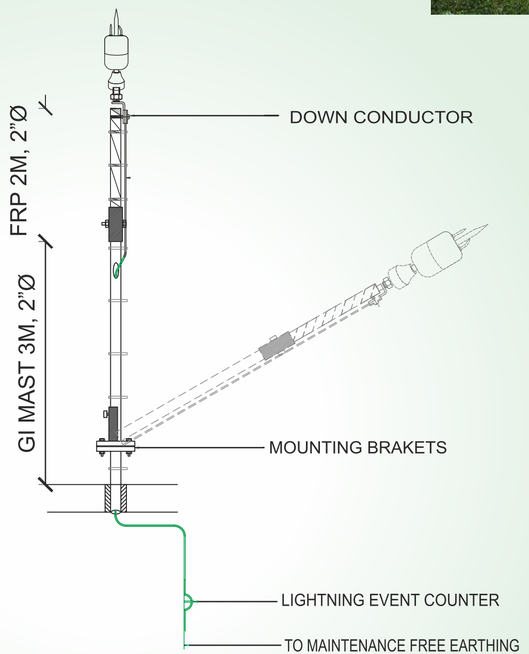
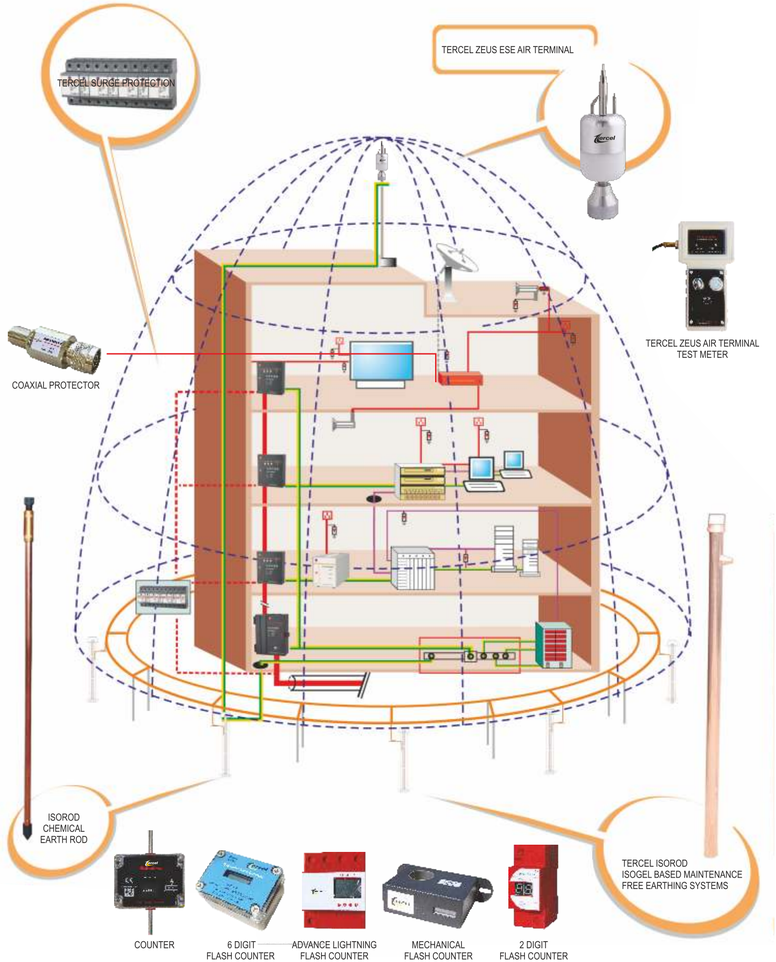
CERTIFICATIONS & APPROVALS



INSTALLATION DRAWING



Tercel International
98, Glengariff Dve, Floreat WA - 6014
Tel.: (08) 9387 6188 Fax : (08) 9387 6588
E-mail : peter@tercel.com.au , info@tercelzeus.com
www.tercel.com.au, www.tercelzeus.com

DISTRIBUTOR

ESE Air Terminal

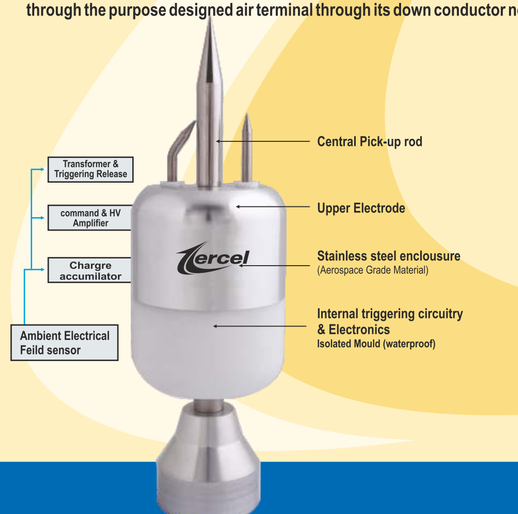
Conforms to NFC17-102 Standards

Turnkey lightning protection systems

Tercel is a recognised leader in Turnkey Lightning Protection systems worldwide. Our area lightning protection systems are designed to provide an efficient and cost effective protection for mission critical applications

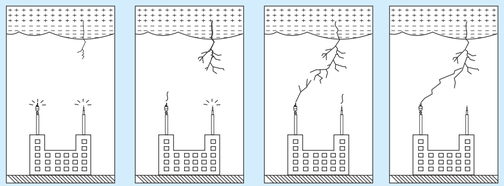
Tercel's controlled streamer ESE lightning conductors are fully autonomous and are in compliance with NFC17-102 standards.

During a storm condition the electrical field intensity in the atmosphere increases rapidly and this sudden change is detected by the sensors fitted to the lower part of the air terminal. This sensors continuously monitor the electrical field as well as store energy from ambient electrical field for the functioning of internal electronics. The information received through the sensors by the electronic triggering circuit inside the housing of the air terminal triggers an ionisation at the upper series of electrodes automatically. This activation of corona is made at the precise time when a downward leader is approaching the ground. This leads to the formation of an upward leader and ensures that the lightning energy is channelled safely down to the low impedance grounding through the purpose designed air terminal through its down conductor network only.



During a lightning activity electrical charges inside the thunderstorm cloud and the concentration of negative charge at the bottom of the cloud creates a giant electric field between the cloud and the ground. The electric field value created depending on the thunderstorm clouds charge concentration values ranging from 5kV/m to 30 kV/m. Due to this giant electric field an opposite charge to this cloud concentration will be developed in the earth surface by corona effect. This corona developed from any prominent object will get attracted towards the downward leader from the cloud concentration. In such conditions air becomes conductive resulting electrical discharges from such clouds. The electric field is constant on a flat surface but will be more intense near sharp points, edges and elevated structures such as trees, buildings, towers etc. For example on the top of a sharp rod the E field reaches 300 times more than on a flat surface.

The concept of an ESE is to trigger an upward streamer earlier than a conventional rod. By controlling the emission of this streamer, Protection area of Tercel Zeus ESE Arrestor is much wider than a conventional rod. The electronic circuit in the Tercel Zeus system is able to detect when the lightning is approaching the ground and at this precise moment it triggers a spark at the tip of the terminal thus involving the emission of an upward streamer which will intercept the lightning. An upward streamer can develop only if its intensity is sufficient. When a lightning is going to occur the intensity of this field becomes about 100 times higher than usual and reaches values around 10kV/m This source of energy is reliable and independent from the rain, the sun or the wind. Tercel Zeus ESE Lightning Conductor Air Terminal uses the ambient electric field as the source energy.

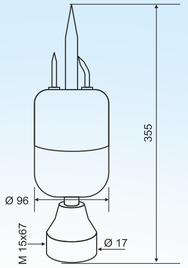


The effectiveness of an E.S.E. lightning conductor is assessed by comparing the upward leader initiation time emitted by the E.S.E. lightning conductor against the upward leader initiation time emitted by a single rod under the same electrical and geometrical conditions during laboratory tests. The advanced triggering time(ΔT) is the average time difference of initiation of the upward streamer between the ESE air terminal and the single rod.

These test are designed to assess the reliabity of an ESE air terminal submitted to repetitive high current shocks. During such tests, the Tercel Zeus ESE air terminals was submitted to several thousand of Amperes and both Negative and Positive current polarities were injected.

Condition and performance of the air terminal is tested BEFORE and AFTER testing and have clearly shown that Tercel Zeus air terminal is NOT AFFECTED by repetitive current shocks of high magnitudes.

Model Number	Tz 20	Tz 40	Tz 50	Tz 63
Current capacity	⩾200KA (10/350μs)			
Capacity against wind speed	⩾40m/s			
Dimension	40cm	39cm	37cm	39cm
Gain in triggering time (ΔT)	20μs	40μs	50μs	60μs
Protection Radius	Calculate using the formula given or select using table 1 to table 4			
WEIGHT	2.5kg	2.6kg	2.9kg	3.1kg
ΔL	20m	40m	50m	60m
Material	Stainless Steel			
Standard	NFC17-102(2011)			



Tz 63

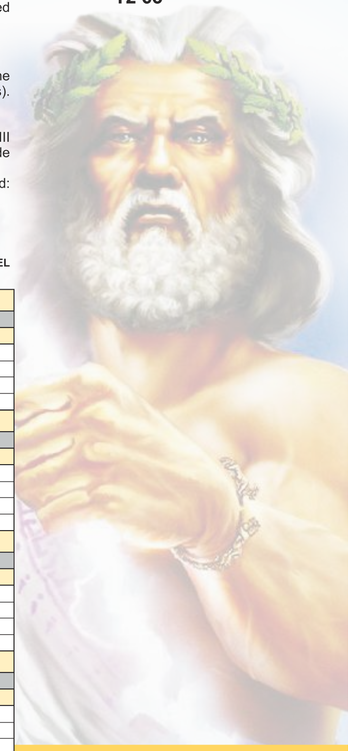
Protection Calculation

The protection area Rp of **Tercel Zeus** lightning conductor is calculated according to French standard NF C17-102

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

Gain in triggering time ΔT of the Chosen **Tercel Zeus,** Which allows the ΔL value to be determined according to the formula ΔL (m) = V(m/_s). ΔT(_s);

D = 20, 30, 45 or 60, depending on the protection level required (I, II, III or IV) on a given site, according to the lightning risk assessment guide (NFC 17-102 appendix B);
h= height of the lightning air terminal above the surface to be protected: (where h <5m, see table below).



PROTECTION RADIUS CALCULATION OF DFFERENT ESE AIR TERMINAL MODEL AS PER NFC 17-102 STANDARDS

Protection Level I, D=20m					
HEIGHT	2	3	4	5	10
MODELS	PROTECTION RADIUS				
Tz 20	15	22	29	37	39
Tz 40	23	35	46	58	59
Tz 50	27	41	55	68	69
Tz 63	31	47	63	79	79
Protection Level II, D=30m					
HEIGHT	2	3	4	5	10
MODELS	PROTECTION RADIUS				
Tz 20	18	27	36	44	46
Tz 40	26	39	52	65	67
Tz 50	30	45	60	76	77
Tz 63	34	52	68	86	88
Protection Level III, D=45m					
HEIGHT	2	3	4	5	10
MODELS	PROTECTION RADIUS				
Tz 20	21	30	41	51	53
Tz 40	30	45	60	75	77
Tz 50	34	52	69	86	88
Tz 63	39	58	78	97	99
Protection Level IV, D=60m					
HEIGHT	2	3	4	5	10
MODELS	PROTECTION RADIUS				
Tz 20	23	35	46	58	61
Tz 40	33	50	67	84	87
Tz 50	38	57	76	95	98
Tz 63	43	64	85	107	109