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Industry fully equipped to meet Domestic Demand arising from Capacity Addition

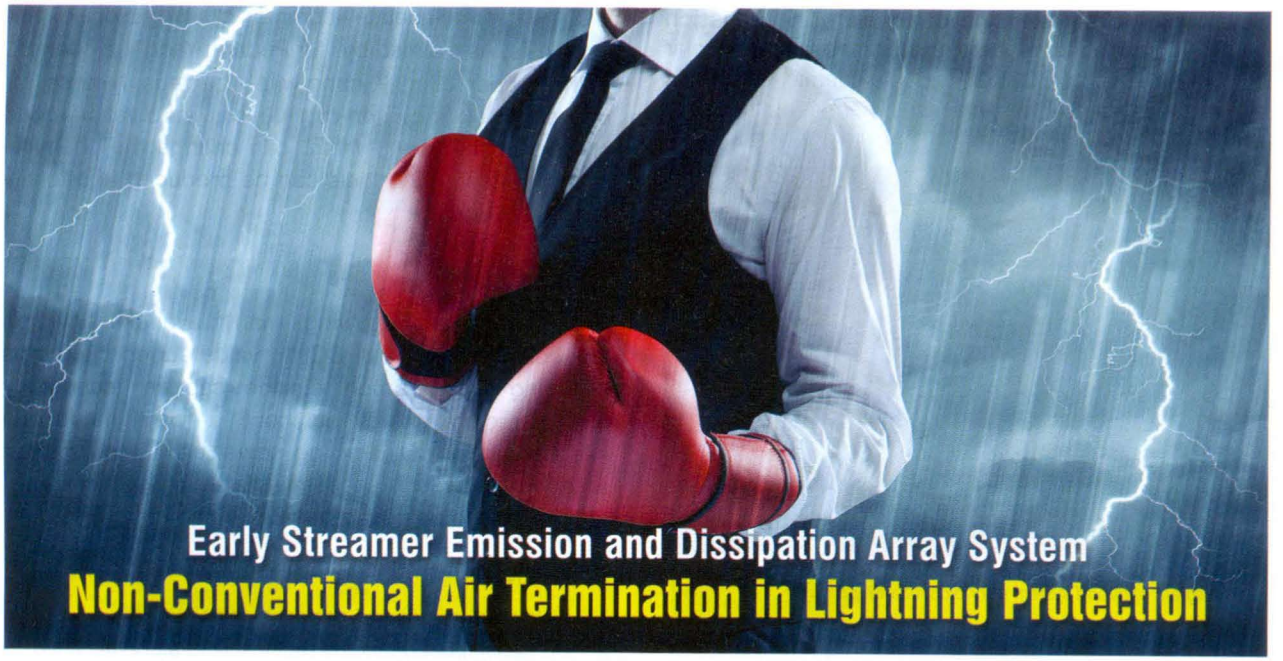
- Exports in power sector growing at 10% CAGR
- Electrical Equipment Grows by 4.25% (2016-17)
- Indian power sector - Investment potential of Rs 15 trillion in next 5 years
- Solar power addition achieved 104% in overall renewable addition
- Imports declining at a rate of 4% in last 5 years

Event
17th African Utility Week

In Depth
Energy Storage in India: A Fast Evolving Landscape

Opinion
Need of Electricity Storage System for Reliable Renewable Energy Integration

SME Talk
Impact of GST on SME



Early Streamer Emission and Dissipation Array System
Non-Conventional Air Termination in Lightning Protection

Air Terminal in an external lightning protection systems can be divided into two categories, namely, conventional and non- conventional. The conventional systems use Franklin rods or mesh. Early Streamer Emission (ESE) and Dissipation Arrays (sometimes called Charge Transfer Systems – DAS / CTS) are the non conventional air terminals.

Many decades of experience shows that Franklin rods or mesh located at critical points on a structure with a proper down conductor and earthing system, the damage due to lightning on the structure could be reduced significantly. To protect electrical and electronic systems with in the structure SPD's are necessary. The system is accepted and appreciated by all national / international standards.

Early Streamer Emission

ESE manufacturers claim that ESE terminals are equipped with discharge triggering device to initiate streamers and increase the probability of connecting to a downward leader. The time advantage realized by the early inception of the connecting leader from an ESE terminal in comparison to a normal Franklin rod would provide a possibility interception at a longer distance in comparison to that from a Franklin rod. Consequently, it is claimed that under similar circumstances an ESE terminal will have a larger protection area than a Franklin rod of similar dimensions.

Experiments and investigations find that these claims are baseless. How ever these rods are accepted in the French standard as an additional standard (in addition to EN 62305)

Practical Issues in India

ESE rods are installed in almost every building in India. Some are made in Europe/China and balance in India. As a proof of reliability ESE manufacturers claim test reports from CPRI. Mistakes done in India are

1. ESE rods are tested with a short current pass of few KA (an iron rod also pass this test). This test report have nothing to do with the principle of ESE
2. ESE rods with one insulated down conductor is used. Even insulated cable through the steel sheet of a PEB building. This is against the French Standard itself
3. Down conductors are installed with number of bends and often through electrical shafts. This create serious threat to electronic installation in the building

NF C 17-102: 2011 (French standard on ESE rods) explain as below

Level of protection I^{+}: The ESE system at level of protection 1 is additionally connected to the metal structure or reinforced bars of the building in addition to the dedicated down conductors included in the ESE system at roof level and ground level. When down conductors are not interconnected at roof level, a ring conductor located above the roof can be used to achieve this requirement..... If there is no natural down conductors or if the above requirement can not be fulfilled, level 1+ cannot be achieved.

Level of protection I^{++}: the roof is protected at I+ with an ESE terminal having radius of protection reduced by 40 %.

The above clause from French standard shows ESE protections is just like doing a conventional Lightning Protection system with an extra ESE rod and down conductor. Even ESE suppliers don't know such points from the ESE standard

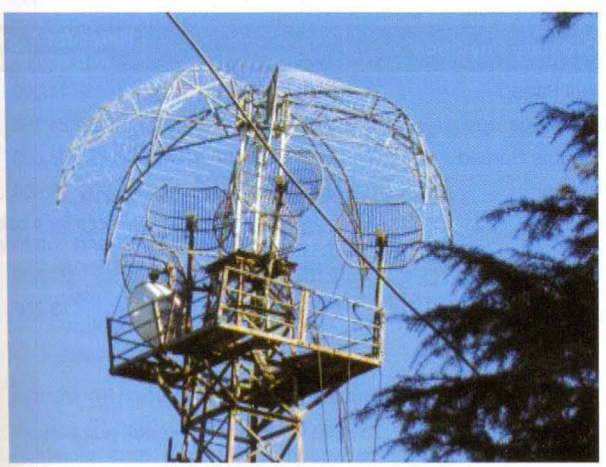
ESE air termination principle do not confirm to IS standards, National electric code, National Building Code as well as CEA safety regulations. As per CEA regulation every building with more than 15 meter height shall be protected as per IS/IEC 62305. In spite of this, large number of industries and commercial buildings use ESE rods (always with one down conductor). Users consider ESE rods as they believe it is the easiest way of doing lightning protection, but are never aware of the dangers behind it. Such installation create serious threat to the structure as well as its contents.

Critical telecom installations in India were using ESE rods a decade back, finding its inefficiency in protection ESE rods were replaced with DAS.

Dissipation Array System or (Charge Transfer System)

The original idea of lightning eliminators or dissipation arrays is to utilize the space charge generated by one or several grounded sharp points to "dissipate" (i.e. neutralize) the charge in thunderclouds and thus prevent lightning strikes to a structure to be protected. The manufacturers of this system claim that the space charge generated by the array will silently discharge the thundercloud.

The idea of DAS means an area with number of DAS systems will never experience a lightning hit. The idea seems to be attractive, but it is the peak of exploitation. Engineering community never accepted DAS.



DAS in a telecom tower

DAS has been installed widely in India especially for critical telecommunication application. After every failure, DAS supplier reply to users that the lightning which created failure is higher than the capacity of that particular model of DAS. Manufacturer recommend to replace the existing DAS with a bigger one at extra cost after every failure.

The Fact

Both ESE and DAS installations in India do not provide any protection to structure, Electronics and Human beings, it also increases the chance of fire inside the building. These devices are widely used due to the attractive features explained in the catalogue.

Insurance companies deny ESE as a protection device and ask users to replace it with conventional system confirming to IS/IEC 62305.

An installation properly designed and installed satisfying Indian standards IS/IEC 62305, IS 3043, IS 732 will protect the installation for years with out maintenance.

National Building code (2015-draft) recommends not to use these non conventional system. Lightning protection as per IS/IEC 62305 is mandatory for buildings more than 15 meter height as per CEA safety regulations (2016-amendment draft). With these code & regulations in place it becomes a legal requirement now to use conventional system and not ESE and DAS.

Courtesy: published research papers of Mr. M.A. Uman and Mr. V. A Rakov & Mr. HARTONO Zainal Abidin

Lightning Protection System
Comparison confirming to IS/IEC 62305 standards and ESE rods

This comparison is made based on the installation practices prevailing in India. NFC 17-102 ESE standard require down conductors and earthing as per IEC 62305 which is not followed in India. (refer French standard NFC17-102:2011 on ESE rods)

Sr. No.	Design Standard	IS/IEC 62305	NFC 17-102: 2011
1	Name usually used	Conventional Lightning Protection	Advanced Lightning protection
2	Protection required against Lightning	ELPS for structure and SPM for contents. All requirements confirmed	Focused only on ESE rod. No protection provided against fire, electronics failure, step potential, touch potential & EMC
3	Acceptance by scientific bodies	Yes. Accepted world wide (including france and spain as main standard)	NO (except french and spain as an additional standard - due to local business conditions)

4	Theory Behind	Faraday Cage	only highlighting the rod
5	Confirmation to IS standard	Yes	NO
6	Testing	IEC 62561 - 1 to 7	Short circuit & surge current from CPRI. Both tests are not related to ESE theory
7	Confirmation to NBC-2016 and CEA regulation	Yes	NO NBC of India - 2016 banned use of ESE
8	Level of protection	Class 1 to 4	Class I^{+}_{++} and I
		Air Termination and Down conductor recommendations specified in IS/IEC 62305	For both classes structural steel as down conductor is mandatory. Additional exposed down conductors in multiple locations are also required (ref 5.2.3.5 of NFC 17-102: 2011). But in India one or two exposed down conductors alone are used

Expected problems of ESE rods

1	Installations in India are not even confirming to French standards - ESE standard recommend to reduce the coverage radius & efficiency of rods to 40 % in high raise buildings, which is not done India
2	No protection provided against fire, electronics failure, step potential, touch potential, EMC. Focused only on ESE air terminal rod
3	Fire and Flash over due to 1 or 2 down conductors. Recommendations as per ESE standards are not followed especially usage of natural down conductors
4	Insurance companies also reject ESE rods as a result number of industries installed conventional LPS at extra cost
5	One world famous ESE manufacturer claims ESE rods as per NF-C standards will not work !!!!!!!!!!!!.

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