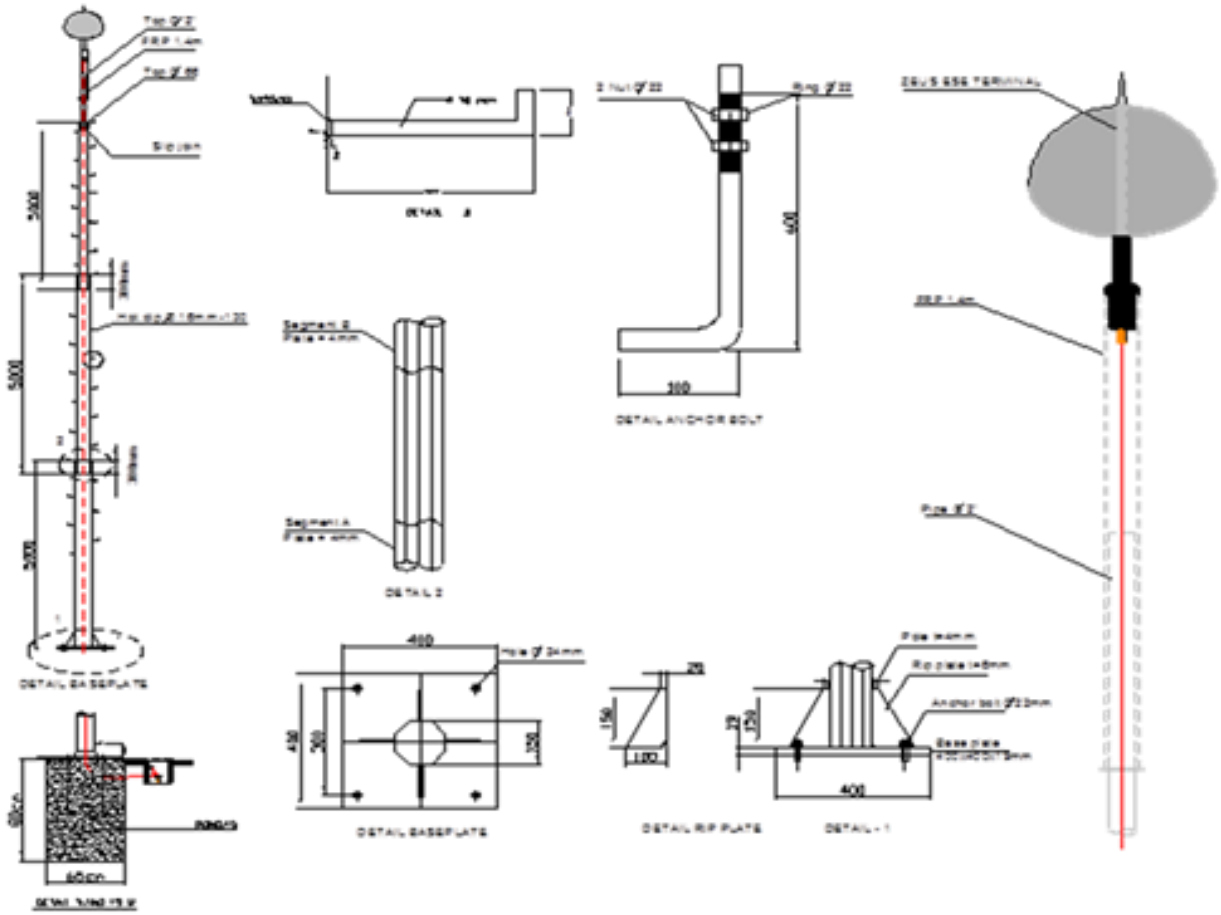
Radius Protection Calculation						
	h(m)	15m	20m	25m	30m	45m
20 KA	r(m)	48	55	60	62	67
30 KA	r(m)	84	97	107	112	120
36 KA	r(m)	105	120	135	142	150

$$Rp = \sqrt{h(2D-h) + \Delta T(2D + \Delta T)} \text{ for } h \geq 5m \text{ where:}$$

The following key parameters determine the calculation :

- Rp radius Protection
- ΔT (µs) 60 is Zeus ESE result test
- h= actual height in meter of installed ZEUS ESE terminal at location to be protected.
- D (in m) de selected level of protection.
  D=20 m for Height Level protection. (Level.1)
  D=45m for Medium Level Protection. (Level,2)
  D=60 m for Standard Protection (Level.3)

FOR APPLICATION AT GOLF COURSE ON THE TOP OF HOTDIP GAVANIZED HDG POLE 20-30 MTR



ZEUS– ESE Early Streamer Emission Air Terminal

- Material made of Stainless Steel and use cable down-conductor shielded copper 50-70sqmm.
- Zeus ESE Air Terminal complies to IEC-620305 , NFC 17-102 and national SNI Standard.
- Tested at Laboratory of High Voltage ITB and Lightning Research Centre of ITB Institute Technology Bandung at Mount Tangkuban Perahu West Java–Indonesia 2030Mt.
- Succesfully tested at CPRI High Voltage Lab Bangalore India.
- Withstand tested against Natural Lightning current ≥ 200 kA.
- Robust Material, Easy Maintenance & Non radio-active components.
- Design to capture & channeling the negative & positive Lightning strike and conduct safely to the ground.

<u>For application at :</u>

- Golf Course , Outdoor Sport facility , Theme Park & Resort
- Oil Tanks Farm, Refineries, Oil Rigs, Mining Facility,
- Med-High Transmission Distribution Electrical Tower 70Kv, 150Kv, 500Kv
- Housing & Property, High Rise Building,
- Airport ATC, Apron Airports, Telecommunication Tower,
- Wind Measurement MetMAst Tower and others.
- Has been Installed at : Royal Jakarta Golf 2012 & Suvarna Golf Halim-2 Jakarta, 2019, Palm Hill Golf 2014, KLGCC Kualalumpur Golf Malaysia 2011, Cipurtra Golf PhomPenh Cambodia 2013, Bukit Indah Golf Batam 2012, Kota Baru Parahyangan Golf Bandung 2018, Krakatau Steel Golf Cilegon 2020, Kapuk Naga Golf Jakarta 2021, Rainbow Hill Golf Bogor 2021.