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Date: 1st July 2006

Dear Friends, Colleagues and Associates,

**Re: *WARNING! of the ICLP Scientific Committee***

The argument of the effectiveness of Early Streamer Emission (ESE) system and the conventional system had lasted for decades and up to date and there is no firm conclusion.

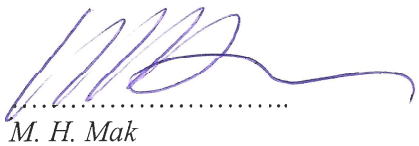
The following papers are the discussion record between Professor Aage E. Pedersen and me. When the whole document is carefully studied we will realize the key point of the argument. I leave individuals to make your own conclusion about the argument.

I have also attached the full version of the Judgment and Court Order issued in Heary Bros. Lightning Protection Co., inc. et al vs. Lightning Protection Institute, East Coast Lightning Equip. Co., et al. (D Ariz Sept. 17, 2005) which can be obtained from www.hearybros.com for further reference.

We still welcome any independent parties to use the Hong Kong platform to carry out lightning protection research.

Do drop a line for further clarification and discussions.

Regards,



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**Title :** **WARNING ! of the ICLP Scientific Committee**

**Date :** 14-09-2005

**Text :**

The Cautionary Message hasn't stopped the sale and promotion of the different types of Early Streamer Emission (ESE) systems. Thus the problem of non-conventional air termination still exists.

Not only Early Streamer Emission (ESE) systems and Ion Plasma Generators (IPG) systems, claimed drastically to enhance lightning reception, but also Charge Transfer System (CTS) and Dissipation Array System (DAS), claimed to prevent lightning to protected structures, are still produced and installed.

These systems are installed in conflict with the requirements of IEC's lightning protection standards and as they are not efficient according to the claims, such systems should be abandoned because they will be dangerous to use.

**In this situation the invited paper presented by Prof. Aa. E. Pedersen during the ICLP'2004 is of central importance and therefore presented below.**

**ESE AND OTHER NON-CONVENTIONAL LP SYSTEMS**

by

AAGE E. PEDERSEN

Honorary Member of the Scientific Committee of ICLP

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**THE TECHNICAL ASPECTS:**

Great efforts have been devoted to improve the efficiency of lightning protection and many possibilities have been suggested over the years.

Radioactive rods have been used for many years but have shown no advantage relative to ordinary lightning rods, and the use of radioactive material for this purpose has now been abandoned in most countries.

Laser-triggered lightning involves an electrically powered, sophisticated and sensitive setup that might prevent its practical use as lightning protection except at very special situations. In addition the method has until now shown difficulties with certainty to ensure subsequent flashes.

Early Streamer Emission System (ESE), attempts to utilize an emission of early discharges (streamers) on special lightning rods, to provoke and trigger an early lightning flash and thus protect the surrounding over a greater area than in the case of ordinary lightning rods. Even though the name Early Streamer Emission indicates, that it is the early onset of streamers on ESE rods relative to the ones on ordinary lightning rods, that is a measure for the advantage, it appears that the advantage actually is determined by the time difference between the instances of the first appearance of any type of discharges on the two types of lightning rods, an interpretation that will favour the rod with the smallest curvature radius on the tip.

Even though the hypothesis seems logical, actual experience in the field has shown that the triggering of a flash is extremely complex and much more complicated than anticipated in

the hypothesis.

An indication of this complexity is apparent in the experience with rocket-triggered lightning. In spite of great effort to trigger the lightning stroke at a suitable instance, a flash often fails to follow regardless of the extreme influence caused in the electric field by the trailing wire from the rocket, and the resulting generation of very long streamers and leaders.

Another experience with formation of long streamers is found under EHV (Extra High Voltages) and UHV (Ultra High Voltages) switching impulse tests where extremely long streamers are experienced often with termination in the blue sky and sometimes terminating on the ground far away from the test object often without causing subsequent flashover.

Therefore, the concept of early streamers is not sufficient and inadequate as a parameter for the determination of any advantage of ESE rods versus ordinary lightning rods.

Moreover, several investigations (for inst. by Z.A.Hartono and by Charles B.More et al) have shown numbers of missinterceptions, and lightning stokes terminating in the close vicinity of ESE rods, and that competition race between ordinary Franklin rods and ESE rods arranged in parallel setups and exposed to natural lightning did not favour the ESE rods as it should be expected according to the claimed properties.

**Creditability of the claimed properties for non-conventional LP devices:**

In the opera "The Elixir of Love" (L'Elisir d'amore) by Gaetano Donizetti, the quack Dulcamara sells medicine at a high prize against all sorts of sufferings including love problems. To make the story short, the medicine appears to work in a peculiar way, mainly because people believe in it.

To avoid that sort of business in real life, laws have been issued against dishonest or fraudulent advertisements requiring that the manufacturers or vendors must be able to prove the advertised properties.

Thus the arguments "I am convinced it works" or "I believe it work" just isn't enough.

In most countries laws concerning Product Responsibility and laws concerning Product Reliability have been issued, but the laws are not always followed.

An advertisement for a known beauty cream promises the user to get 10 years younger skin. If this was true, a warning should be given not to be used by children less than 10!

Because this advertisement is not dangerous, nobody seems to object even though the advertisement violates the laws.

On the other hand, if safety problems are involved there exist tough requirements for the acceptance of products.

As an example, this is the case for the acceptance of new drugs where strict requirements have to be fulfilled and numerous tests conducted before such drugs can be marketed.

As another example, the knowledge of the actual tensile strength for straps and slings are necessary in order to evaluate the load such straps and slings can be used for with a sufficient high safety margin. I think that everyone will agree that it is indispensable to perform actual tensile strength tests, and that it will not be sufficient indirectly to evaluate the tensile strength by means of measurements of other parameters, for inst. the elasticity coefficient.

Therefore, relevant standards are important for components, apparatuses or systems where safety is the issue, or where safety is involved, and moreover, that the standards contain tests' specifications relevant to the circumstances under which the items are going to be used.

Consequently standards, norms and code of practice should comply with at least one of the following requirements:

- Founded on recognized and verified physical theory and models.
- Founded on recognized and verified empirical models and experiences.
- Founded on recognized tradition and practice and experiments from the field

collected over sufficient number of years.

**Question 1: Do the non-conventional lightning protection systems, as safety providing systems, obey the abovementioned requirements for safety?**

**Answer 1: No, none direct measurement of the protection offered has been successfully conducted or sufficient empirical data collected from field tests to convince the international technical and scientific community within this field, nor are the systems founded on any recognized or verified physical theory.**

**Question 2: Does the French ESE standard NF C 17-102 (1995) rest on any of the stated preconditions for safety standards?**

**Answer 2: No, the French ESE standard does not require or specify any direct method to evaluate the efficiency of the protection offered by the non-conventional lightning protection system, leaving the evaluation of the performance alone on the basis of an indirect method, a method that is partly inadequate partly incorrect. The same seems to apply for the other national ESE standards.**

**The French ESE standard and its major deficiencies:**

- The hypothesis for the function of the ESE rod is insufficient and inadequate, and the hypothesis seems to be limited alone to discharges over smaller distances.

- The French standard does neither require nor specify verification tests under natural lightning conditions.

- Only laboratory tests for the verification of the function is specified and required. However, laboratory tests are insufficient and inadequate because it is impossible in any laboratory to simulate natural lightning conditions not least due to the limited space and the vast nonlinear characteristics of the lightning processes.

- Only negative lightning is considered.

- The standard misinterprets the use of the rolling sphere concept.

- The standard seems to cover a wide range of lightning rods with auxiliary stimulation of predischarges on the tip of the rods. However, the standard does not distinguish between the different types, for which reason the standard is lacking necessary specifications versus the different form and principles for the individual device.

- Tests of the electronic components and auxiliary systems for the ESE rods, including the power supply for the ones which need it, to withstand lightning influences and aging are missing. Similarly are tests for evaluating the effect of the external environment missing, for example the effect of contamination for floating electrode systems.

- Requirements and specifications for the recurrent inspections and possibilities for testing of the individual ESE rods, including any necessary auxiliary systems, to verify their original and unchanged properties, are neither required nor specified in the French ESE standard or in its copies in other countries.

**To conclude:**

Even though the hypothesis behind the ESE concept at a first glance might seem rational and likely, it has shown to be partly wrong and in any case insufficient. Moreover, the working group has selected a laboratory test in the standard for the determination of the advantage over ordinary lightning rods, a non-representative test in a non-representative environment, and thus a test that cannot take into account the nonlinearity of the discharge phenomena between laboratory conditions with stroke lengths quoted in meters while lightning discharges are quoted in kilometres.

As done by the working group behind the standard, it is fully legitimate to extrapolate the theories and models for discharges over moderate distances to lightning conditions in spite of the vast nonlinearities of the discharge phenomena. However it is indispensable subsequently to demonstrate and verify that the extrapolation with sufficient accuracy does

work in practice. Unfortunately this has not been done, and it seems to reveal that the working group has suffered the lack of support by scientists with sufficient knowledge concerning physics of lightning.

In addition to the missing requirement in the standard for verification tests under natural lightning condition, the manufacturers have never succeeded in verifying the claimed efficiencies for any of the different ESE types (in a way that satisfies the international technical and scientific community within this field) in spite of the repeated promises over more than 15 years.

Similarly, it has neither been possible for independent scientists nor organizations to confirm the claimed advantages. On the other hand several investigations have indicated that the ESE devices offer no advantages relative to ordinary lightning rods.

**To avoid similar problems and unfortunate errors and mistakes in the future, any standard ought to be exposed to international criticisms, especially when the standard concerns safety matters and devices used for safety purposes.**

**THE MORAL ASPECTS:**

In spite of the lack of verification of the claimed properties, and in spite of the repeated criticisms from the scientific community, the ESE manufacturers have continued for more than 15 years to sell and promote ESE systems with promises of the non-proven efficiencies compared to ordinary lightning rods.

Instead of providing the repeatedly promised proofs for their claims, they have intimidated persons, organizations, companies and standard-organizations with threats of legal actions when they have pointed out, that the claimed advantages are un-proven and when they have warned against the use according to the claims until proven. Some manufacturers and vendors have even got so far as actually suing some of them.

Even the French Engineering Society (SEE) has been threatened with legal action by the French manufacturer.

**THE LEGAL ASPECT:**

- In the light of the current laws, what sort of responsibility does the manufacturers of ESE devices carry for their products?

- Is it possible for the manufacturers and the vendors to liberate themselves for any responsibility by referring to the French ESE standard or its copies in other countries, and leave the responsibility to the national standard organizations?

- Do the working groups behind the standards (and its single members) carry any legal responsibility?

- Who is in the last end responsible for the standard in France (and in other nations for the copies of the French ESE standard)?

- What sort of responsibility does scientists and scientific organizations like ICLP carry to enlighten similar problems like the ones in the ESE standards with protection systems that might be dangerous to use?

**WHAT TO DO ABOUT THE SITUATION?**

- How can the relevant authorities in France (and other nations) be approached to inform them about the problem with the ESE devices, and what can we do to help them solve the problems with the ESE standards?

- Do we need some sort of Codex for standardization, production, verification and commerce of safety devices like lightning protection devices, or should we merely leave it up to the market?

view all

**MAK MING HUNG'S 1st Email**

**On**

**14th January 2006**

**To**

**AAGE E. PEDERSEN**

-----Oprindelig meddelelse-----
**Fra:** Michelle [mailto:lps@lpsystem.com]
**Sendt:** 14. januar 2006 04:23
**Til:** aa-e-p@get2net.dk; fioramonti@aei.it
**Cc:** Zaini Awang; Zainal Abidin; Yusoff; Yoong Fon Yen; Wong Ling Haw; Wong Chen Keong; Victor; Ting Kuok Ing; Tay Gee Yong; Tay; Tar Singh; Tan Boon Ann; Steve; Sarsi; Prem Kumar; Paul Chen; Ooi; Ong Tai Chew; Muhamad Fuad; Mohd Aman; Micheal Chan; Mahendran; Looi Hip Peu; Ling Liong Lai; Liew Ah Choy; Lawrence Th'ng; K. K. Lau; Jimmy Liew; J. Azhari; Ibak; Hong Ah Fook; Hamdan; Franco; Francis Law, ESET; Foong Kok Thong; Foo Kiat Ming; Fong Chin On; Edavath Raghavan Nair; E.F International S.A.; Chow Chew Hoong; Chong King Liong; Baljit Singh; Anthony Ngu; Ang Boh Kheng; Ahmad Zainal; Abu Hashim
**Emne:** WARNING! of the ICLP Scientific Committee

Dear Sir,

Your paper entitled “ESE AND OTHER NON-CONVENTIONAL LP SYSTEM” (as per attached) has been widely circulated here in Malaysia. It is a very informative paper. Being a professional engineer and a supplier for a proprietary ESE product for the past 30 years, I strongly feel that it is unjust to conclude that ESE systems are not efficient and dangerous to use.

The following are Quotes extracted from your paper and our Comments with regards to your quotes.

**THE TECHNICAL ASPECTS:**

Quote:

Radioactive rods have been used for many years but have shown no advantage relative to ordinary lightning rods, and the use of radioactive material for this purpose has now been abandoned in most countries.

Comment:

Radioactive rods have been abandoned not because it shows no advantage relative to ordinary rods but because of environmental concern as it contains Radioactive substance which are currently banned in most countries after the nuclear disaster in Russia. In actual fact, radioactive rods are part of ESE rods too. The only difference is that Radioactive substance were used to launch the upstreamers while majority of today’s ESE rods rely on the electric field to trigger the launch of upstreamers.

Quote:

Early Streamer Emission System (ESE), attempts to utilize an emission of early discharges (streamers) on special lightning rods, to provoke and trigger an early lightning flash and thus protect the surrounding over a greater area than in the case of ordinary lightning rods. Even though the name Early Streamer Emission indicates, that it is the early onset of streamers on ESE rods relative to the ones on ordinary lightning rods, that is a measure for the advantage, it appears that the advantage actually is determined by the time difference between the instances

of the first appearance of any type of discharges on the two types of lightning rods, an interpretation that will favour the rod with the smallest curvature radius on the tip.

Comment:

I think there has been some confusion between the upstreamer and other discharges. Sharp tip does not mean that it can launch up streamer earlier. Sometimes the Corona Effect of a sharp tip forms space charge to prevent the launch of up streamer. A good ESE rod will launch upstreamers only at suitable time to prevent space charge problem.

Quote:

Even though the hypothesis seems logical, actual experience in the field has shown that the triggering of a flash is extremely complex and much more complicated than anticipated in the hypothesis.

Comment:

If TRIGGERING of a flash is extremely complex and much more complicated than anticipated, then is it correct to state the following?

Quote:

Therefore, the concept of early streamers is not sufficient and inadequate as a parameter for the determination of any advantage of ESE rods versus ordinary lightning rods.

Comment:

If the ESE rods do not have early streamer emission then the number of ESE rods required to protect a building will have to be the same as ordinary lightning rods i.e. one ESE rod every 10 to 15 meters apart. However there are many buildings that are equipped with only 1 ESE rod or even 1 ESE rod for several buildings.

In Hong Kong a total of more than 1000 ESE rods of our proprietary product; E.F. have been installed since 1975. Out of which 450 systems were monitored through our maintenance scheme as attached in Appendix A “E.F. in Hong Kong”. Some of these systems were equipped with lightning counters and the total number of lightning discharges onto the system till date is 1266. The very rare cases where lightning did bypass the ESE rod and caused very minimal and minor damages are also listed in Appendix A. Based on this data, if ESE rod does not have any advantage versus ordinary lightning rods, then wouldn’t most of the building suffer damages to the façade especially at the corners since the ESE rods are mostly placed at the centre of the buildings?

Quote:

“Moreover, several investigations (for inst. by Z.A.Hartono and by Charles B.More et al) have shown numbers of missinterceptions, and lightning stokes terminating in the close vicinity of ESE

rods, and that competition race between ordinary Franklin rods and ESE rods arranged in parallel setups and exposed to natural lightning did not favour the ESE rods as it should be expected according to the claimed properties."

Comment:

Does this mean that there are NO missinterceptions by the ordinary rods? Could we have more information as to the parallel setups? Were these setups done in actual Field Application where both ESE and ordinary Franklin rods were in placed? How many systems were installed? What was the coverage area?

The Lightning Flash Density in Kuala Lumpur is more than 25 per kilometer square per year [(1)]. We have been supplying E.F. since 1995 in Malaysia and till date we have supplied more than 250 systems with 75 systems located in Kuala Lumpur. If there are missinterceptions and ESE rods do not have the claimed properties, then wouldn't all these buildings have damages to the façade especially when located in an extremely high lightning flash density area? For your further information, 45 of these buildings located in Kuala Lumpur are higher than 60 meters while more than 95% of the systems installed in Hong Kong are higher than 60 meters. Our data clearly proves the effectiveness of ESE rods for buildings of any height and open areas. This would also mean that our proprietary product is above IEC 1024 and NF C 17-102 since the standards are meant for buildings less than 60 meters only.

**Creditability**

New concepts are always turned down by authorities who are always cautious. It normally takes a long time; sometimes many decades to centuries before a new theory or concept is being approved depending on the evolution of the item especially any theory that cannot be simulated or tested in laboratory. For example, when car was first invented, people said that a car can never run faster than a horse but today we cannot live without a car. When Kolaj Kopenik first presented the theory that the earth moves around the sun no one believed him and he was even persecuted. After he died many years, then only people accepted his theory. As another example, when wireless communication was first invented, a British general said that wire is the only way for telecommunication. Today, a mobile telephone has become a basic necessity. Even until today, some people still disagree with Darwin's evolution.

Quote:

Therefore, relevant standards are important for components, apparatuses or systems where safety is the issue, or where safety is involved, and moreover, that the standards contain tests' specifications relevant to the circumstances under which the items are going to be used.

Comment:

I agree that standards are important especially where safety is the issue. However in lightning protection can any standard i.e. IEC 1024, NF C 17-102, BS 6651, etc. provide 100% guarantee? If lightning cannot be simulated in the laboratory and triggering lightning is very complex, then can any standard prevent or withstand Mother Nature?

In today's world, a day can hardly go by without the use of electronics. However electronics are very susceptible to damaged by effects of a lightning strike. BS 6651:1992 Appendix C. "General advise on protection of electronic equipment within or on structures against lightning" provided a guidance on this topic. However when this standard was revised in 1999, it still remained in Appendix C. When will be the next issue and will it be part of the standard or remain as Appendix C? This clearly shows that for a standard to recognize new components, apparatuses or systems, it takes a very long time and until it has been fully adopted, end-users continue suffer damages and losses.

Quote:

Consequently standards, norms and code of practice should comply with at least one of the following requirements:

- Founded on recognized and verified physical theory and models.

- Founded on recognized and verified empirical models and experiences.

- Founded on recognized tradition and practice and experiments from the field collected over sufficient number of years.

Comment:

Because of the unpredictable nature and incomplete understanding of the mechanism of lightning, the condition of today's lightning research has not changed much from Benjamin Franklin's time where there were no verified physical theory and models. All suggested modeling of today are still full of assumptions which means it is not much different from Benjamin Franklin – No Model.

Recognized tradition? In the 1990s, French scientists made "life-size" experiments on lightning during several years in Saint Privat d'Allier. Subsequently in 1995, the NFC 17-102 standard was issued.

Practise and experiments from the field? Improvement of ionising initiation used in ESE devices is also inspired by what has always been observed in the nature such as lightning strikes favoured by hot ionised air coming out of chimneys, emission coming out of radioactive rocks, discharges between objects with a floating potential, etc.

Quote:

However, laboratory tests are insufficient and inadequate because it is impossible in any laboratory to simulate natural lightning conditions not least due to the limited space and the vast nonlinear characteristics of the lightning processes.

Comment:

Therefore I agree that at this moment we should only consider Field Application instead of laboratory test because lightning is unpredictable and a natural event. However my interpretation of Field Application is to collect data containing the following parameters namely:

a) The total number S lightning strike intercepted by ESE systems.
b) The number N of ESE system observed/monitored
c) Monitoring period in Year
d) Number F lightning bypass the ESE system
e) Number K bypass due to malfunction of ESE system such as poor up keep and incomplete system or misapplication
f) The area covered by the above monitored ESE systems.
g) Exact location of installation for third party to verify the data easier.

With the above parameter, we can calculate the failure rate R of ESE system in respect to number of ESE system by:

$$R = \frac{F - K}{N}$$

And the failure rate P of ESE system in respect to number of lightning strike by:

$$P = \frac{F - K}{S}$$

In order to minimize the random effect, the field statistic should fulfill the following criteria:

1) The number of ESE systems to be observed must not be in tens but in hundreds to thousands ….the more the better.
2) The area covered must in the hundreds to thousands $KM^2$ …the more the better.
3) The monitoring period must be more than 10 years ….the longer the better.

We know that there are not many sites in the world that can fulfill the above conditions, except Hong Kong. Nearly 70% of Hong Kong buildings are using ESE systems which have been installed since the 1970s [(2)]. Appendix A shows that we have been monitoring the systems and have records of more than 20 years. It clearly proves the effectiveness of E.F. i.e a type of ESE rod. A similar study of another brand of ESE system also indicates the effectiveness of ESE system [(3)]. The failure rate R is less than 1% per year and the main reason of failure was weak lightning discharge. If you or any other international independent research body is interested to have a further study or research through the Hong Kong platform, please contact us and we are willing to render our assistance.

**To conclude:**

Quote:

Similarly, it has neither been possible for independent scientists nor organizations to confirm the claimed advantages. On the other hand several investigations have indicated that the ESE devices offer no advantages relative to ordinary lightning rods.

Comment:

If ESE rods are ineffective but there are so many buildings around the world that utilizes it, then would it mean that these buildings are not protected from lightning? Malaysia has the second highest lightning incidences in the world and there are more than 1,000 installations of ESE rods by many different manufacturers in the entire country. If your findings are true, then at least 50% of these buildings would have damages to the façade. We cannot provide a very detailed data as our Hong Kong counterpart can, but what we can share is the following:

1. Empire Tower in Kuala Lumpur installed E.F. on 27th Dec. 2001 has recorded 2 lightning discharges as of 11th March 2002.
2. Berjaya Times Square in Kuala Lumpur installed E.F. on 11th Sept. 2002 has recorded lightning discharges as of 24th Nov. 2004 as follows:

| | *Total Lightning Discharge* |
|---|---|
| *High Zone Tower A* | **15** |
| *High Zone Tower B* | **18** |
| *Low Zone Tower B* | **4** |
| *Low Zone Tower A* | **0** |

3. Federal Hill Housing installed E.F. on 2nd Dec. 2004 has recorded 3 lightning discharges as of 2nd Dec. 2005

**THE MORAL ASPECTS:**

Quote:

In spite of the lack of verification of the claimed properties, and in spite of the repeated criticisms from the scientific community, the ESE manufacturers have continued for more than 15 years to sell and promote ESE systems with promises of the non-proven efficiencies compared to ordinary lightning rods.

Comment:

What other proof is better than seeing and experiencing it yourself? ESE rods have been used for 30 years. If it is not proven in Field Application, this system would have been abandoned just like the others. Engineers continue to use ESE rods and ESE market continue to expand instead of shrinking not because person, organizations, companies, etc. are being intimidated but merely because they are confident in ESE rods. The number of systems installed without having much problems arising after thunderstorm has proved the effectiveness of ESE rods. Lightning is totally unpredictable but with its wide used in tropical country it is only a matter of collecting the data from Field Application as a prove.

**THE LEGAL ASPECT:**

What sort of responsibility do standard bodies carry? In MS IEC 61024-1-2:2001 it states in the National Foreward "Compliance with a Malaysia Standard does not of itself confer immunity from legal obligations." In IEC 61024-1-2 clause 1.1 states "This part of IEC 61024 serves as a guide and is applicable to the design and installation of LPS for common structures up to 60 m high". Hence if an engineer were to do any design for lightning protection does the standard enlighten their responsibility? What more when the building is more than 60m high?

I hope to hear from you soon on the issues I raised because I strongly feel that it is unjust to ban ESE system unless you can provide reference data. We also hope that you will consider withdrawing your paper until a thorough study on ESE performance in Field Application is carried out.

*References:*
*(1) MS 1460:1999 pg. 3*
(2) *A Preliminary Survey of Lightning Protection Practices in Hong Kong Buildings. By Y DU, PhD CENG MIEE and K M LAU, B Eng (Hons) Msc. Published in The Hong Kong Institution of Engineers Transactions. Volume 10. Number 3.*
(3) *A Statistical Analysis of the Performance on the System 3000 in Hong Kong. By Dr. F. D'Alessandro, A. App. Sc., B. Ed,. PhD., MIREE, MIE Aust.*

*Regards,*
***Mak Ming Hung***
*Managing Director*
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**ATTACHMENT - APPENDIX A**

**E.F. IN HONG KONG**

# E.F. In Hong Kong

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 1) | Grand Stanford Harbour View, T.S.T. | 12-May-81 | N/A |
| 2) | Hang Seng School of Commerce, Shatin | 10-Jul-82 | N/A |
| 3) | A.F.I. Cold Stroage, Fo Tan | 14-Jul-81 | N/A |
| 5) | The H.K. Polytechnic University Phase IIA | 31-Dec-81 | N/A |
| 6) | The Clearwater Bay Golf & Country Club | 25-Sep-82 | N/A |
| ★7) | H.K. Sports Institute, Shatin | 15-May-82 | N/A |
| 8) | Beverly Villas, La Salle Road | 14-Apr-81 | N/A |
| 9) | Bella Vista, A Kung Wan | 30-Jul-81 | N/A |
| 10) | Euro Trade Centre | 13-Aug-81 | N/A |
| 11) | Belgian Bank Tower | 3-Sep-82 | N/A |
| 13) | Ruttonjee House, Central | 2-Jul-83 | N/A |
| 14) | City On Shatin - (Blk 12) | 22-Jan-82 | N/A |
| | " - (Blk 18) | 22-Aug-81 | N/A |
| | " - (Blk 25) | | N/A |
| | " - (Blk 27) | | N/A |
| | " - (Blk 32) | 25-Feb-84 | N/A |
| | " - (Blk 35) | 12-May-93 | N/A |
| | " - (Blk 41) | 8-May-85 | N/A |
| | " - (Blk 45) | 8-May-85 | N/A |
| 15) | Happy Villa, Kau Wah Keng | 15-Apr-82 | N/A |
| 16) | Fairmont House, Cotton Tree Drive | 5-Mar-83 | N/A |
| 17) | Greenview Court, Tsuen Wan | 12-Nov-82 | N/A |
| 18) | St. John's Bldg., Garden Road | 21-Jul-83 | N/A |
| 19) | Great Eagle Centre, Wanchai | 7-Sep-83 | N/A |
| 20) | Harbour Centre | 7-Sep-83 | N/A |
| 21) | Silvercord, T.S.T. | 5-Oct-83 | N/A |
| 22) | Kong Nam Ind. Bldg., Tsuen Wan | 25-Mar-82 | N/A |
| 23) | Yan Oi Tong, Tuen Mun | 20-Oct-84 | N/A |
| 24) | Shatin Heights, Tai Po Road | 3-Dec-83 | N/A |
| 25) | Nan Fung Centre, Tsuen Wan | 2-Apr-83 | N/A |
| 26) | Far East Finance Centre | 18-Apr-83 | N/A |
| 28) | Witty Commercial Bldg., Mongkok | 15-Jun-01 | N/A |
| 29) | Island Centre, Causeway Bay | 8-Dec-84 | N/A |
| 30) | CDW Bldg., Tsuen Wan | 22-Jan-83 | NIL |
| 31) | Provident Centre, Wharf Rd. | 23-May-83 | N/A |
| 33) | Rosary Villas, Shatin | 12-Dec-84 | N/A |
| 34) | Wheelock House | 7-Nov-84 | N/A |
| 35) | Tsing Yi Garden, Tsing Yi Island | 26-Dec-86 | N/A |
| 36) | Wing Hing Court, Tung Lo Wan Road | 3-Sep-83 | N/A |
| 37) | Connaught Garden, Connaught Road West | 2-Nov-85 | N/A |
| 38) | Tai Po Centre, Tai Po - (Blk 3) | 9-May-87 | N/A |
| | " - (Blk 5) | | N/A |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| | Tai Po Centre, Tai Po - (Blk 8) | | N/A |
| | " - (Blk 14) | | N/A |
| | " - (Blk 21) | | N/A |
| 39) | Jubilee Garden, Shatin | 18-May-87 | N/A |
| 40) | Tuen Mun Technical Institute, Tuen Mun | 30-Sep-86 | N/A |
| 41) | Shatin Permanent Bus Depot | 31-May-88 | NIL |
| 42) | Vigor Industrial Building, Tsing Yi Island | 26-Jul-86 | N/A |
| 43) | Kenyon Court, Bonham Road | 2-Nov-85 | N/A |
| 44) | La Hacienda, 31/33 Mt. Kellett Road | 31-Jan-85 | N/A |
| 45) | Manor Centre, Un Chau Street | 5-Dec-86 | N/A |
| 47) | 46 Magazine Gap Road | 19-Nov-82 | N/A |
| 48) | Grand Court, Homantin Hill Road | 15-Apr-82 | N/A |
| 49) | Harbour Heights, North Point | 7-Sep-88 | NIL |
| 51) | Regal Kaitak Hotel | 16-Mar-82 | N/A |
| 52) | Tregunter Tower, Tregunter Path | 17-Jul-81 | N/A |
| 53) | RBL 1025, Beelleview Place, Repulse Bay | 5-Oct-88 | N/A |
| 56) | Manderly Garden, Deep Water Bay Road | 28-Nov-85 | N/A |
| ★57) | Wah Yuen Chuen, Ha Kwai Chung | 17-Oct-85 | N/A |
| 58) | Flamingo Garden, Fei Ngo Shan Road - (Lot 830 House A3) | 15-Jul-86 | N/A |
| | " - (Lot 831 Blk B) | 15-May-82 | N/A |
| | " - (Lot 832 Blk C,D) | 14-Apr-82 | N/A |
| ★59) | Kowloon Park Indoor Games Hall, T.S.T. | | NIL |
| 60) | AIL 438, Aberdeen | 16-Apr | 4 |
| 62) | Air Freight Forwarding Centre, CLK - (No.1) | 7-May-98 | 3 |
| | " - (No.2) | | 17 |
| | " - (No.3) | | 4 |
| | " - (No.4) | | 6 |
| | " - (No.5) | | 5 |
| 64) | The Albany, Albany Road | 22-Apr-89 | 8 |
| 66) | Guangdong Water Building, Austin Road | 4-Oct-95 | 6 |
| 68) | Bamboo Vista, 5 Middle Gap Road | 16-Apr-88 | 11 |
| 69) | Bank of China, Computer Centre, Shatin | 27-Mar-87 | NIL |
| 72) | Bay View Garden, Wing Ting Road | 11-Oct-89 | 2 |
| 77) | Belvedere Garden, Tsuen Wan - (Tower 1) | 1-May-91 | NIL |
| | " - (Tower 6) | | NIL |
| 78) | Birchwood Place, No. 94 Macdonnell Road | 20-Dec-89 | 9 |
| 84) | No. 1-3 Breezy Path | 14-Mar-96 | N/A |
| 86) | The Brentwood, No. 11 Repulse Bay Road | 18-Feb-89 | N/A |
| 88) | Caltex Oil Station, Hung Shui Kiu | 18-Dec-89 | 2 |
| ▲ 103) | Choi Wan Estate - 白鳳樓 | 2-Jan-98 | 5 |
| | " - 長波樓 | | 2 |
| | " - 時宇樓 | | 2 |
| | " - 飛鳳樓 | | 4 |
| | " - 星辰樓 | | 5 |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| | Choi Wan Estate - 繡文樓 | | 2 |
| | " - 白虹樓 | | 2 |
| | " - 觀日樓 | | 8 |
| 107) | City Plaza 3 & 4, Tai Koo Shing - (3) | 7-Mar-92 | N/A |
| | " - (4) | | N/A |
| 108) | Classical Garden, Tai Po - (Phase 2) | 8-Feb-95 | 3 |
| | " - (Phase 3) | 10-Jul-96 | 2 |
| 109) | Concord Bldg., Soy Street | | N/A |
| 111) | 160-161 Connaught Road West | 2-Mar-98 | 19 |
| 112) | 181-183 Connaught Road West | 7-Aug-95 | 3 |
| 113) | Container Terminal TR3, Kwai Chung | 14-Jan-93 | NIL |
| 115) | Cornwall House, Quarry Bay | 13-Aug-90 | N/A |
| 118) | 51-55 Deep Water Bay Road - (House 2) | 27-Nov-96 | 8 |
| | " - (House 6) | | 8 |
| | " - (House 12) | | 4 |
| 120) | DCH Bldg., 25 Westlands Road - (East) | 3-Mar-98 | N/A |
| | " - (West) | | N/A |
| 121) | DCH Motor Services Centre at Ap Lei Chau | 22-Jan-94 | N/A |
| 122) | DCH Service Centre, Kowloon Bay | 10-Aug-93 | N/A |
| 128) | Dynamic Cargo Centre, Tsuen Wan | 12-Nov-91 | N/A |
| 129) | East Point Centre, Causeway Bay | 27-Jul-93 | NIL |
| 131) | Eden Garden, Fanling - (Tower 3) | 27-Sep-92 | 2 |
| | " - (Tower 12) | | 3 |
| | " - (Tower 16) | | 2 |
| 135) | Energy Ind. Centre, Yuen Long | 30-Mar-93 | 5 |
| 138) | Euston Court, 6 Park Road | 2-Mar-89 | N/A |
| 139) | Ever Gain Building, Tsuen Wan | 3-Apr-95 | 2 |
| 140) | Ever Gain Centre, Shatin | 23-Mar-93 | 9 |
| 141) | Evergain Plaza - (Blk A) | 4-Aug-98 | 2 |
| | - (Blk B) | | 2 |
| 142) | Evergo House, Wanchai | 20-Jul-96 | NIL |
| 145) | Festival Walk, Tat Chee Avenue - (T1) | 13-Nov-98 | 4 |
| | " - (T2) | | 4 |
| | " - (T3) | | 4 |
| | " - (T4) | | 4 |
| | " - (T5) | | 4 |
| | " - (T6) | | 4 |
| | " - (T7) | | 4 |
| | " - (T8) | | 4 |
| 147) | Flora Garden, 7 Chun Fai Road | 19-Jan-88 | N/A |
| 149) | Fortress Metro Tower, Fortress Hill Station | 20-Jun-87 | N/A |
| 152) | Hang Seng Bank New Headquarters Building, Central | 13-Apr-91 | N/A |
| 155) | F.S.S.T.L. 148 | 2-Aug-95 | 6 |
| 158) | 10-12 Fung Fai Terrace, Happy Valley | 14-Oct-92 | N/A |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 161) | Garden Vista, Shatin | 1-Aug-89 | 9 |
| 163) | 92-108 Gloucester Road | 9-Apr-91 | 4 |
| 164) | 175-180 Gloucester Road - (East) | 1-Jul-94 | 4 |
| | " - (West) | | 6 |
| 165) | Fanling Sheung Shui Town Lot No. 109 | 5-Jun-91 | N/A |
| 166) | Lot No. 1104 in D.D. 215, Sai Kung | 16-Dec-92 | 7 |
| 168) | Golden Villa, Yau Kom Tau | 10-Jun-95 | 19 |
| 173) | Grandview Garden, Aberdeen | | N/A |
| 174) | Greenfield Garden, Tsing Yi - (Blk 3) | 17-Jul-90 | N/A |
| | " - (Blk 7) | | N/A |
| | " - (Blk 11) | | N/A |
| 176) | Greenland Garden, Tuen Mun | 31-Jul-89 | NIL |
| ★182) | Ho Koon Nature Education Cum Astronomical Centre, Tso Kung Tam, Tsuen | 3-Mar-95 | 4 |
| 184) | Aegean Villa, Sai Kung | 29-Mar-95 | 5 |
| 185) | Hang Seng Bank, Tsuen Wan | 29-Jun-98 | 4 |
| 187) | Yuen Long Landmark, Yuen Long | 2-Jul-90 | N/A |
| 188) | 2 Hatton Road & 17 Kotewall Road | 21-Dec-93 | N/A |
| 190) | Hilltop Gardens, Fung Shing Street | 5-Oct-90 | N/A |
| 193) | No. 32-36 Hollywood Road | 5-May-95 | NIL |
| ★197) | The HK Institute of Education, Tai Po - (HA) | 27-Apr-99 | 3 |
| | " - (HB) | | 2 |
| | " - (E) | | 3 |
| | " - (MID) | | 3 |
| | " - (N) | | 2 |
| | " - (HC) | | 2 |
| | " - (S) | | 2 |
| | " - (Admin) | | 6 |
| | " - (Senior Staff Quarter) | | 1 |
| 198) | Hong Kong International School, Tai Tam | 9-Nov-88 | NIL |
| 199) | Hong Kong Parkview, Tai Tam - (Tower 1) | | N/A |
| | " - (Tower 5) | | N/A |
| | " - (Tower 8) | | N/A |
| | " - (Tower 13) | | N/A |
| | " - (Tower 18) | | N/A |
| 200) | Hongkong Telecom Sha Lo Wan Station | 17-Mar-99 | 2 |
| 203) | Hong Tak Garden, Tuen Mun | 10-May-88 | 1 |
| 204) | Honour Industrial Centre, Chai Wan | 24-Mar-90 | 3 |
| 205) | House A2, 18 Tao Fung Shan Rd, Shatin | 23-Mar-83 | N/A |
| 207) | Houston Industrial Building, Tsuen Wan | 10-Nov-89 | NIL |
| 208) | Coronet Court, Yuen Long | 10-Oct-95 | 6 |
| 213) | International Trade Centre, Tsuen Wan | 19-May-95 | 3 |
| 216) | Nos. 136-142 Java Road, North Point | 8-Apr-00 | 8 |
| 220) | T.S.T Kai Fong Welfare Centre | 28-Jun-89 | N/A |
| 227) | Kennedy Terrace 10-18 Kennedy Road | 22-Apr-89 | N/A |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 228) | King's Park Villa, K.I.L. 11002 King's Park | 27-Jun-97 | 8 |
| 229) | 338-348 & 366 King's Road - (East) | 16-May-97 | 2 |
| | " - (West) | | 2 |
| 232) | KMB Bus Depot 80 & 81- (80H) | 20-Oct-95 | 3 |
| | " - (80L) | | 7 |
| | " - (81) | | 5 |
| 233) | Kodak House, North Point | 13-Oct-93 | 9 |
| 235) | K.T.I.L. 654 | 29-Oct-99 | 5 |
| 236) | Kui Fat Building, Yuen Long | 26-Sep-90 | 6 |
| ★238) | Kwai Shing West Estate - (Blk 1) | 23-Jun-98 | 1 |
| | " - (Blk 3) | | 7 |
| | " - (Blk 5) | | 5 |
| | " - (Blk 6-E) | | 2 |
| | " - (Blk 6-W) | | 3 |
| | " - (Blk 7) | | 6 |
| | " - (Blk 8) | | 7 |
| | " - (Blk 9) | | 5 |
| | " - (Blk 10) | | 3 |
| 245) | DD130 Lam Tei - (Blk 1) | 13-May-98 | 3 |
| | " - (Blk 5) | | 3 |
| | " - (Blk 7) | | 5 |
| | " - (Blk 9) | | 8 |
| 246) | Landmark North | 23-Jan-95 | 11 |
| 250) | Chinachem Leighton Centre, 25-31 Leighton Road - (East) | 5-May-95 | 4 |
| | " - (West) | | 5 |
| 253) | Lippo Centre, Cotton Tree Drive | 27-Nov-87 | N/A |
| 260) | Macau Ferry Terminal, Sheung Wan - (China Merchants Tower) | | N/A |
| | " - (West Tower) | | N/A |
| 261) | 11 Magazine Gap Road | 5-Dec-95 | 12 |
| 264) | Manhattan Heights, Kennedy Town | 28-Dec-99 | 4 |
| 265) | Man Yee Building | 28-Sep-99 | 2 |
| 271) | No. 2-6 Mau Lam Street | 2-Apr-97 | |
| 272) | 15-23 Mau Tan Street, Yuen Long | 25-Jan-94 | 8 |
| 273) | Mega Trade Centre, Tsuen Wan | 15-Sep-94 | 6 |
| 275) | Metroplaza, Kwai Chung - (Tower 1) | 16-May-91 | NIL |
| | " - (Tower 2) | | 27 |
| 283) | New Jade Garden, Chai Wan - Block 2 | 14-Jul-88 | N/A |
| | " - Block 6 | | N/A |
| 284) | New Kowloon Plaza, Beach Street | 25-Apr-90 | 3 |
| 288) | New Town Plaza, Shatin - Block 2 | 14-Sep-91 | NIL |
| | " - Block 4 | | NIL |
| 289) | New Town Tower, Shatin | 29-Nov-88 | 1 |
| 296) | Oddssey Centre, Shatin | 1-Mar-89 | N/A |
| 298) | Oxford House, Quarry Bay | 16-Jul-99 | 7 |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 300) | Pacific Place, Admiralty - Tower A | 29-May-91 | 7 |
| | " - Tower B | | 4 |
| | " - Office Tower | | 1 |
| | " - Hotel Tower | | 7 |
| 301) | Pacific View, 34 Tai Tam Road | 23-Jan-91 | 8 |
| 303) | Paliburg Plaza, 68 Yee Wo Street | 7-Jul-89 | 3 |
| 304) | Palm Springs, Wo Shang Wai, Yuen Long - Club House | 13-Oct-93 | N/A |
| | " - Phase 2 Club House | 4-Dec-95 | 2 |
| | " - LPG | 28-Oct-93 | 9 |
| 306) | ParkLane Centre, Tuen Mun | 28-Apr-95 | NIL |
| 307) | No. 25 Peak Road | 29-Dec-93 | N/A |
| 309) | Peaks Ville, 74 Robinson Road | 8-Feb-93 | N/A |
| 310) | Pearl Oriental Centre, 189 Gloucester Road | 14-Nov-95 | 2 |
| 313) | Pennington St. & Keswick St., Causeway Bay | 7-May-94 | NIL |
| 314) | No. 1-7 Perfection Place | 16-Nov-90 | 7 |
| 315) | Peridot Court, Tuen Mun - (Blk 3) | 2-May-91 | N/A |
| | " - (Blk 8) | | N/A |
| 317) | Pierhead Garden, Tuen Mun - (Tower 2) | 26-Oct-88 | 4 |
| | " - (Tower 5) | | NIL |
| 318) | Pine Villa, Shatin - (Blk E) | | N/A |
| | - (Blk H) | | N/A |
| 319) | Plover Cove Garden, Tai Po | 20-Apr-90 | N/A |
| 321) | Po Garden, 9 Brewin Path | 13-Nov-90 | N/A |
| ★322) | Pok Oi Hospital, Care and Attention Home | 18-Apr-96 | 8 |
| 323) | Port Centre, Aberdeen | 26-Sep-89 | 1 |
| 326) | Q.B.I.L. No. 8s.D., Quarry Bay | 9-Sep-96 | N/A |
| 327) | Queen's Garden, 9 Old Peak Road - (Blk A) | 17-May-91 | 10 |
| | " - (Blk C) | | 8 |
| 329) | 82-92 Queen's Road West | 27-Jul-97 | 2 |
| 330) | 506-516 Queen's Road West | 11-Nov-98 | 2 |
| 331) | Rainbow Garden, Tuen Mun | 14-Apr-89 | 5 |
| 332) | Ravana Garden, Shatin - (Blk 1) | 29-Apr-88 | 1 |
| | " - (Blk 3) | | 3 |
| 333) | Red Hill Road, R.B.L. 777 - (Blk 3) | 8-Jul-96 | 5 |
| | " - (Blk 10) | | 2 |
| | " - (Blk 18) | | 4 |
| | Red bHill Road, R.B.L. 777 - (Swimming Pool) | | 14 |
| 342) | Riviera Garden, Tsuen Wan - (Tower 3) | 2-May-88 | N/A |
| | " - (Tower 5) | | N/A |
| | " - (Tower 8) | | N/A |
| | " - (Tower 12) | | N/A |
| | " - (Tower 18) | 7-Dec-89 | 11 |
| 343) | Riviera Lodge, Tai Po | 31-Dec-94 | N/A |
| 344) | Robinson Heights, 8 Robinson Road | 17-Jan-90 | N/A |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 345) | Regal Crest, 9 Robinson Road | 10-Dec-91 | 1 |
| 346) | Royal Ascot, Shatin - (Blk 1) | 25-Aug-95 | 13 |
| | " - (Blk 5) | | 13 |
| | " - (Blk 7) | | 12 |
| | " - (Blk 8) | 10-Mar-97 | 13 |
| | " - (Blk 11) | | 12 |
| 347) | The Royal Court, Kennedy Road | 15-Nov-89 | N/A |
| 348) | The Hong Kong Jockey Club - (Blk 13) | 14-Jan-87 | N/A |
| | " - (Blk 14) | | N/A |
| | " - (Blk 17) | | N/A |
| | " - (Blk 18) | | N/A |
| 349) | Royal Park Hotel, Shatin | 11-Aug-89 | N/A |
| ★351) | Sam Yuk Secondary School, Tai Po - (Higher) | 22-Aug-89 | N/A |
| | " - (Lower) | | N/A |
| 354) | Sceneway Garden, Lam Tin Station - (Blk 1) | 3-Aug-92 | N/A |
| | " - (Blk 3) | | N/A |
| | " - (Blk 5) | | N/A |
| | " - (Blk 7) | | N/A |
| | " - (Blk 10) | | N/A |
| | " - (Blk 13) | | N/A |
| | " - (Blk 16) | | N/A |
| 356) | Scenic Heights, 58A-B Conduit Road | 7-Dec-87 | NIL |
| 357) | Sea Crest Villa, 18 Castle Peak Road - (Ph. 2) | 17-Oct-94 | 17 |
| | " - (Ph. 3) | 16-Jan-95 | 6 |
| 358) | Sea View Garden, Tuen Mun | 9-Feb-87 | N/A |
| 361) | No. 26 & 28 Severn Road, The Peak | 6-Dec-96 | 20 |
| 363) | Sheeny Terrace, Tsuen King Circuit | 23-Jan-90 | N/A |
| 364) | Soka Gakkai Int'l of H.K. Cultural & Recreational Centre, Tai Po - (SSR) | 5-Apr-96 | NIL |
| | " - (VP) | | NIL |
| | " - (MB) | | NIL |
| 372) | Singapore Int'l School | 7-Jul-95 | 2 |
| 374) | Siu Lek Yuen 36A - (Tower 2) | 5-Jan-00 | 2 |
| | " - (Tower 7) | | 2 |
| 377) | Springfield Garden, Shatin | 8-Nov-05 | NIL |
| 379) | S.T.T.L. 17 R.P., 11-19 Wo Shing Street | 1-Apr-96 | 11 |
| 380) | The Tolo Place, Ma On Shan - (Blk 1-2) | 13-Jul-96 | N/A |
| | " - (Blk 3) | | N/A |
| | " - (Blk 4) | | N/A |
| 381) | S.T.T.L. 420, Shatin | 24-Sep-97 | 5 |
| 383) | No. 44 Stubbs Road | 23-Dec-95 | 3 |
| 384) | Sun Kwong Centre, Lung Cheung Road | | N/A |
| ▲ 385) | Sun Tin Wai Estate, Shatin - 豐圍樓 | 12-Aug-98 | 4 |
| | " - 盛圍樓 | | 5 |
| | " - 富圍樓 | | 4 |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| | Sun Tin Wai Estate, Shatin - 裕圍樓 | | 4 |
| | " - 福圍樓 | | 5 |
| | " - 榮圍樓 | | 7 |
| | " - 欣圍樓 | | 5 |
| 386) | Sunwise Ind. Building, Tsuen Wan | 25-Sep-91 | NIL |
| 387) | Sun Yuen Long Plaza, Yuen Long - (Blk 2) | 16-Jul-93 | 9 |
| | " - (Blk 5) | | 19 |
| 389) | Taclon Industries Ltd., Tai Po Ind. Est. | 14-Mar-90 | N/A |
| 391) | Fortune Garden, Tai Po - (Entry) | 13-Dec-90 | NIL |
| | " - (Swimming Pool) | | N/A |
| | " - (After C12) | | N/A |
| | " - (After D9) | | NIL |
| 392) | T.P.T.L. 118, Lo Ping Road, Tai Po - (Tower 15) | 17-Jun-00 | NIL |
| | " - (Tower 43) | | NIL |
| | " - (Tower 61) | | NIL |
| | " - (Tower 93) | | NIL |
| 395) | T.P.T.L. 145 (D.D. 167) Cheung Muk Tau, Ma On Shan - (Blk 5) | 11-Mar-99 | 11 |
| | " -(Blk 11) | | 10 |
| | " -(Blk 16) | | 9 |
| 400) | Teikyo University H.K. Kindergarten | 15-Apr-92 | NIL |
| 401) | Times Square, Causeway Bay - (Tower A) | 26-Feb-93 | 9 |
| | " - (Tower B) | | 11 |
| 402) | T.M.T.L. 211, Tuen Mun | 11-Mar-99 | 5 |
| 404) | No. 99 Tai Ho Road, Tsuen Wan | 20-Nov-98 | 2 |
| 414) | Tseung Kwan O Lot 17 - (Blk 1) | 13-Feb-98 | 13 |
| | " - (Blk 3) | | 11 |
| | " - (Blk 6) | | 10 |
| | " - (Blk 8) | | 8 |
| 417) | Tseung Kwan O Lot 40 - (Blk 1) | 5-Sep-99 | 5 |
| | " - (Blk 3) | | 7 |
| ★419) | Tsing Ma Visitor's View Center | 28-May-98 | 3 |
| 427) | Tsuen King Garden, Tsuen Wan - (Blk 2) | 18-May-88 | N/A |
| | " - (Blk 5) | | N/A |
| | " - (Bk 10) | | N/A |
| 428) | Tsuen Tak Garden, Tsuen Wan | | N/A |
| 429) | Tsuen Wan Town Plaza, Tsuen Wan | 13-Jan-90 | 9 |
| 430) | Tuen Mun Town Plaza, Tuen Mun - (Blk 4) | | N/A |
| | " - (Blk 7) | | N/A |
| 436) | T.V.B., T.V. City, Clear Water Bay - (Pro. Block) | 13-May-93 | 11 |
| | " - (TV Bldg) | 22-Apr-95 | 10 |
| 440) | Vicwood Plaza, Connaught Road | 3-Oct-87 | N/A |
| 441) | Villa Athena, Ma On Shan - (Blk 2) | 5-Nov-94 | 3 |
| | " - (Blk 5) | | 7 |
| | " - (Blk 9) | | 5 |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 446) | West Tram Depot | 17-Mar-89 | N/A |
| 447) | Wah Po Building, Kennedy Town | 14-Apr-97 | NIL |
| 455) | Yuen Long Plaza, Yuen Long | 19-Sep-89 | N/A |
| 460) | World Tech Centre, 95 How Ming Street | 5-Jan-93 | 4 |
| 461) | 63-73 Wo Yip Ho Road, Kwai Chung | 14-Jun-96 | 4 |
| 467) | Belcher Gardens, Pok Fu Lam Road - (Tower 2) | 26-Sep-01 | N/A |
| | " - (Tower 3) | | 2 |
| | " - (Tower 6) | | 3 |
| 480) | Island Resort, C.W.I.L. 152, Siu Sai Wan - (Tower 1) | 8-May-01 | 4 |
| | " - (Tower 5) | | 6 |
| | " - (Tower 8) | | 3 |
| 481) | Y.I., No. 8B & 10 Tai Hang Road | 28-Apr-01 | 3 |
| 484) | Kingsford Garden, H.K. | 14-Feb-01 | 5 |
| 485) | 71 Mount Kellett Road, The Peak | 14-Feb-03 | 6 |
| 486) | 41-47 Waterloo Road & Kwong Wa Street | 6-Aug-01 | 3 |
| 493) | TPTL 161, Sam Mun Tsai Road, Tai Po - (House 2) | 1jun02 | 3 |
| | " - (House 76) | | 3 |
| | TPTL 161, Sam Mun Tsai Road, Tai Po - (House 108) | | 3 |
| | " - (House 138) | | 3 |
| | " - (House 190) | | 2 |
| 494) | Sham Tseng C401/C701 - (Tower 6) | 11-Mar-02 | 5 |
| | " - (Tower 8) | | 7 |
| | " - (Podium) | | 2 |
| 496) | New TV City at Tseung Kwan O - (Microwave Tower) | 25-Jan-02 | 6 |
| | " - (Drama Studio) | 21-Mar-02 | 4 |
| | " - (Live Studio) | 26-Mar-02 | 6 |
| | " - (Workshop) | 3-Sep-02 | 2 |
| | " - (Outdoor Shooting) | 23-Oct-02 | 6 |
| | " - (Live Studio Block) | 23-Oct-02 | 2 |
| | " - (News/Carpark) | 4-Jun-02 | 4 |
| 497) | Warwick House, TaiKoo Place | 4-Feb-02 | 2 |
| 498) | Somerset House, TaiKoo Place | 4-Feb-02 | 2 |
| 500) | I.I. 8882 Leighton Hill & GIC Area - (Blk 2) | 24-Jan-02 | 4 |
| | " - (Blk 5) | | 2 |
| | " - (Blk 8) | | 5 |
| | " - (GIC) | | 13 |
| 501) | Ma Wan Island (Phase 1 & 2) - (Blk 2) | | 2 |
| | " - (Blk 5) | 12-Oct-02 | 3 |
| | " - (Blk 8) | 12-Oct-02 | 3 |
| | " - (Blk 11) | 12-Oct-02 | 3 |
| | " - (Blk 15) | 3-May-02 | 3 |
| | " - (Blk 17) | 12-Oct-02 | 3 |
| | " - (Club House) | 5-Oct-02 | 3 |
| 502) | No. 1 Ho Man Tin Hill Road | 29-Apr-02 | 2 |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 509) | Shangri-La Hotel, T.S.T. | 3-Sep-01 | 4 |
| 510) | New KMB Bus Depot at West Kowloon Reclamation - ( No. 1) | 3-Jun-02 | 2 |
| | " - ( No. 2) | | 2 |
| | " - ( No. 3) | | NIL |
| | " - ( No. 4) | | 5 |
| 512) | Hunghom Commercial Centre | 23-May-94 | N/A |
| 513) | Garden Terrace, 8 Old Peak Road | 10-Dec-93 | 4 |
| 514) | Fung House, Connaught Road | 6-Jan-98 | N/A |
| 520) | Sham Tseng, Commercial Block | 7-Nov-01 | N/A |
| 521) | Water Sports Centre and RCP, CUHK - (WSC) | 3-Sep-02 | NIL |
| | " - (RCP) | | NIL |
| 525) | STTL 461 Ma On Shan - (Terminal A) | 29-May-02 | N/A |
| | ' - (Terminal B) | | N/A |
| 526) | Lot 269 in DD390 Castle Peak Rd., Sham Tseng | 16-Jan-03 | 4 |
| 528) | KIL 11127 at 201 Tai Kok Tsui Road - (Ph.1 Tower 1) | 4-Dec-03 | 2 |
| | " - (Ph.2 Tower 3) | 2-Sep-03 | 3 |
| | " - (Ph.2 Tower 8) | 2-Jun-03 | 3 |
| | " - (Ph.2 Tower 10) | 4-Dec-03 | 3 |
| 531) | Asian House, 1 Hennessy Road | 24-May-02 | N/A |
| 532) | TMTL 374, Area 55A, So Kwun Wat - (Tower 1) | 17-Sep-02 | 2 |
| | " - (Tower 2) | | 2 |
| | " - (Tower 3) | | 2 |
| | " - (Tower 5) | | 3 |
| | " - (Tower 6) | | NIL |
| | " - (Tower 7) | | 4 |
| | " - (Tower 8) | | 2 |
| 539) | Tradeport Logistics Centre, Chek Lap Kok - (No. 1) | 20-Nov-02 | 2 |
| | " - (No. 2) | | 2 |
| 542) | 沙田公立學校 | | |
| 543) | Cambridge House, 979 King's Road | 10-Mar-03 | 6 |
| 547) | Ap Lei Chau I.L. 128 at Ap Lei Chau Drive | 11-Sep-03 | 7 |
| 548) | Cameron House, 40 Magazine Gap Road | 14-Aug-04 | N/A |
| 550) | Estoril Court, 55 Garden Road | 1-Mar-91 | N/A |
| 551) | DVOR/DME Station in Tung Lung Island | 3-Feb-99 | 4 |
| 552) | Southeast Ind. Bldg., Tsuen Wan | 25-Oct-97 | N/A |
| 553) | Koway Court, 111 Chai Wan Rd. | 28-Nov-96 | N/A |
| 554) | Citicorp Centre, 18 Whitfield Rd. | 8-Mar-93 | 4 |
| 555) | The H.K. Academy for Performing Arts | 21-Jan-99 | N/A |
| 556) | Bus Depot on TMTL 82 | 22-Jan-99 | 2 |
| 557) | China Resources Building | 30-Oct-95 | N/A |
| 558) | Sunny Villa, Yau Kom Tau | 14-Jan-92 | N/A |
| 559) | Inter-continental Plaza | 26-Nov-98 | N/A |
| 563) | 62B Robinson Road | 6-Nov-99 | N/A |
| 564) | Greig Road, Taikoo V | 27-May-03 | 6 |

| No. | Location | Installation Date | Total Lightning Discharge |
|---|---|---|---|
| 567) | The Clearwater Bay Golf Club House | 18-Jan-03 | 3 |
| 570) | Hang Shing Building, Yaumatei | 18-Jun-03 | NIL |
| 575) | Hong Kong Oxygen, Tai Po | 29-Apr-03 | 4 |
| 576) | Grand Promenade, Sai Wan Ho - Tower 1 | | |
| 582) | Lot No. 4767 in DD104 Yuen Long - (House 7) | 7-Aug-03 | 4 |
| | " - (House 28) | | 5 |
| 584) | Three Pacific Place, 1 Queen's Road East | 15-May-04 | 2 |
| 589) | 26 Belcher's Street, Kennedy Town | 24-Apr-04 | 5 |
| 591) | K.T.I.L. 750, Kwun Tong | 10-Feb-04 | |
| 595) | Hoi Luen Ind. Centre, Kwun Tong | 7-Apr-04 | N/A |
| 609) | No.53 Stubbs Road | 15-Sep-04 | 2 |
| 613) | Block 1, Illumination Terrace | 21-Oct-04 | 4 |

Total Lightning Discharge = Total lightning discharge intercepted from date of installation till

NIL = No Counter

★ ASD Project

▲ Housing Authority Project

[1] Counter replaced on 23/5/2005

[2] Counter replaced on 4/12/2003

# E.F. "Failure Cases" in Hong Kong

| Job Ref# | Location | Incident Block No. | Report Date | Reason |
|---|---|---|---|---|
| 77) | Belvedere Garden, Tsuen Wan | Tower 6 | 23-Jun-03 | Low Intensity lightning |
| 288) | New Town Plaza Phase 3, Shatin | Block 5 | 3-Aug-02 | Low Intensity lightning |
| 374) | The Castello, Siu Lek Yuen 36A | Block 1 | 4-Jun-05 | Low Intensity lightning |
| 582) | Metro Harbourview, Tai kok Tsui Road | Tower 1 | 19-Oct-02<br>16-Aug-03 | Low Intensity lightning<br>Refer to EF's Letter |
| 548) | Cameron House, 40 Magazine Gap Road | | 7-Aug-04<br>12-Aug-04 | Terminal damaged before the incident, first installation in 1984 |
| 558) | Sunny Villa, Yau Kom Tau | Block 2 | 21-Jul-05 | Low Intensity lightning |
| 576) | Grand Promenade, Sai Wan Ho | Tower 1 | 27-Jun-05 | Low Intensity lightning |
| 582) | Greenery Gardens, Yuen Long | House 10<br>House 15 & 16 | 8-May-05 | Low Intensity lightning |

## ***Summary***

1 The total installation in Hong Kong is more than 1000 systems. The list is less than half of the total installation.

2 The total lightning interception should be more that the grand total of 1266 because quite a number of intallations are without counters.

3 The failure rate in respect to total number of lightning interception is 8/1266 = 0.63%

4 The failure rate in respect to inspected installation is 8/450 = 1.7%. It should be noted that the failure report will be received even if the installation is not in the maintenance scheme. Therefore we can asume there is no failure for the installation not included in the above list. Hence the actual failure rate should be les than 0.63% and 1.7%.

5 The acceptable failure risk is 7% (93% protection level) in the design stage.

**AAGE E. PEDERSEN'S 1st Email Reply**

**On**

**23rd February 2006**

**To**

**MAK MING HUNG**

**From:** Aage Pedersen
**To:** Michelle

**Cc:** Kithil, Rich ; Evans Frank ; Hartono, Z.A. ; Morgan, Jennifer ; Mousa, Abdul ; Moore, Charles B ; Rison, William ; Sherlock John ; Montandon, E. ; Rachidi Farahd ; Bouquegneau, Christian ; Cooray, Vernon ; Flisowsk Zdobyslaw ; Mazzetti Carlo ; Abu Hashim ; Ahmad Zainal ; Ang Boh Kheng ; Anthony Ngu ; Baljit Singh ; Chong King Liong ; Chow Chew Hoong ; E.F International S.A. ; Edavath Raghavan Nair ; Fong Chin On ; Foo Kiat Ming ; Foong Kok Thong ; Francis Law, ESET ; Franco ; Hamdan ; Hong Ah Fook ; Ibak ; J. Azhari ; Jimmy Liew ; K. K. Lau ; Lawrence Th'ng ; Liew Ah Choy ; Ling Liong Lai ; Looi Hip Peu ; Mahendran ; Micheal Chan ; Mohd Aman ; Muhamad Fuad ; Ong Tai Chew ; Ooi ; Paul Chen ; Prem Kumar ; Sarsi ; Steve ; Tan Boon Ann ; Tar Singh ; Tay ; Tay Gee Yong ; Ting Kuok Ing ; Victor ; Wong Chen Keong ; Wong Ling Haw ; Yoong Fon Yen ; Yusoff ; Zainal Abidin ; Zaini Awang

**Sent:** Thursday, February 23, 2006 12:17 AM

**Subject:** SV: WARNING! of the ICLP Scientific Committee

2006.02.22

Dear Mr. Mak Ming Hung,

I have tried in the following sections to answer the major questions raised in your mail of January 14. 2006.

I think you are right that radioactive rods (in most countries) were banned due to health problems associated with the radioactive substances.

However, as I have stated in my lecture, the radioactive rods have shown not to provide any higher reception efficiencies than ordinary lightning rods. And thus the manufacturer's claims of superior efficiency (versus the simple lightning rod) have been wrong all along. For further details I would like to refer you to the literature and the numerous papers and reports existing.

In order to get a product that could substitute the radioactive rods and retain a considerable market (and I guess a lucrative one) the ESE rods were developed based on a hypothesis of functions similarly to the triggered gabs utilized for inst. in impulse generators. However, the field distribution for such gabs is relatively uniform and the gab distances short contrary to lightning with extreme non-uniform field distributions and discharge lengths quoted in kilometers.

In spite hereof, the ESE manufacturers started to advertise and sell the ESE devices before they had provided proofs and verifications under real lightning conditions of the advantage claimed, alone based on laboratory experiments and only under negative impulse voltages. Unfortunately, subsequent efforts to provide the necessary verifications have failed. Similarly, it has been impossible

in controlled tests for any independent parties or scientists to prove or confirm the advertised enhanced efficiencies of ESE rods.

The idea of the generation of “up-streamers” (or whatever you name it) has been repeated over and again in spite of the criticism received. When the criterion was criticized for being only loosely defined (and in addition insufficient), the idea was supplemented with the requirement that the “up-streamer” should be launched “at the right moment” (whatever that means, and how that might be achieved and verified).

Even though the formation of streamers on the lightning rods is a necessary requirement, it is not a sufficient condition to ensure the triggering of a down coming lightning flash.

Furthermore, the experience from exposed lightning protection systems under actual lightning conditions, and theoretical investigations, has shown that the attraction efficiency is practically the same for ESE lightning rods and ordinary lightning rods.

In this connection I will again draw you attention to the very interesting investigation of lightning rods under natural lightning conditions that has illustrated this fact. As mentioned in the lecture, the investigation was carried out by Professors C. B. Moore and W. Rison from New Mexico Institute of Mining and Technology. If you haven’t already read about the results, I think you should take a closer look into it.

A longterm test was initiated, as a competition test between a mixed group of similarly erected ordinary lightning rods and ESE rods, where the rods under the same conditions were exposed to natural lightning. As a surprise all flashes terminated on the ordinary lightning rods and not on the ESE rods.

The most astonishing result, however, was that the ordinary rods at all were hit, because all the ordinary rods should have been fully protected by the ESE rods if the claimed properties of the ESE rods were true. Thus, this simple test demonstrates that the claimed increase in efficiency of the ESE, estimated by means of laboratory tests, is incorrect and wrong, and that the difference, for practical purposes, between the efficiencies of ordinary lightning rods and ESE can be considered equal.

Moreover, investigations in practice of miss-interceptions of flashes to ESE protected constructions and buildings (not least performed in your own country), have also shown the lack of correspondence between the results obtained in nature and the expected results based on the efficiency claimed by the manufacturers.

Also theoretical investigations (as mentioned before) have shown that the there will be only very small differences in the attraction efficiency between ESE and ordinary lightning rods. For further information see the appropriate literature.

Consequently it will be dangerous to install ESE rods according to the claimed efficiency, and this is the reason why ICLP have found it necessary to issue a warning in order to protect the costumers and authorities that can't be expected to have the necessary knowledge of lightning and lightning protection.

This is also the reason why the international standard organization IEC, the European standard organization CENELEC, and a long row of national lightning protection standards like the American Lightning Protection Standard under NFPA, the Australia and New Zeeland lightning protection standards have abstained from covering ESE devices in their standards even though several attempts have been made by the proponents of the ESE concept.

Unfortunately, the existing national French ESE standard NF C 17-102 (and the copies hereof in a few countries) rest on a number of misconceptions of the physics of lightning phenomena resulting in a completely wrong estimation of the efficiency on the basis of laboratory tests. In addition it lacks relevant test specification for qualification tests under natural lightning conditions and checking possibilities for control of the devices during the recurrent inspection of the protection system. Thus, it is a standard that never should have been issued.

For this reason the French standard (and its copies) will have to be withdrawn, and it seems that the major problem left is to minimize the associated pain that this will cause.

Finally, for your information, the lack of verified properties for ESE devices has also been recognized and confirmed in a recent court case, where a manufacturer and a vendors of ESE devices have been sentenced to obey very severe restrictions as specified in the attached INJUNCTION from the US District Court of Arizona.

In order for a new lightning protection method or system to be recognized it is a prerequisite that they have been scrutinized as outlined, and that it must pass all the previously mentioned tests and evaluations. Unfortunately, and so far, none of the ESE systems have passed these preliminary tests and evaluations, and in addition the claimed efficiencies have been proven wrong in independent tests as previous stated. Therefore, the systems should not be used according to the claimed and wrong properties.

If a protection system, on the contrary, has passed the preliminary scrutiny, the final and ultimate test of the function of any lightning protection system, as you rightly state, is the results achieved under actual lightning condition.

However, it is more difficult to perform a meaningful statistical evaluation than people normally realize, and if the investigation should be finished within an acceptable number of years, it will require a great number of installations.

As you know, several lightning incidents on unprotected structures and miss-interceptions on protected structure only will give rise to minor and unnoticed damages. Therefore the damage rate alone can not be taken as a measure of the reception efficiency.

A realistic statistical evaluation of the lightning protection under natural lightning condition will at least require:

- that the systems are instrumented with instruments of known and sufficient recording accuracy,
- that the lightning incidents similarly are monitored with sufficient accuracy, and that it will be possible to monitor the position of the flashes to the lightning protection system as well as the miss-interceptions and the associated damages for both protected and non-protected structure,
- that it will be possible to monitor the lightning activity sufficiently accurate in order to be able to compare the results from different buildings and different systems relative to their exposure of lightning with all its great variations.

These requirements are very difficult to fulfill, therefore most of the reported results of such field data analysis will be so inaccurate and uncertain, that the results can not be use to prove anything.

In the warning given by ICLP concerning non-conventional and non-verified systems, not only Early Streamer Emission (ESE) systems has been mentioned, but also the Ion Plasma Generators (IPG) systems, claimed drastically to enhance lightning reception, and the Charge Transfer System (CTS) and Dissipation Array System (DAS), claimed to prevent lightning to protected structures. In addition and for the same reason the warning should maybe also have included the use of the non-verified Collective Volume Method (CVM) and the use of coax cables for down conductors.

Finally, it is interesting that you, as a defense for the ESE rods, refer to Mikolaj Kopernik (or Nicolaus Copernicus in the Latinized version) and that his hypothesis was first recognized many years after his dead. As a matter of fact, the “Copernican system” immediately appealed to a large number of independent and openminded astronomers and mathematicians. On the contrary the opposition against the hypothesis rested on common and religious beliefs and not on science or logical reasons. The theory won because the opponents were unable to provide solid evidence to reject the hypothesis and that the hypothesis

on the contrary was recognized due to the overwhelming agreement with the results of objective observations.

If you compare the situation concerning Copernicus with the ESE situation, the belief that the sun was rotating around the earth as center is similar to the belief that the ESE (on the basis of the results of limited and not relevant laboratory experiments) can be extrapolated to lightning conditions. In both cases, the hypothesis of the sun rotating around the earth, and the hypothesis concerning the ESE has been proven incorrect and wrong. Therefore, I think that your example actually illustrate the opposite of what you have tried to convey.

A recent example illustrating the problems concerning acceptance and refutation of ideas and hypotheses is the situation about the so-called “cold fusion”.

The publication of the tests behind the hypothesis was printed in one of the leading scientific periodicals and the results were so convincing that nearly unlimited assets for further research within the field were provided, and many scientists changed their minds concerning the acceptance of this fantastical possibility of a break-true in a practical future utilization of fusion energy.

The hypothesis, unfortunately, turned out to be wrong. None of the independent scientific groups succeeded in getting the same results as at the original experiments, and finally it was discovered that the original test-setup had been contaminated by an external source causing the wrong interpretation of the test-results.

For further information concerning the necessary requirement for verifications of hypotheses and theories, I have attached an invited lecture from the ICLP conference in Poland 2002.

As a consequence of your comments and questions, and the answers as outlined above, it is obvious that warnings concerning the use of non verified systems are apt and therefore should not be withdrawn from ICLP’s homepage. If my lecture shows to be more difficult to be understood than anticipated, it might be considered to revise or substitute the text in order to make it more understandable also for non-specialists, but this will be up to the Executive Board and the Scientific Committee of ICLP to decide.

I hope that this has answered the main comments and questions you have put forward in your e-mail of January 14th.

Sincerely yours

Aage E. Pedersen

Attachments:

Injunction and Order from US District Court of Arizona.
**No. CIV 96-2796 PHX/ROX concerning false advertisement of ESE devices.**

Invited Lecture ICLP Conference 2002, Krakow, Poland.
**Science, Technology and Standardization in Lightning Protection, ICLP 2002, Poland.**

**Home office:**

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**ATTACHMENT -**

**INJUNCTION AND ORDER FROM U.S. DISTRICT COURT OF ARIZONA**

**IN THE UNITED STATES DISTRICT COURT**
**FOR THE DISTRICT OF ARIZONA**

| | | |
|---|---|---|
| Heary Bros. Lightning Protection Co., Inc. et al.,<br><br>Plaintiffs,<br><br>vs.<br><br>National Fire Protection Association, Inc.;, et al.,<br><br>Defendants. | ) | No. CIV 96-2796 PHX/ROS<br><br>**INJUNCTION AND ORDER RE: HEARY BROS. LIGHTNING PROTECTION, INC; LIGHTNING PREVENTOR OF AMERICA, INC; AND NATIONAL LIGHTNING PROTECTION CORP.** |

**WHEREAS,** East Coast Lightning Equipment, Inc. has brought a counterclaim action against Heary Bros. Lightning Protection, Inc., Lightning Preventor of America, Inc., and National Lightning Protection Corporation (hereinafter, "Plaintiffs") alleging that Plaintiffs have engaged in false advertising in violation of Section 43(a) of the Lanham Act, 15 U.S.C. §1125(a); and

**WHEREAS, THE COURT**, having considered the matter, and after oral argument on May 2, 2003, entered a written Order dated October 23, 2003, determining that East Coast Lightning Equipment, Inc. has established by unrefuted evidence that the tests on which Plaintiffs base their advertising claims are not sufficiently reliable to establish that Plaintiffs' air terminal products provide an enhanced zone of protection within a specific, measurable radius and protection against lightning strikes in open spaces; and

**WHEREAS,** the Court, having therefore determined that Plaintiffs' advertising claims regarding the range of protection provided by their air terminal products and the claims of protection from lightning in outdoor settings are "literally false" under Section 43(a) of the Lanham Act, 15 U.S.C. §1125(a);

**THEREFORE, IT IS ORDERED THAT** an injunction shall issue enjoining and restraining the Plaintiffs, their successors, officers, agents, employees, dealers, distributors, and attorneys and on all persons, partnerships or corporations in present or future active concert or participation with the Plaintiffs or any other person, partnership or corporation acting on behalf of the Plaintiffs, from advertising, whether explicitly or implicitly, that any or all Plaintiffs sell a lightning protection air terminal or similar product that has been proven to significantly extend the maximum range of protection against lightning damage beyond that afforded by NFPA 780 requirements.

For purposes of this Order and Injunction, the term "advertising" shall encompass oral and written statements made in the context of commercial advertisement or promotion of Plaintiffs' air terminal products and systems utilizing Plaintiffs' air terminal products, for the purpose of influencing even a single potential customer to buy, or recommend the purchase of, Plaintiffs' air terminal products and systems utilizing Plaintiffs' air terminal products.

**AND FURTHERMORE THAT:**

1. Plaintiffs are enjoined and restrained from advertising that they sell a lightning protection system utilizing air terminals that provide a measurable zone of protection, greater than systems installed in accordance with NFPA 780; and/or that the system can function effectively to protect open spaces; and

2. Plaintiffs are enjoined and restrained from advertising that they sell an "improved," "enhanced," or "more efficient" lightning protection system utilizing air terminals that rely on calculations of an enhanced range of protection; and

3. Plaintiffs are enjoined and restrained from advertising that any "enhanced" air terminal system manufactured, marketed, and/or sold by Plaintiffs (including but not limited to the "Early Streamer Emission" air terminal product, the "Electronically Activated Streamer Emission" air terminal product, so-called "Active" air terminal products, "Radioactive" air terminal products, and "Ionizing" air terminal products):

a) Is accepted by Underwriters Laboratories ("UL"), the National Fire Protection Association ("NFPA"), the Institute of Electrical and Electronics Engineers ("IEEE), the International Electrotechnical Commission ("IEC"), the National Electric Code (NEC) and/or the Lightning Protection Institute ("LPI");

b) Has been tested and certified by a private testing lab to provide a measurable zone of protection greater than systems installed in conformance with NFPA 780;

c) Is able to protect open areas, including but not limited to amusement parks, golf courses, stadiums, and playing fields;

Plaintiffs are further **ORDERED:**

4. To file with the Court and serve on counsel for East Coast Lightning Equipment, Inc., within 30 days after the entry of this Order and Injunction, or within such period as this Court may direct, a report in writing and under oath, setting forth in detail the manner and form in which each Plaintiff has complied with this Order, including copies of all advertising and promotional material demonstrating compliance herewith; and

5. To post a copy of this Injunction and Order, and attached Judgment on Plaintiffs' websites and other sources of electronic advertising.

**AND FURTHERMORE:**

The Court shall retain jurisdiction of this action, and noncompliance by any person or entity subject to this Order and Injunction shall be subject to the Court's power of contempt.

Dated October 7, 2005

Roslyn O. Silver
U.S. District Judge

**ATTACHMENT –**

**26. INTERNATIONAL CONFERENCE ON LIGHTNING PROTECTION,**

**ICLP, 2-6. SEPTEMBER 2006, KRAKOW, POLAND**

26. INTERNATIONAL CONFERENCE ON LIGHTNING PROTECTION,
ICLP, 2. - 6. SEPTEMBER 2002, KRAKOW, POLAND

# SCIENCE, TECHNOLOGY AND STANDARDIZATION IN LIGHTNING PROTECTION

## Invited Lecture

**Aage E. Pedersen**
aa-e-p@get2net.dk
Honorary Member of the Scientific Committee of ICLP. Former Asc. Prof . at TU Denmark

**ABSTRACT: ICLP and its conferences cover a wide range of subjects and aspects within Lightning and Lightning Protection - from pure science and fundamental processes in lightning to design of lightning protection systems and to practical problems in lightning protection.**

**In connection with some of the recent work behind issuing lightning standards, the role of science have been repeatedly discussed and similar discussions have taken place concerning the requirement for validation and verification of results of experience and research when such results have been proposed to be used for standardization.**

**In order to improve future discussions and to make them more fruitful than it has been the case in the past, the following lecture tries to enlighten some of the important characteristics of the different areas of science, technology and standardization, their differences and their mutual influences.**

**Keywords**: Science, Technology, Standardization, Verification.

## 1. INTRODUCTION

ICLP and its conferences cover a wide range of subjects and aspects of Lightning and Lightning Protection from pure science and the fundamental processes in lightning to applied physics, technical research and engineering to collection and investigation of lightning data, evaluation of risks, analysis of lightning caused damages etc., supply of information as basis for standardization, questions concerning design of lightning protection systems to practical problems in lightning protection.

Over the last decades, considerable work has been done to establish an international accepted common platform as the foundation for necessary and sufficient requirements to lightning protection, and the work has already resulted in a number of international standards, which are used as a substitute for, or as a base for the different national lightning standards.

In addition, for cost benefit purposes, great efforts have been directed toward procedures for the selection of the necessary and sufficient requirements for the lightning protection system as a function of the lightning threads and the type of structure involved, and several ideas of improvements, especially of the reception efficiency, have been proposed.

Often systems with claimed improved efficiency have been marketed and their properties explained in scientific and semi-scientific terms, and even courses and standards for their use have been offered as in the classical example of the Lightning Repeller Systems, suggested and marketed by Mario de Barnardi. This business went on for years regardless of the criticism that the physical explanation was pure imagination and fiction. Even though he was not a scholar, and therefore to some extent may be excused for adopting some romantic and absurd ideas, he has anyhow earned his worldwide fame for misconduct.

It is understandable that inventive persons, who think they have got a good idea, try to fight for it and try to ensure the economical benefit of their idea.

It is also understandable and characteristic for such inventors that they are convinced of the importance of their invention, and it may be admitted, that it is often very difficult for a nonspecialist to understand what it takes in the field to verify the claimed properties.

In the last few years vivid discussions have taken place concerning the necessary requirements, scientifically and technically, to ensure that claimed properties for new devices are real and apply under natural lightning conditions, even reputed scientists and qualified experts sometime seems to have difficulties appreciating the difficulties involved in such tests, especially under so random phenomena as found in lightning.

Lately a draft for a new lightning standard for non-conventional lightning receptors was rejected in US due to the lack of scientific foundation and practical evidence of the functions claimed in the draft standard.

Subsequently, some of the proponents for the non-conventional lightning receptors similarly questioned the scientific foundation of the classical lightning protection; some of them even went as far as starting a legal action, to get the classical lightning protection standard rejected for the same lack of scientific foundation.

It therefore might be beneficial to look a little closer at the subjects: Science, Technique and Technology, Standardization, the Rule of Games for the areas, and the

question of Testing and Verification.

An attempt is made in the following sections to enlighten some important characteristics of the different abovementioned areas, their similarities and differences and the strong mutual interaction between the different areas, in order to improve the result of the conference contributions and to improve the future discussions and to make them more fruitful than it has been the case in the past.

## 2. SCIENCE

Man has always tried to understand and explain the world surrounding him.

In the beginning this understanding was given in form of supernatural believes, reflected in the different mythologies found in all parts of the world. Later this understanding was supplemented or exchanged by ideas from early philosophers thinking, and subsequently substituted by explanations based on science.

The driving force in science is curiosity and our desire and attempt to give a more rational explanation and description of nature, from the close environment to the whole universe, by means of logical reasoning and by theories and models of what we perceive and in such a way, that we in addition might be able also to forecast.

I have seen, I have heard, I have felt, I have smelled therefore I know, or even therefore I understand.

Unfortunately, our sensing organs for vision, hearing, smelling, and feeling all are very complex, and the signals are highly processed in the brain before the signals are turned into perception, and therefore extremely subjective in spite of the normal thinking of objectivity.

The eyes as an example are very interesting to analyze a little closer. As well known, the images of what we see are by the lens in the eye displayed on the retina. Here light-sensitive rods and color sensitive cones send signals via nerves to the brain and result in our perception of what we look at. However, this process is very complicated and difficult to comprehend. In the eye the image on the retina is turned upside down relative to the depicted, left is tuned to the right and right turned to the left. But this transformation in the brain to the correct orientation of the perception is easy compared to the next complication. In the very limited area of the retina, the central fovea, there is a high density of rods and cones, and in the rest of the retina there are only rods with less density. That means, that only the image at the central fovea can be recognized with a high resolution and in colors, whereas the rest of the image is recorded in black and white only and with a low resolution. Regardless hereof we "see" the whole picture in color after processing the bulk of signals from the eye in the brain.

Therefore we should be very careful not to rely uncritical on what we have sensed, but try to use some objective means as well, in order to confirm or disconfirm what we have sensed.

In addition our "understanding" and "explanation" of nature are chosen between many possible forms suitable to the functioning of the brain, and do not necessarily reflect the real thing.

In the following we will limit the questions concerning science to Natural Science, and the discussion will be divided into two, Fundamental Science and Applied Science including Technical Research, and we will look a little closer on some different aspects of these types of sciences.

### 2.1 Fundamental Science

Natural Science is an attempt to describe nature in rational terms of basic principles and as function of simple laws.

As earlier mentioned the driving force is curiosity where "how" and "why" are some of the most important questions in order to achieve answers by means of theories, laws and principles on the bases of which we can explain and predict.

The degree of satisfaction of such theories depends on the degree to which its predictions correspond to the observation in nature and the ability of the theory to include phenomena that it has not been possible to explain before.

If the theory is not rejected due to logical conflicts or disagreements with the experience from nature, the theory is considered correct, anyhow within a certain application range or "framework".

The theory stands until a new and more comprehensive theory have been established which include and explain phenomena within a greater range outside the former framework and when it at the same time includes the results of the previous theory.

As part of the universe, it is difficult, and most likely impossible, for us fully to "explain" or "understand" everything in the universe.

There are two main reasons for this fact.

First of all, we are a very small part of the universe, and moreover a universe we are only able, partly, to see from the "inside", without the possibility to see it from the "outside". As part of the universe we are limited to "understand", "describe", and "explain" the world in forms suitable to our perceptions and our brain with the limitations this entail.

Secondly, even if we by chance could enclose the whole universe in some few and fundamental laws and principles, we would never be able to prove this, independent of how many tests we would make, because the $n^{th}$ successful test with conforming results may be followed by a test in disagreement with the theory, either due to limitations in the theory or due to unavoidable failure in the test. Karl Popper was possibly the first one explicitly to state this relation.

Karl Raimund Popper (1902-1994) was an Austrian philosopher living and teaching in England through many years and knighted by queen Elisabeth II in 1965. His work is of great importance for the philosophy behind Natural Science. One of his important theories within this area was, that he for the first time suggested and generalized the abovementioned theorem, that a scientific theory never can be proven to be correct, but on the contrary, if the theory is insufficient, it can be proven to be wrong, and thereby be rejected.

Another of his main contributions is the thesis that progress does not come from observations, collection of data or from induction, but stem from the desire to get satisfactory answers to "why" and "how", followed by intuitively perceived ideas or concepts[1], "conjectures"

[1] I think we all remember the cry of surprise "Heurica! Heurica!" (I have got it) referred to Arcimedes (287? - 212 B.C.) when he in a bathtub discovered that the raise in the water level corresponded to the amount of water displace by the volume of the part of his body

capable of given more satisfactory answers. These ideas or concepts are in turn discussed and tested for their ability to comprehend experience within an extended area and/or include explanations for more phenomena than previous theories were capable to do. If the concept or idea does not withstand the tests, it is "refuted". Therefore, the mere collection of data from natural phenomena is only a mean to stimulate the curiosity and to be able to ask the questions necessary for the formulation of new ideas and to provide the basis for the acceptance or rejection of such ideas.

The principles mentioned are contained in his idea of CONJECTURE AND REFUTATION described in his fundamental philosophical works given in the two books: "THE LOGIC OF SCIENTIFIC DISCOVERY" and "CONJECTURES AND REFUTATIONS", books which strongly can be recommended for further studies. Karl Popper was also working within sociology in which field the two famous books: "THE OPEN SOCIETY AND ITS ENEMIES" and "THE POVERTY OF HISTORICISM" with results that are of increasing interest to our societies. In both areas his work has resulted in repeated conferences and seminars where his ideas and the consequences of his work are discussed. Furthermore, numerous references can be found on the Internet

Therefore, in science all ideas should be more than welcome, provided that the ideas are accompanied by scientific analysis of its capability to include already accepted theories and how it is able to explain new phenomena and to expand our earlier understanding of phenomena that has not been possible to be explained previously.

Hereafter the real scientific battle starts, where scientists are investigating the content and the consequences of the new proposed theory trying to find loopholes in the theory, either for the purpose of accepting, improving or rejecting the theory.

This is the reason why objective criticism is the most important tool to discriminate between more or less adequate theories or wrong or insufficient theories, according to the extent to which they can withstand criticisms, and if it fails to withstand the criticism, then the theory is refuted as "wrong" or "insufficient".

One of the classical examples of the transition from the early philosophical thinking to modern theories is the history of the explanation of the movement of the sun and the planet.

The ancient Greek philosophers like Pytagoras (569 - 469 B.C.) and Aristoteles (384 - 322 B.C.) regarded the earth, as center of the universe and above the earth were several hemispheres rotating relative to the earth and to each other. This view was kept by the Alexandrian philosopher and scientist Ptolemeus (from about 100 - 170 A.D.) and presented in his astronomy reference book, ALMAGEST, for which reason the earth-centered theory is often referred to as the Ptolemaen System.

This point of view was maintained until the Polish scientist Niculaus Copernicus (1472 - 1543) reached the conclusion that the planets and the earth moved around the sun in circles. Copernicus actually started his study at the university here in Krakow, studying mathematics, later he went to Bologna and Padova in Italy to study mathematics and medicine (since physicians at that time considered astrology important for medicine).

The Danish scientist Tycho Brahe (1546 - 1601) was also interested in astrology and therefore also interested in the movements of the planets. He invented a long number of new instruments with a high degree of precision, and he performed a long number of measurements of the movement of the planets from his observatory on a small island between Denmark and Sweden.

Later, these measurements were used by the German scientist Johannes Kepler (1571 - 1630). By complicated calculations he examined the courses of the planets, and he succeeded in demonstrating, that the courses of the planets were not circles but ellipses.

Finally, these series of discoveries triggered the English scientist Isac Newton (1643 - 1715) to discover and suggest the general existence of gravity, proportional to the masses, as the force explaining the movements of the planets.

These examples illustrate clearly the theorem of Popper, first the curiosity, then the attempt to raise the right questions and trying to formulate satisfactory answers, the CONJECTURES. The discussions and debate following, even it took hundreds of years, resulted in rejections, REFUTATIONS, of the old theories followed stepwise by new and improved CONJECTURES.

It also illustrates the content of empirical knowledge in science and regardless of the very accurate models for the movements of the celestial bodies, so accurate, that we can forecast the movement with a very high degree of accuracy hundred of years in advance. In spite of this, we still do not know the origin of gravity, but at least for the time being we have to be content with the fact that gravity is a force proportional to the masses of the objects involved, and that we in theory and in practice can handle this force.

The ignorance concerning the deeper understanding of matters like gravity also applies to many other interactions. Regardless of this ignorance we still are able to deal with the phenomena in the same way as we eat every day without knowing in detail what the food does to us - but we do know, that avoiding eating is disastrous.

In order for a scientist to get new ideas he must be hypersensitive and imaginative, possess sufficient intellectual capacity to be able to evaluate and expose his own and previous ideas to criticisms. Also he must be extremely stubborn to fight for his idea and at the same time modest and humble toward the complexity of nature. No wonder that these qualities sometime make scientists difficult to work with!

Contrary to the result of Natural Science, which can never be proven in the literal meaning of the word, but only can be proven wrong or insufficient if the results do not agree with experience, results of mathematics can be proven. The reason is that Mathematics, opposite to Natural Science, is an intellectual game resting on a number of axioms. Therefore, mathematical theories can be proved or disproved and thus be truly verified according to the compliance or noncompliance with the axioms.

Finally, it should be stressed that for Natural Science Mathematics is an indispensable tool, and furthermore that Natural Science has given inspiration to mathematicians to develop new parts or given new ideas according

immersed in the water.

to new needs. Therefore, there exists a symbiotic coexistence between the two sciences.

### 2.2 Applied Science and Technical Research

Applied Science and Technical Research utilize the results achieved by the different branches of natural sciences for the purposes of achieving knowledge within a narrow scope, for inst. in order to get/establish sufficient knowledge in order to develop new techniques, methods or new devises.

Normally, for this purpose it is necessary to develop mathematical models for the physical phenomenon or physical processes, and the influencing forces, where the influencing forces can be separated from the physical system making it possible to determine the outcome as a function of different influences.

Due to limitations or shortcomings in physical understanding of the phenomena and the influencing forces and limitations in the calculation facilities, it is usually necessary to simplify the mathematical models.

When the models have been build, we often forget the approximations and the simplification made, and we may even use the models outside its sphere of application; and because the calculation with the models often can give an extreme number of digits we often forget that the simplification made may even question the results of the first few digits.

As an example we are using voltages and currents and concentrated elements like resistance (R), inductance (L) and capacitance (C) as constant values, because it makes calculations much easier. But we often forget, that the concept requires linear and quasi stationary systems, where the distance between the electrodes of the individual elements must be small in comparison with the wavelength considered. Even distributed elements, such as for inst. used for traveling waves must obey the same requirement as above.

Lightning involves so high frequencies and so short wavelengths, and extends over so great distances, that the above requirements only are fulfilled for small parts of the lightning phenomena.

Therefore, the calculation should rightly be based on the electric and magnetic field as function of charges and charge movements, and resistively (r), permeability ($\mu$) and permittivity ($\varepsilon$) of the materials and media involved.

In spite of the limitations mentioned, we still use models out of its range of validity, for simplicity, but we should recognize this beforehand and point out and analyze the limitation when presenting the results and when comparing the calculated result with the real phenomena.

It gets even more difficult when we deal with nonlinear elements or phenomena, conditions that make it impossible to use superposition and thus scaling. And hysteresis complicates the calculations even more, and when we for practical reasons linearize the elements involved we should analyze the effects of the approximations used.

Another example where we use approximations, maybe without to think too much on the consequences, is interpolation and extrapolation.

Normally interpolation is used to find an intermediate value between two known values. For small intervals this is normally done by linear interpolation and without problems. But it requires, that the course of the function is differentiable and that it is sufficiently smooth in the region of interest.

Extrapolation on the other hand is highly risky, because inherently it is assumed, that the course of the function outside the known part is similar to the cause within the known part, and if no additional knowledge is available about the values outside the known part, the extrapolation will be pure guesswork.

Many other sources contribute to a wrong evaluation of the research, like numeric oscillations for some iteration procedures, misuse of statistics, where the statistical evaluation and treatment often are done on a too small sample, a selected part of the sample, or where several samples are mixed together. These mistakes are often done unintentionally but unfortunately, intentionally misuse is also seen like the selection of data that support the result and suppress the data that do not support the result.

One other example where we can make great mistakes is by comparing the form of functions, where we propose a correlation between some influencing factors alone due to similar forms like the comparison of the change in the universal temperature and the emission of greenhouse gasses, forgetting all other causes responsible for the temperature rise.

Similar problems exist for tests under controlled conditions for inst. of lightning phenomena. For laboratory tests, the greatest difficulties are caused by the limitation of the dimensions in the laboratory and the difficulties in simulating the boundary conditions. Furthermore, all discharge phenomena are strongly nonlinear, for which reason it is impossible to make model test.

The presence of space charge and background fields, positive and negative ions of different categories and weight, free electrons, large variations in the environment along the path of the flash, in wind speed, air temperature, pressure, and water in different forms etc. limit the possibility of precision both for laboratory tests and for calculations.

Even the most used parameter for lightning exposure, Thunder-Storm-Days and Flash-Densities are only known and can only be measured with a very low degree of accuracy.

Due to the way the Thunder-Storm-Days are measured, the accuracy is higher in rural areas than in towns or cities due to the surrounding noise. Moreover the Thunder-Storm-Days does not tell very much about the local distribution of flashes, and it is actually this distribution, and not the average ones that is of interest in order to evaluate the threat.

The recordings of flash densities tell much more about the local distribution, but even this measure is greatly inaccurate. Very long time is required to estimate whether the lightning flashes to ground are even or uneven distributed within 1 $km^2$. If we assume 1 flash pr./$km^2$/year, measurements must be carried out for inst. in a thousand years or more in order to get sufficient recordings to determine the local lightning distribution, and over that long time the climate would probably have changed like it has done in the last thousand years[2].

When presenting the results of an investigation or a scientific work, it is important to give the results in such a

[2] A warm period in the Middle Age, around 1200, was succeeded by a cold period, the small Ice Age, around 1700, and now we are in a new warm period.

form, that other persons are able to understand, appreciate and possibly repeat the work.
Therefore, the report, beyond a satisfactory scientific level should at least contain the following elements:

1. What is the objective of the work?
2. What is already known from earlier investigations?
3. What has been done, including assumptions, methods and data, which make it possible for third party to repeat the investigation?
4. What is the main result of the investigation?
5. How does the outcome compare or conflict with previous knowledge and how does it expand our general knowledge within the actual field?
6. What should be done in the future to expand the specific area of research?
7. Acknowledgments of type and extent of scientific support.
8. Information concerning the extent and type of financial support and the author's appointment and company affiliations, especially where economical interest of the result of the research is involved.

Contrary to the results in fundamental science the result of the work of applied science and technical research can be verified, anyhow to a satisfactory degree of accuracy, even though practical conditions often make such verifications difficult.

## 3. TECHNOLOGY

This category covers the practical use of the available knowledge and practical solutions of lightning protection problems and therefore the area, where methods and ideas are turned into practical solutions, and the area, where these ideas and methods get their ultimate tests. Engineering and craftsmanship are thus aspects of technology.

Technology also includes the great number of techniques that are preconditions for the daily life, our technical living standard, tools and instruments, test facilities, procedures, infrastructure and its systems, communication, centers of knowledge and information, libraries, calculation means and methods, availability of materials, goods and components, products, apparatus, instruments, equipment, methods procedures and practices, measuring techniques and test specifications and most of the items are provided by standards. Moreover, this area often generates idea for and inspiration to the needs for more research in specific areas.

## 4. STANDARDIZATION

Standards create a common platform (national, regional or preferable international) - even though some parts may be open to criticism, standardization is of immense importance to all of us in our daily life, to our professional world, for trade and for mutual and equal competition.

Moreover, standards and standardization are one of the most effective methods of technology transfer from the industrial part of the world to the developing countries.

In old days it was sufficient to standardize within limited geographical areas, for inst. within individual countries or trading blocks, and standards were often used as trade barriers and to protect sovereignty over a given territory or zone of interest.

In former days different regions thus had different standards without too much disadvantages. Examples are the units for temperature, Fahrenheit, Réaumur, and Celsius used in different parts of the world. Similarly, the units for length, area, volume, and weight were numerous and different. In the same way the world was split up in left-hand and right-hand traffic regions. Unfortunately the possibility of unifying the driving system seems now to have been lost due to the involved and steadily increasing cost for the change even though the need at the same time is increasing.

Fortunately the time measured in 24 hours per day, in 60 minutes per hour, and 60 second per minute was adopted universally long time ago and fortunately clocks go clockwise everywhere.

The substitution of the Roman numbering system and the universal acceptance of the Arabian system with the base 10 was of great importance, even though the choice of base 12 instead of base 10 might have been a better choice and may have given a more harmonious and flexible system, but the fact that the system is universal accepted is of cause much more important.

As the mutual interaction between the different parts of the world increased, it was necessary to agree on a general unit system for length, area, volume, weight and temperature etc., resulting in our internationally accepted SI unit system, which also include units for electrical and magnetic phenomena. Therefore results in one part of the world can be compared to results from others and be evaluated without too much trouble.

It is not always easy to reach consensuses when compiling standards.

However, it is normally possible to compile standards in cases of terms and units, system and procedure oriented standards, methods, and application standards etc. in a cooperative and constructive atmosphere, where the only battles normally concern principal matters.

Contrary, standards for apparatus, instruments, equipment and devises, where great economical interests are involved, often give rise to quite different difficulties to reach consensuses and involve more serious battles.

For safety standards like Lightning Protection Standards it is of outmost importance that the required security level also is provided when following the design criteria specified in the standard, and therefore it is our obligation, to ensure, that such standards fulfill some practical and theoretical conditions.

The practical demand should ensure that the standard is easy to use and generally applicable, and that the requirements are given in as simple terms as possible in order to make it possible for designers, contractors and inspectors to use the standard without the need for complicated calculations and computers. Similarly "conditions" apply to the possibility for the authorities approval of the protection design and the confirmation of, that the proposed design is in accordance with the standard's requirement and provide the specified efficiency.

Concerning the theoretical foundation of the standard, it is our obligation to ensure, that the requirement is derived on general acknowledge theories and practices and

that the consequences of the requirement do not diverge form experiences gained in the field.

Therefore the inclusion of new concepts and new methods in a standard should be avoided and postponed until the methods have been generally accepted and agreed upon by experts and the international scientific community. In safety standards like Lightning Protection Standards this requirement is even more important. Therefore, the introduction of not generally accepted methods in such standards should be avoided; also references to such methods for information should similarly be avoided, even in national ones.

## 5. INTERACTION BETWEEN THE DIFFERENT SUBJECTS

### 5.1 Science

Very few of us are making fundamental work within Natural Science, most of us are working within applied physics or technical research, the result of this work is used for achieving a better understanding of lightning phenomena and for improving actual lightning protection either in defined areas or for general purposes such as for the improvement of lightning protection standards.

But regardless of the area in which we are working there exists a tremendous feedback from and between the other areas.

For example, progress in Natural Science has to a great extent been possible only because measuring techniques has been constantly improved, similarly the possibility for making calculations on large systems has undergone dramatically improvements through the last decades, this also applies to the experimental facilities available, thus modern scientific work would be impossible without the advanced stage of our technology.

These improvements are directly related to the improvement in technology and available techniques and methods. Moreover, the standardization means, that results achieved in one part of the world, may be compared to results in another part of the world, because a great number of the methods, techniques and the units are standardized, even the terms are to a great extent standardized.

This gives an optimal possibility for sharing and comparing results and for the acceptance or rejection of ideas and theories through a vivid discussion and constructive criticism.

### 5.2 Techniques and Technology

The development of techniques and technologies, so to speak, brings the result of science into use in practice, and without these tools science would have great difficulties to advance.

On the other hand, the level of techniques and technology is a direct consequence of the scientific results and the associated development and furthermore depending on the standardization of material, tools, methods and procedures etc.

### 5.3 Standardization

In standardization, the different items and methods from Techniques and Technologies are in principle founded on the best available theoretical knowledge. Therefore, standardization is strongly depending on the two former areas. Moreover, standardization often reveals the need for achieving more knowledge and is thus an inspiration for new scientific research.

## 6 FINAL REMARKS

As demonstrated in the lecture, we do not know or understand everything in nature, this also applies to lightning. But even so we are still able to tackle the problems, also concerning lightning protection, and in addition instigate new investigations necessary to make the protection more efficient.

Most of the content presented, is known to all of us, but sometime we forget the consequences and forget to take this knowledge into regard. Thus, it is my hope that a closer attention to these relations will result in better contributions to the conference and stimulate to more fruitful discussions than have been the case in the past.

Finally, I would like to point out, that the ICLP conferences try to stimulate research of lightning phenomena and try to stimulate the practical application of these results. Therefore all ideas and contributions are welcome, and ICLP provides a forum for the discussions hereof, but do not take responsibilities for the individual contributions. As a consequence papers to the conference will only be rejected provided that:

1. The paper is outside the scope of the conference.
2. The paper layout is not in line with the conference rules.
3. The paper does not have a sufficient high technical/scientific standard.

Now coming to the end, my final address should be:

You are the lucky ones that now have the chance, obligation and possibilities to conquer the world - and continue the work of our ancestors. I wish you all a real god time and good luck doing so.

**Home Office:**
**Staenget 1A, DK 2820 Gentofte, Denmark.**
**Phone: +45 39 65 17 10, Fax: +45 39 68 33 38.**

**MAK MING HUNG'S 2nd Email**

**On**

**20th April 2006**

**To**

**AAGE E. PEDERSEN**

**Fra:** lps [mailto:lps@lpsystem.com]
**Sendt:** 20. april 2006 10:53
**Til:** Aage Pedersen
**Cc:** Jérôme DUBIN; Abu Hashim; Ahmad Zainal; Ang Boh Kheng; Anthony Ngu; Baljit Singh; Chong King Liong; Chow Chew Hoong; E.F International S.A.; Edavath Raghavan Nair; Fong Chin On; Foo Kiat Ming; Foong Kok Thong; Francis Law, ESET; Franco; Hamdan; Hong Ah Fook; Ibak; J. Azhari; Jimmy Liew; K. K. Lau; Lawrence Th'ng; Liew Ah Choy; Ling Liong Lai; Looi Hip Peu; Mahendran; Micheal Chan; Mohd Aman; Muhamad Fuad; Ong Tai Chew; Ooi; Paul Chen; Prem Kumar; Sarsi; Steve; Tan Boon Ann; Tar Singh; Tay; Tay Gee Yong; Ting Kuok Ing; Victor; Wong Chen Keong; Wong Ling Haw; Yoong Fon Yen; Yusoff; Zainal Abidin; Zaini Awang; Loh Bak Kim; ClarenceChieng; Lourdes Rubanathan; LPS-Tech; 1joseph@sjalegal.com
**Emne:** Re: WARNING! of the ICLP Scientific Committee

Sorry for the late reply to your email dated 22 Feb 2006. I have have caught up with many new ESE new installations here.

After studying your email, I noticed that a few of the questions I raised in my previous email were unanswered and hence I would like to highlight it once again here
(1) The data to support your claim that ESE should be banned. Though you suggested that I look into the investigation carried out by Profs C. B. Moore and W. Rison, I would appreciate it much better if you can give me the detail of the set up and data of the investigation. On the other hand, where is the data from Hartono? Without data support, to me, I feel that your claim is meaningless.
(2) Why most of the buildings protected by ESE terminals did not suffer severe damage as you claimed that ESE systems are dangerous.

Besides the above, I also have some comment on your email of 22 Feb 2006 as follows:_

Quote
However, it is more difficult to perform a meaningful statistical evaluation than people normally realize, and if the investigation should be finished within an acceptable number of years, it will require a great number of installations.

Comment
As I stated in my email on 14 Jan 2006 that there are more than 1000 installations in Hong Kong with all records, doesn't this is fulfill your requirement of great number of installations and long period of monitoring.

Quote
As you know, several lightning incidents on unprotected structures and miss-interceptions on protected structure only will give rise to minor and unnoticed damages. Therefore the damage rate alone can not be taken as a measure of the reception efficiency.

Comment
I cannot agree with you that lightning will only cause minor damage to building. From my field experiances it all depends on the lightning intensity, high intensity lightning can

cause severe facade damage to the building. On the other hand, from what you said, you also agree with me that most of buildings protected by ESE systems did not suffer severe damage. Minor building damage may not be noticeable in your country but the buildings in Hong Kong are very high, especially most of the new buildings are 150 meters and above. A low intensity lightning causes minor damage to the building, but the small chip of 1cm x 1cm x 1cm concrete chip that falls from 150 meters height will definitely cause noticeable effect. With the high standard building management system in Hong Hong, a minor damage is easily discovered. Though the statistics in Hong Kong may not be 100% accurate, but at least it can reflect the actual scenario. Please note that our Hong Kong statistics not only record the miss interception, but also record the lightning hit to the ESE terminals (through the lightning stroke counter). Hence if ESE does not function as what it was designed, then where comes the counter reading?

Quote

A realistic statistical evaluation of the lightning protection under natural lightning condition will at least require:

- that the systems are instrumented with instruments of known and sufficient recording accuracy,
- that the lightning incidents similarly are monitored with sufficient accuracy, and that it will be possible to monitor the position of the flashes to the lightning protection system as well as the miss-interceptions and the associated damages for both protected and non-protected structure,
- that it will be possible to monitor the lightning activity sufficiently accurate in order to be able to compare the results from different buildings and different systems relative to their exposure of lightning with all its great variations.

These requirements are very difficult to fulfill, therefore most of the reported results of such field data analysis will be so inaccurate and uncertain, that the results can not be use to prove anything.

Comment

You suggested a method which turned down yourself. There is no doubt that your suggestion will get a more accurate result, but unfortunately it is impossible to apply, especially to monitor large number of locations. A method that cannot be practically used is equivalent to no method. That means your suggestion is meaningless. The statistics in Hong Kong may not be 100% accurate, but it is practical and better than other field test of limited installation, limited area, and limited monitoring period. On the other hand, can you show any field application performance record of conventional systems to support your claim that conventional system is better than ESE system?

Thank you for the court order attachment in your email on 22 Feb 2006, however the information of the attachment was insufficient. Instead of only 2 pages, the full set document is a total of 28 pages. If you study the document carefully, you will find that it was a business argument more than technical argument. On the other hand we know from

the document that Dr. Martin Uman, an ESE opponent, stated that "CONVENTIONAL SYSTEM IS NOT BASED ON A THEORECTICALLY WELL-JUSTIFIED CONCEPT, BUT IT WORKS IN PRATISE, IT WORKS FOR A LONG TIME."(Bottom of page 2 and beginning of page 3 of document CV 96-2796-PHX-ROS from The United States District Court For the District Of Arizona). ESE has been used for more than 30 years, I just wonder what is the different between 200 years and 30 years. If you don't have the full set document, please go to www.hearybros.com to down load.

You also attach your paper "Science, Technology and Standardization in Lightning Protection" in your email on 23 Feb 2006, after I studied the paper, especially the beginning of page 6 about the standardization, I feel that we are so lucky that there was no standard and no so called scientist to make noise in Frankin's time, otherwise until today we still suffering from lightning strike due to no applicable lightning protection system!

I hope you can answer the above questions in detail and show the public the traceable data you have.

Regarding the Kolaj Kopenik case, please refer to my email on 14 Jan 2006, the problem was come from Authority, however if you think the same thing will not be happen in scientific society, you are wrong, I just give one more example.

Subranhmanyan Chandrasekhar, a young scientist, when he presented his paper before the monthly meeting of the Royal Astronomer Society in Cambridge in 1935 about the collapse of a star with great than 1.44 of solar mass, the collapse of the star will not stop and stay at the white dwarf stage but will continue to collapse inward. The result of his work was immediately turn down by Eddington, a science giant and most influential astronomer at that time, and accused him of a fundamental conceptual error. Even though there were some people voiced out that the young scientist was right, Eddington still insist his opinion that relativistic degeneracy was wrong, and that there was no limit to the mass of a white dwarf ..and kept on argue with the poor young guy both in public and in private discussion even he could not point out what was wrong in Chandrasekhar's equation. The opposition not only hurt the young guy, made him actually gave up his research in this subject, but also left most of the astronomers confused and doubtful about the subject for more than two decades.

Now Chandrasekhar's conclusions were widely accepted and the 1.44 solar mass is called the Chandrasekhar's limit, and he won the Nobel Prize in 1983 for his groundbreaking work in those years.

Conclusion

The purpose of lightning protection system is to protection any object from lightning hit, because human still not fully understood the mechanism of lightning, it is meaningless to argue the theory. The most important thing is that if any system can protect any object

from severe damage by lightning, we can consider the system is a workable system, of cause it may not be a perfect system. The perfect system may not be come out forever unless human being finally fully understand the mechanism of lightning. For the time being, what we can do is to continue to use any system that people believe it works, that is why NFPA also wanted to withdrew the NFPA780 sometime ago.

I also want to voice out to the public that for the past so many years, there was not a reliable site to study the performance of ESE system and makes a lot of argument. We welcome  any independent party to use the Hong Kong platform to do the lightning protection research, I can not guarantee there is sufficient facility for people to study the conventional system, but the facility for the study of ESE system is there. I also voice out to the engineers who had applied ESE system to their projects, please tell people what is your experience in the application of ESE systems.

Mak

**AAGE E. PEDERSEN'S Final Email**

**On**

**1st May 2006**

**To**

**MAK MING HUNG**

**From:** Aage Pedersen [mailto:aa-e-p@get2net.dk]
**Sent:** Monday, May 01, 2006 11:03 AM
**To:** Aage Pedersen; lps
**Cc:** Jandrell Ian; Allen, Norman; Siew, W H; Chisholm, Bill; Caie, Matthew; Brian Burrows; ishii@u-tokyo.ac.jp; gacgomes@yahoo.com; 1joseph@sjalegal.com; LPS-Tech; Lourdes Rubanathan; ClarenceChieng; Loh Bak Kim; Zaini Awang; Zainal Abidin; Yusoff; Yoong Fon Yen; Wong Ling Haw; Wong Chen Keong; Victor; Ting Kuok Ing; Tay Gee Yong; Tay; Tar Singh; Tan Boon Ann; Steve; Sarsi; Prem Kumar; Paul Chen; Ooi; Ong Tai Chew; Muhamad Fuad; Mohd Aman; Micheal Chan; Mahendran; Looi Hip Peu; Ling Liong Lai; Liew Ah Choy; Lawrence Th'ng; K. K. Lau; Jimmy Liew; J. Azhari; Ibak; Hong Ah Fook; Hamdan; Franco; Francis Law, ESET; Foong Kok Thong; Foo Kiat Ming; Fong Chin On; Edavath Raghavan Nair; E.F International S.A.; Chow Chew Hoong; Chong King Liong; Baljit Singh; Anthony Ngu; Ang Boh Kheng; Ahmad Zainal; Abu Hashim; Jérôme DUBIN; Kithil, Rich; Evans Frank; Hartono, Z.A.; Morgan, Jennifer; Mousa, Abdul; Moore, Charles B; Rison, William; Sherlock John; Montandon, E.; Rachidi Farahd; Bouquegneau, Christian; Cooray, Vernon; Flisowsk Zdobyslaw; Mazzetti Carlo; Zaini Awang; alefort@indelec.com; alainrousseau@worldonline.fr; ljoseph@sjalegal.com; Berger Gerard; Jouaire Jacques; Ishii, M.; Gruet, Pierre; Gomes; Rakov@Ece. Ufl. Edu; Uman, Martin; Darveniza, Mat; Darveniza, Matt; Scuka Viktor; Zahlmann Peter; Hasse Peter; Heidler, F.; Kawamura T; Piantini Alexandre; Leite Duilio; Piparo Lo; Barnardi, Marina; Garbagnati, Emilio; Dellera, Luigi; Noack Friehelm
**Subject:** SV: WARNING! of the ICLP Scientific Committee

2006.05.01

Dear Mr. Mak Ming Hung,

Thank you for your e-mail of 20.04.2006.

However, I did not expect that it would be necessary to extend the communication with you as I have answered the main points in your former mail; therefore this answer will be short.

As it appears from your reply and your references, it would not be too difficult for you to find the publication from the Prof. C. Moore and Prof. W. Rison, and you are free to get and study the material and the results I have referred to, so please go ahead.

The experiment referred to has shown that the claimed effect of ESE devices, and the advertised efficiencies versus common Franklin rods, did not show up in practice.

When you take this result into account and furthermore consider that the hypotheses behind the French ESE standard NF C 17- 102 are wrong, it is necessary to be extra cautious when making any conclusion concerning the field data you have referred to. And before the scientific community can endorse the result, the data must be evaluated in the way stated in my former e-mail, and the result has furthermore to be presented in a form that can be checked by independent researchers, and not least, it must be possible for independent parties to repeat similar experiments with similar results.

When the hypothesis concerning ESE systems was proposed, I was hoping that it might have resulted in an improved efficiency of lightning protection systems, but as the results accumulated from research, service, and theoretical consideration, and all have given negative results, I have had to change my original hope for an improvement. And now it is only persons and companies that directly or indirectly earn money on the ESE technique (like manufacturers, vendors of ESE devices and some few designers of lightning protection systems), that still try to promote this type of systems. This may be due to the simple psychological effect, that it is difficult for us to be fully objective if we have an economical interest in not being so. And even worse, some manufacturers have the nerve to proclaim that they will continue to produce ESE devices with reference to the

French ESE standard as long as it exists, even though they are quite aware of that the ESE devices do not work according to the claims, some even make applications for patents on new designs of ESE devices.

Concerning your reference to Benjamin Franklin and his development of lightning protection, it is interesting to notice that Franklin himself was extremely self-critical, and he repeatedly rejected his own conjectures according to the observations and collected results from experience, and he continued to exchange former conjectures to new ones in order to fit the expectations to the experienced behavior. As an interesting detail, he was quite aware of the importance of his invention and development, but nevertheless he generously started: *"As we enjoy great advantages from the inventions of others, we should be glad of an opportunity to serve others by any invention of ours; and this we should do freely and generously"*. This is certainly something quite different from the marketing of ESE devices that do not comply with the claimed and promised properties, and in spite hereof one-sided defend a profitable business.

Your reference to lack of scientific foundation of conventional lightning protection might easily be misunderstood. It is correct that we do not understand everything about every lightning phenomenon, but we do know much much more about lightning and lightning protection that we do know about gravity. In spite hereof we can easily judge the good design criteria for constructions from the poor ones, and so it is the case for lightning protection. And similarly, if someone came up with a steel beam claimed to be several times stronger than ordinary beams, you probably would ask for solid proofs before you would tolerate it to be used in practice.

In your e-mails, you have made a number of references to science. For your benefit and to give you a better understanding of the principles behind science, I would recommend you to study the international recognized philosopher Karl R. Popper (especially renowned within natural science), for inst. by reading his book, “Conjectures and Refutations”.

Finally, I wish you success in the process of canceling your representation and use of unsafe lightning protection means like ESE products and systems.

Sincerely yours / Aage E. Pedersen

PS! For your information ICLP arranges a conference this year in Japan, Kanazawa, from September 18 – 22. Details about subjects and registration can be found via www.iclp-centre.org or directly at www.iclp2006.net. Maybe it would be interesting for you (or anyone to whom the copy of the mail is sent) to participate. Anyhow, you should be very welcome.

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**Heary Bros. Lightning Protection**

**Judgment and Court Order**

**Heary Bros. Lightning Protection**
Lightning Protection Since 1895


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- Master Specifications
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# Judgment and Court Order

We have redesigned our website and our advertising to fully comply with the accompanying order and judgment issued in Heary Bros. Lightning Protection Co., Inc. et al. vs. Lightning Protection Institute, East Coast Lightning Equip. Co., Inc., et al. (D. Ariz. Sept. 17, 2005).

If you wish to review the decision dated September 9, 2005 with respect to the order, the text of the decision also is available for download below.

We note that the decision makes clear that the court has made no ruling as to the safety of either traditional multipoint systems or ESE systems, and the court actually denied the requests of our competitors to rule that ESE Systems are unsafe. Moreover, the court also expressly indicated that it was not restraining in any respect the method of installation and design of ESE systems.

If our competitors have stated or implied otherwise, they are not being honest with you and we suggest you read the text of attached decision itself. Simply click on 'judgment-and-court-order.pdf' below to read, in sequence, the Judgment, the Order and the text of the decision.

## JUDGMENT AND COURT ORDER:

» judgment-and-court-order.pdf [Acrobat PDF, 1.54 Mb]


**TRANSLATE THIS PAGE:** Français | Deutsch | Italiano | Portuguese | Español

Home Page | Installations | Faraday vs Preventor | Master Specifications
Free Design Service | Product Catalog | Judgment & Court Order | Contact Heary Bros.
RELATED SITE: Lightning Preventor of America



11291 Moore Road, Springville NY 14141 USA
Telephone: 716-941-6141

**IN THE UNITED STATES DISTRICT COURT**
**FOR THE DISTRICT OF ARIZONA**

| | | |
|---|---|---|
| Heary Bros. Lightning Protection Co., Inc.; Lightning Preventor Of America, Inc.; National Lightning Protection Corporation,<br><br>Plaintiffs,<br><br>vs.<br><br>National Fire Protection Association, Inc.; Lightning Protection Inst.; Allan P. Steffes; Thompson Lightning Protection Co., Inc. East Coast Lightning Equipment, Inc.<br><br>Defendants. | ) | No. CIV 96-2796 PHX/ROS<br><br>**JUDGMENT** |

On October 23, 2003, the Court, having reviewed all the motions filed by the parties and the extensive record in this case, and having heard oral argument, issued a written opinion granting summary judgment in favor of all Defendants on all claims in Plaintiffs' Second Amended Complaint.

**FURTHER,** the Court granted summary judgment in favor of Defendant/Counterclaimant East Coast Lightning Equipment, Inc. on its counterclaim and granted East Coast Lightning Equipment injunctive relief on that claim.

**THEREFORE,** the Court orders that Defendants have JUDGMENT against Plaintiffs on all claims in the Second Amended Complaint and the Second Amended Complaint is dismissed with Prejudice.

**FURTHER,** the Court has ordered Plaintiffs to pay reasonable attorneys' fees and costs incurred by Defendant East Coast Lightning Equipment, Inc. in filing its two summary judgment motions on Counts II, III, and IV. Accordingly, East Coast Lightning Equipment, Inc. shall have JUDGMENT against Plaintiffs for its attorneys' fees and costs in the amount of $10,658.00.

**FURTHER,** the Court orders that East Coast Lightning Equipment, Inc. shall have JUDGMENT against Plaintiffs for their violations of Section 43(a) of the Lanham Act, 15 U.S.C. §1125(a) and Plaintiffs are permanently enjoined as directed by this Court's Injunction and Order issued contemporaneously with this JUDGMENT.

Dated October 7, 2005

Roslyn O. Silver
U.S. District Judge

**IN THE UNITED STATES DISTRICT COURT**
**FOR THE DISTRICT OF ARIZONA**

| | | |
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| Heary Bros. Lightning Protection Co., Inc. et al.,<br><br>Plaintiffs,<br><br>vs.<br><br>National Fire Protection Association, Inc.;, et al.,<br>Defendants. | ) | No. CIV 96-2796 PHX/ROS<br><br>**INJUNCTION AND ORDER RE: HEARY BROS. LIGHTNING PROTECTION, INC; LIGHTNING PREVENTOR OF AMERICA, INC; AND NATIONAL LIGHTNING PROTECTION CORP.** |

**WHEREAS,** East Coast Lightning Equipment, Inc. has brought a counterclaim action against Heary Bros. Lightning Protection, Inc., Lightning Preventor of America, Inc., and National Lightning Protection Corporation (hereinafter, "Plaintiffs") alleging that Plaintiffs have engaged in false advertising in violation of Section 43(a) of the Lanham Act, 15 U.S.C. §1125(a); and

**WHEREAS, THE COURT,** having considered the matter, and after oral argument on May 2, 2003, entered a written Order dated October 23, 2003, determining that East Coast Lightning Equipment, Inc. has established by unrefuted evidence that the tests on which Plaintiffs base their advertising claims are not sufficiently reliable to establish that Plaintiffs' air terminal products provide an enhanced zone of protection within a specific, measurable radius and protection against lightning strikes in open spaces; and

**WHEREAS,** the Court, having therefore determined that Plaintiffs' advertising claims regarding the range of protection provided by their air terminal products and the claims of protection from lightning in outdoor settings are "literally false" under Section 43(a) of the Lanham Act, 15 U.S.C. §1125(a);

**THEREFORE, IT IS ORDERED THAT** an injunction shall issue enjoining and restraining the Plaintiffs, their successors, officers, agents, employees, dealers, distributors, and attorneys and on all persons, partnerships or corporations in present or future active concert or participation with the Plaintiffs or any other person, partnership or corporation acting on behalf of the Plaintiffs, from advertising, whether explicitly or implicitly, that any or all Plaintiffs sell a lightning protection air terminal or similar product that has been proven to significantly extend the maximum range of protection against lightning damage beyond that afforded by NFPA 780 requirements.

For purposes of this Order and Injunction, the term "advertising" shall encompass oral and written statements made in the context of commercial advertisement or promotion of Plaintiffs' air terminal products and systems utilizing Plaintiffs' air terminal products, for the purpose of influencing even a single potential customer to buy, or recommend the purchase of, Plaintiffs' air terminal products and systems utilizing Plaintiffs' air terminal products.

**AND FURTHERMORE THAT:**

1. Plaintiffs are enjoined and restrained from advertising that they sell a lightning protection system utilizing air terminals that provide a measurable zone of protection, greater than systems installed in accordance with NFPA 780; and/or that the system can function effectively to protect open spaces; and

2. Plaintiffs are enjoined and restrained from advertising that they sell an "improved," "enhanced," or "more efficient" lightning protection system utilizing air terminals that rely on calculations of an enhanced range of protection; and

3. Plaintiffs are enjoined and restrained from advertising that any "enhanced" air terminal system manufactured, marketed, and/or sold by Plaintiffs (including but not limited to the "Early Streamer Emission" air terminal product, the "Electronically Activated Streamer Emission" air terminal product, so-called "Active" air terminal products, "Radioactive" air terminal products, and "Ionizing" air terminal products):

a) Is accepted by Underwriters Laboratories ("UL"), the National Fire Protection Association ("NFPA"), the Institute of Electrical and Electronics Engineers ("IEEE), the International Electrotechnical Commission ("IEC"), the National Electric Code (NEC) and/or the Lightning Protection Institute ("LPI");

b) Has been tested and certified by a private testing lab to provide a measurable zone of protection greater than systems installed in conformance with NFPA 780;

c) Is able to protect open areas, including but not limited to amusement parks, golf courses, stadiums, and playing fields;

Plaintiffs are further **ORDERED:**

4. To file with the Court and serve on counsel for East Coast Lightning Equipment, Inc., within 30 days after the entry of this Order and Injunction, or within such period as this Court may direct, a report in writing and under oath, setting forth in detail the manner and form in which each Plaintiff has complied with this Order, including copies of all advertising and promotional material demonstrating compliance herewith; and

5. To post a copy of this Injunction and Order, and attached Judgment on Plaintiffs' websites and other sources of electronic advertising.

**AND FURTHERMORE:**

The Court shall retain jurisdiction of this action, and noncompliance by any person or entity subject to this Order and Injunction shall be subject to the Court's power of contempt.

Dated October 7, 2005

Roslyn O. Silver
U.S. District Judge

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF ARIZONA

| | |
|---|---|
| Heary Bros. Lightning Protection Co., Inc., et al.,<br><br>Plaintiffs,<br><br>vs.<br><br>Lightning Protection Institute, et at.,<br><br>Defendants. | No. CV 96-2796-PHX-ROS<br><br>**ORDER** |

Pending are Plaintiffs' and Defendant East Coast Lightning Equipment, Inc.'s ("East Coast") proposed forms of injunction. Also pending are Defendant East Coast Lightning Equipment, Inc.'s Motion and Memorandum in Support of Entry of Sanctions for Bad Faith Affidavits (Doc. #368); Defendant East Coast Lightning Equipment, Inc.'s Amended Motion to Strike Facts Asserted in Plaintiffs' Supporting Affidavits Re: Objection to East Coast's Proposed Injunction (Doc. #369); Plaintiffs' Cross-Motion to Strike Portions of Defendant's Supplemental Submission (Doc. #374); and Defendant East Coast Lightning Equipment, Inc.'s Motion and Memorandum of Points and Authorities to Strike Facts Asserted in Affidavit of Counsel Re: Objection to East Coast's Proposed Injunction (Doc. #384).

## I. BACKGROUND

On October 23, 2003, the Court filed its Order disposing of the parties' various motions, including motions for summary judgment, and ordered Plaintiffs' Second Amended

Complaint dismissed with prejudice. [Doc. #341]. The Court granted Defendant East Coast Lightning Equipment's ("East Coast's") Motion for Summary Judgment on Counterclaim (claims of false description, and deceptive practices in violation of the Lanham Act), and ordered East Coast to submit a proposed injunction. Both parties submitted forms of injunction and a variety of other motions which were addressed in this Court's Order filed on September 27, 2004 (Doc. #361).

The September 27, 2004 Order permitting additional briefing regarding Plaintiffs' business dealings subsequent to the entry of this Court's October 23, 2003 Order (Doc. #361). The parties were given a briefing schedule for arguments addressing the parties' separate proposed injunctions and Defendants' claims that Plaintiffs have violated the intent underlying the rulings within the Court's October 23, 2003 Order. The parties filed the currently-pending motions in conjunction with the permitted additional briefing,

**A. The October 23, 2003 Order granting summary judgment in favor of Defendants**

The Court's October 23, 2003 Order addressed, at pages 42 through 57, East Coast's Lanham Act Counterclaim against Plaintiffs, in which East Coast alleged that Plaintiffs engaged in false advertising. East Coast's claims of literal false advertising addressed claims by Plaintiffs that the early streamer emission ("ESE") air terminals (lightning rods) marketed by Plaintiffs provide "a specific and measurable zone of protection" from lightning strikes and that these devices can protect against lightning strikes in open spaces. As is set forth in the Order, East Coast submitted evidence of a number of Plaintiffs' advertisements in which Plaintiffs claimed a measurable zone of protection for various ESE products and also claimed that the products protected open areas such as athletic fields. The Court recognized that East Coast's false advertising claims were "interrelated, because Plaintiffs claim they can protect from lightning strikes in open spaces *because* the zone of protection extends to cover those spaces." [Id.]

Plaintiffs argued against East Coast's Counterclaim in part by criticizing the opinion of East Coast's expert, Dr. Martin Uman, who stated that claims regarding the superiority of

ESE devices were based on questionable theory and inconclusive experiments in the laboratory and under natural conditions. Plaintiffs contended that Dr. Uman's expert report was inconsistent with the lack of reported failures of ESE terminals in the field, and that Dr. Uman himself had conceded that conventional lightning rod systems were not based on a "theoretically well-justified concept, but it works in practice, it has worked for a long time . . . ." [Id., p. 46.] In its Order granting summary judgment for East Coast, this Court observed that "East Coast is not claiming that Plaintiffs' advertising is false because the advertising claims that ESE devices work in general; rather, East Coast is claiming that the advertising is false because it promises a measurable protection, greater than conventional rods, and that it can function effectively to protect open spaces." [Id., p. 46.]

In response to Plaintiffs' argument that the Court must consider the reliability of testing of conventional lightning rod systems to establish a baseline standard for the testing of ESE systems, the Court declared that the pleadings had not required a decision regarding "the entire state of advertising for the lightning protection industry," and that it was only ruling on "whether the ads at issue are literally false." [Id.]

Plaintiffs also contended that Mr. Heary and Mr. Rapp could testify, based on their personal knowledge, that there has been a lack of reported failure of ESE systems and that this is evidence to support the claim that ESE systems are effective. The Court stated: "[t]he lack of reported failures does not itself provide support for a measurable zone of protection. In fact, the lack of failures requires a scientific or technical inference to support a claim of effectiveness or an enhanced zone of protection; Plaintiffs must provide expert testimony establishing the inference." [Id., p. 53.]

Summarizing its holding, the Court noted in conclusion that "Plaintiffs' claims that their ESE products provide a measurable zone of protection and protect against lightning strikes in open spaces are not supported by tests sufficiently reliable to support those claims, and are "literally false" under the Lanham Act." [Id., p. 56.]

**B. East Coast Lightning Equipment, Inc.'s Proposed Injunction**

On October 20, 2004, Defendant East Coast again submitted a proposed injunction. The proposed injunction, among other things, enjoins Plaintiffs and those acting on their behalf or in participation with them from "advertising, whether explicitly or implicitly, that any or all Plaintiffs sell a lightning protection air terminal or similar product that has been proven to significantly extend the maximum range of protection against lightning damage beyond that afforded by United States safety standard requirements." [Defs.' Proposed Injunction, p. 2.] The proposed injunction would also enjoin Plaintiffs from advertising that its air terminal systems "can function effectively to protect open spaces," that its air terminal systems "rely on calculations of an enhanced range of protection," or have been tested and certified to perform as claimed, have a measurable range of protection based on sound technical research establishing the claimed range, or has a measurable range of protection because the system "conforms with a foreign lightning protection standard." [Id., pp. 3-4.]

The injunction would require Plaintiffs to serve a copy of the injunction order and judgment in this matter to Plaintiffs' past air terminal products customers, likely purchasers or specifiers of lightning protection systems, all lightning protection contracting firms, and "all potential customers to whom Plaintiffs have previously disseminated their literally false advertising materials . . . ." [Id., pp. 4-5.] East Coast's proposed injunction would further require Plaintiffs to "monitor construction reporting services" for five years in the future to identify projects in the U.S. in which Plaintiffs' products have been specified and to serve a copy of the injunction on them, to advertise that the installation of air terminals in a configuration that deviates from the standard for conventional protection system "could be dangerous." [Id., p. 10.] Additionally, the proposed injunction would mandate that Plaintiffs spend $50,000.00 per year in the five years following entry of the Order on print advertising communicating that Plaintiffs' claims for enhanced zones of protection for air terminals "lack validity" and "may be dangerous" if installed in a configuration other than

that applied to conventional lightning protection systems, and also to post a copy of the injunction on Plaintiffs' "websites and other sources of electronic advertising." [Id., p. 11.]

**C. Plaintiffs' opposition to East Coast's proposed injunction**

Plaintiffs complain that East Coast's proposed injunction is overbroad and does not properly reflect the Court's holding on summary judgment. Specifically, Plaintiffs argue that the proposed injunction is improper because it is based on two conclusions that were not decided by the Court: that ESE air terminal systems do not work and are dangerous when not installed in conformance with standards governing the installation of conventional lightning protection systems. Instead, Plaintiffs contend that they should be able to advertise that their ESE systems work, based on 25 years of experience during which "neither Plaintiff has had a single verified reported failure of a properly installed and maintained system." [Doc. #373 (Pls.' Sur-Surreply), p. 5.]

## II. DISCUSSION

The Court's Order on Summary Judgment held that Plaintiffs' advertising that ESE systems provide a measurable zone of protection and protect against lightning strikes in open spaces was literally false, violated the Lanham Act, and would be subject to an injunctive remedy. This holding was based on Ninth Circuit precedent permitting a party to establish literal falsity by showing that tests underlying the false claims is unreliable. [Doc. #341, p. 44.] The Court did not hold that Plaintiffs' advertising regarding the specified zone of protection was false only if the advertising explicitly stated that the zone of protection was based on scientific testing. Instead, the Court found that East Coast had proffered evidence, which Plaintiffs had failed to refute with controverting evidence, that the advertised zone of protection was "not supported by tests sufficiently reliable to support those claims." [Id., p. 56.] Moreover, this Court specifically found that Mr. Heary's and Mr. Rapp's personal knowledge of a lack of reported failures of ESE systems did not support Plaintiffs' advertised claim of a measurable zone of protection, and was not responsive to East Coast's attacks on the validity of testing relied on by Plaintiffs.

Plaintiffs misperceive the effect of this Court's Order on summary judgment by arguing that they are able to continue to advertise a measurable zone of protection based on the alleged lack of reported failures of ESE systems or on alleged compliance with foreign standards. As noted, the Court made no findings in its October 23, 2004 Order whether ESE systems work in general, but rather found that claims of a measurable zone of protection were not based on reliable scientific testing. This conclusion was necessarily directed to the configuration of ESE systems advertised, which all parties agree include far fewer air terminals and related equipment than conventional lightning rod systems. As the Plaintiffs note, however, the Court did not make a finding that conventional systems were safe or that ESE systems were unsafe. Moreover, the Court did not conclude that Plaintiff could not advertise a lack of reported failures (if truthful), but did hold that testimony of the lack of reported failures did not support the advertised claim of a measurable zone of protection.

**III. East Coast Lightning Equipment, Inc.'s Proposed Injunction and Order**

The portions of East Coast's proposed injunction disputed by the parties are discussed below.

**1. Reference to United States safety standard requirements**

At page 2, lines 10 through 21, the proposed injunction would enjoin Plaintiffs and others working with them "from advertising, whether explicitly or implicitly, that any or all Plaintiffs sell a lightning protection air terminal or similar product that has been proven to significantly extend the maximum range of protection against lightning damage beyond that afforded by United States safety standard requirements." The final wording in that sentence, i.e., "beyond that afforded by United States safety standard requirements" is vague, and does not provide clear guidance to Plaintiffs. East Coast concedes this criticism in its Response (Doc. #364, p. 7) and offers to omit "United States safety standard" and substitute instead the term "afforded by NFPA 780 or UL96A requirements." Because the conclusions in Dr. Uman's report, on which the Court relied, are based on NFPA 780 as the baseline installation

configuration, the proposed injunction will be amended to substitute "NFPA 780" for the term "United States safety standard requirement."

Plaintiffs object to the use of NFPA 780 because there was no finding that this safety standard provides a sufficiently reliable basis for a specific, measurable zone of protection. [Doc. #363, p. 9.] As noted in the October 2003 Order, the pleadings in this matter did not require the Court to decide the state of advertising for the lightning protection industry, but only whether the ads at issue are literally false.

**2. Statements regarding the historical performance in the field of ESE systems**

Plaintiffs argue that nothing in the Order prevents them from advertising that, based on historical experience, ESE systems "will provide protection to structures from lightning damage." [Doc. #363, p. 15.] Again, the October 2003 Order concluded that the proposed testimony of Frederick Heary and Robert Rapp regarding the lack of reported failures of ESE systems did not provide support for a measurable zone of protection. [Doc. #341, p. 53.] Specifically, the Order reasoned that

> the lack of reported failures does not itself provide support for a measurable zone of protection. In fact, the lack of failures requires a scientific or technical inference to support a claim of effectiveness or an enhanced zone of protection; Plaintiffs must provide expert testimony establishing the inference. Moreover, the anecdotal evidence is not responsive to East Coast's attacks on the validity of the testing.

[Id.] Accordingly, Plaintiffs may not advertise a measurable zone of protection based on the historical performance in the field of ESE systems. East Coast's proposed injunction as drafted prevents Plaintiffs from employing such advertising.

**3. Listing by Underwriters Laboratory, Inc.**

East Coast's proposed injunction would enjoin Plaintiffs from advertising that the ESE system "is accepted" by Underwriters Laboratories ("UL") and a number or other entities. Plaintiffs complain that the term "accepted by" is impermissibly vague and also overreaching because there has been no such advertising. [Doc. #363, pp. 17-18.] Moreover, Plaintiffs

argue that component parts of the ESE system have been listed with UL, and so they can truthfully advertise that fact. Plaintiffs assert that Paragraph 3(a) of the proposed injunction fails to comply with Rule 65, Fed.R.Civ.P.

Defendants counter that because UL does not have a standard for ESE systems,"any representations relating to UL in the context of advertising ESE systems deceptively suggest UL's endorsement - a powerful consumer inducement." [Doc. #364, p. 15.]

Plaintiffs may not be enjoined from truthful advertising that component parts of the ESE system are listed with UL, as long as that advertising is not done in a manner that reasonably implies that UL has endorsed the system as a whole or its installation. East Coast's proposed injunction does not prevent Plaintiffs from advertising that component parts used in ESE systems are listed with U.L., but only prohibits advertising directed to ESE systems as a whole.

**4. Product guarantees and insurance coverage**

East Coast's proposed injunction would enjoin Plaintiffs from advertising that ESE systems sold by them have "a measurable, expanded, range of protection that is insured by multi-million dollar product guarantee policies[.]" Plaintiffs note that the Court granted summary judgment in favor of Plaintiffs on East Coast's claims regarding product guarantees and insurance coverage.

East Coast responds that its proposed injunction would not prevent Plaintiffs from advertising that they have insurance and guarantee the product, but only that the devices provide measurable, specific ranges of protection.

After the mention of insurance guarantees is removed from Paragraph 3(b), the residual language refers to advertising that the ESE system "[h]as a measurable, expanded, range of protection." This remaining language is repetitive and will be ordered removed. The proposed injunction elsewhere enjoins Plaintiff from advertising that the ESE systems provide a measurable zone of protection. Thus, the proposed injunction would also enjoin

Plaintiff from advertising that there is insurance and product guarantees for such measurable zone of protection. Paragraph 3(b) will be ordered omitted from the proposed injunction.

**5. Compliance with the French national standard**

At Paragraph 3(g), East Coast's proposed injunction would enjoin Plaintiffs from advertising that their ESE systems have "a 'proven' measurable zone of protection because it allegedly conforms with a foreign lightning protection standard." Plaintiffs object to this limitation because this Court's October 2003 included nothing that would prevent them from truthfully stating that their ESE systems comply with foreign standards, as long as they did not also assert a specific measurable zone of protection based on the foreign standards.

The October 2003 Order noted that Plaintiffs had raised the issue of compliance with foreign standards to refute East Coast's allegation that Plaintiffs falsely advertised that the ESE system provided a measurable zone of protection. This Court concluded that Plaintiffs had not provided admissible evidence that "conformance to any foreign standard provides a scientific basis" for such advertising. As noted, because Plaintiffs are enjoined from advertising a specific, measurable zone of protection it would be redundant for the injunction to also specifically enjoin Plaintiffs from advertising a zone of protection based on compliance with foreign standards. Sub-paragraph 3(g) will be omitted from the proposed injunction. For the same reason, sub-paragraph 3(e) is redundant and will also be removed.

**6. Corrective advertising**

Plaintiffs state that East Coast's proposed injunction propose two categories of corrective advertising: (1) serving a vast array of persons with a copy of the injunction via certified mail; and (2) requiring Plaintiffs to affirmatively state that the ESE system is dangerous and/or must be installed in compliance with NFPA 780. [Doc. #363, pp. 20-21.] Plaintiffs complain that corrective advertising is not appropriate because East Coast has not established that consumers have been actually influenced by the literally false advertising and that this consumer impression is likely to linger even after the false advertising ceased. Additionally, Plaintiffs argue that consumers of lightning protection systems are

sophisticated and that Defendants have not identified even one consumer of lightning protection products who was unaware of the industry-wide debate surrounding ESE systems and the zone of protection controversy relating to the test methods for such systems. Plaintiffs also argue that the proposed injunction is overly broad, requiring Plaintiffs to disseminate the injunction to a range of persons and entities that is indiscernible and potentially bankrupting. Finally, Plaintiffs complain that any requirement that Plaintiffs advertise that their products are dangerous exceeds both the scope of East Coast's claims and this Court's Order.

East Coast cites Warner-Lambert Co. v. FTC, 562 F.2d 749 (D.C. Cir. 1977) to support its argument that even though it has not submitted evidence of actual consumer confusion, it should be presumed that Plaintiffs' advertising resulted in such confusion. In dicta, the D.C. Circuit suggested that:

> it might be appropriate in some cases to presume the existence of the two factual predicates for corrective advertising [that deceptive advertising played a substantial role in creating or reinforcing in the public's mind a false belief about a product, and that this belief would linger on after the false advertising ceases]. But we need not decide that question, or rely on presumptions here, because the [Federal Trade] Commission adduced survey evidence to support both propositions.

562 F.2d at 762.

East Coast has not identified any instances in which a court has actually presumed the factual predicate for corrective advertising, as East Coast urges this Court to do. Instead, as the cases cited by Plaintiffs illustrate, courts have relied on evidence of confusion before permitting corrective advertising. See Novartis Corp. v. FTC, 223 F.3d 783, 787-88 (D.C. Cir. 2000) (court affirmed FTC's requirement for corrective advertising was based on studies that attempted to quantify the improvement in consumer perception of pain reliever after a nine-year advertising campaign, including a survey of "lingering effects" six months after the campaign concluded); Warner-Lambert, 562 F.2d at 762-63 (finding that product survey data and related expert testimony "constitute substantial evidence in support of the need for corrective advertising . . . ."); PBM Prods., Inc. v. Mead Johnson & Co., 174 F. Supp. 2d

417, 422 (E.D. Va. 2001) (noting that courts "have considered the existence and reliability of consumer surveys" in assessing the evidence needed to support a claim for prospective corrective advertising, citing Novartis and Warner-Lambert); and American Farm Bureau Fed'n v. Alabama Farmers Fed'n, 935 F. Supp. 1533, 1550-51 (M.D. Ala. 1996) (relying on surveys establishing consumer confusion between parties to award corrective advertising damages).

Although the Warner-Lambert court logically surmised that companies would be "wasting their massive advertising budgets" if the advertising did not have any effect on consumer belief, 562 F.2d at 762, here there is no evidence to indicate what consumers of ESE systems actually believed about the product, let alone what effect Plaintiffs' advertising had on those beliefs.

East Coast notes that Plaintiffs stated that between the early 1980's and 2001, East Coast wrote thousands of letters to architects, engineers and others who made recommendations on lightning protection systems advising that reliable testing did not support a measurable zone of protection for ESE terminals or that the terminals were effective to protect open spaces. Because Plaintiffs, in opposing summary judgment, did not specify any instance in which East Coast's letters actually prevented the purchase of an ESE system, East Coast urges the Court to conclude that Plaintiffs' advertising must have had the intended effect. Such a conclusion, however, would be entirely speculative and is not drawn.

East Coast argues that the proposed injunction must require Plaintiffs to "run corrective ads specifically stating that systems that are not installed in conformance with NFPA 780 and/or UL96A can be dangerous, and must provide copies of the Injunction and the Court's Order to prospective customers. . . ." This requirement, however, would exceed the injunctive relief contemplated in this Court's October 2003 Order:

> In arguing against injunctive relief, Plaintiffs contend that granting injunctive relief would require the Court to administer a broad and intrusive injunction to regulate the lightning protection industry. Plaintiff's arguments are overstated. For example, Plaintiffs argue that an injunction "would place the Court in the position of ordering that all lightning protection systems be installed in compliance with NFPA and U.L. standards" and "effectively

> prevent[] any competing systems of lightning protection from being sold or distributed in the United States." . . . These claims are unfounded, because the injunction would only affect Plaintiffs' advertising, not compliance standards or distribution.

[Doc. #341, p. 57.] If the Court were to require Plaintiffs to run corrective ads stating that systems not installed in conformance with NFPA 780 or UL96A are dangerous, this would in effect go beyond advertising and require a product's compliance with those standards. By limiting the injunction to preventing Plaintiffs from advertising that the ESE system provides a measurable zone of protection greater than that of conventional lightning rods or that ESE systems protect open spaces, the injunction conforms with this Court's holdings in the October 2003 Order.

**7. Required revisions to East Coast's Proposed Injunction and Order**

Consistent with the above discussion, East Coast will be required to revise its Proposed Injunction and Order filed on October 20, 2004, as follows:

- On page 2, lines 19 and 20, replace the phrase "United States safety standard" with "NFPA 780 requirements";
- Omit as redundant: page 3, sub-paragraph (b); page 4, sub-paragraphs (e), (f), and (g);
- On page 4, sub-paragraph (c), replace the phrase "perform as claimed" with "provide a measurable zone of protection greater than systems installed in conformance with NFPA 780";
- Omit paragraphs 4 through 8, pages 4 through 11.

**B. Defendant East Coast Lightning Equipment, Inc.'s Motion and Memorandum in Support of Entry of Sanctions for Bad Faith Affidavits (Doc. #368)**

East Coast argues for Court-ordered sanctions against Plaintiffs for submitting affidavits in support of their arguments against East Coast's proposed injunction. East Coast contends that Plaintiffs "mis-characterize and misrepresent specific findings" in the October 2003 Order in a knowing or reckless manner. East Coast's allegations center primarily on

Plaintiff's argument that they should be able to advertise a specific, measurable zone of protection based on personal experience in the field rather than on scientific testing.

Although the Plaintiffs' disputed affidavits in fact misconstrue this Court's holdings set forth in its October 2003 Order, there is room for differing interpretations of the Order, particularly where the Court has not yet issued an injunction. It does not appear that Plaintiffs' affidavits were necessarily made recklessly or with knowledge the statements were false. East Coast's request for sanctions will be denied.

**C. Defendant East Coast Lightning Equipment, Inc.'s Amended Motion to Strike Facts Asserted in Plaintiffs' Supporting Affidavits Re: Objection to East Coast's Proposed Injunction (Doc. #369)**

East Coast objects to statements made in the affidavits of Frederick Heary and Robert Rapp, as well as in a letter attributed to Arnaud Lefort. East Coast's objections will be addressed in turn.

Plaintiffs state that because they are only providing supplemental information to guide the Court in defining the parameters of an injunction in this matter, the rules bearing on admissibility of evidence applicable to consideration of summary judgment pursuant to Rule 56 should not be applied. Plaintiffs further state that, pursuant to Rule 65, the Court's focus should not be on the admissibility of evidence, but rather "how it can proceed to tailor the injunction to eliminate only the specific harm found by the Court." [Doc. #375, p. 4.]

East Coast urges the Court to review the testimentary evidence submitted in the parties' supplemental briefing as it would any other such evidence, regardless of whether the evidence is exercising legal or equitable jurisdiction.

A court may consider evidence that is not admissible when considering a preliminary injunction. See Moore's Federal Practice 3d §65.23[2] ("The requirements of Rule 56(e) for affidavits in support of a motion for summary judgment are not expressly applicable to affidavits in support of a preliminary injunction. Since injunctive relief is discretionary and non-final, application of the standards for summary judgment affidavits would be inappropriate."); Butcher v. Gerber Prods. Co., 8 F. Supp. 2d 307, 314 (S.D.N.Y. 1998)

("Because the purpose of a preliminary injunction is on to preserve the *status quo* in a given case until a trial can be held, and 'given the haste that is often necessary if these positions are to be preserved, a preliminary injunction is customarily granted on the basis of procedures that are less formal and evidence that is less complete than a trial on the merits . . . .'"). The injunction in this case, however, is to be entered after the Court has considered the merits and has entered summary judgment, and will be permanent, not preliminary. Thus, the relaxed procedures applicable to a preliminary injunction do not hold.

**1. Frederick Heary's November 2003 affidavit**

East Coast objects to a number of averments asserted by Mr. Heary in his November 2003 affidavit. Each is addressed in turn.

**a. Statement 2**

Mr. Heary states that he believes, pursuant to this Court's October 2003 Order, that while Heary Bros. may not advertise "a measurable zone of protection based on . . . . testing," "Heary Bros. should be permitted to engage in truthful advertising of its ESE products." East Coast argues this is legal argument and not a statement of facts on which Mr. Heary is competent to testify, and that his belief on how the Court should craft the injunction is irrelevant. The Court agrees with East Coast: Statement 2 will be stricken as impermissible legal argument.

**b. Statement 3**

In Statement 3, Mr. Heary states what he believes would be the effects of East Coast's proposed injunction if adopted by the Court, and argues that his personal experience has shown that both ESE systems and conventional systems are equally effective. The first and fourth sentences of Statement 3 will be stricken as legal conclusion.

**c. Statements 5 and 6**

East Coast complains that Statements 5 and 6 are not statements of fact, but rather conclusory allegations and legal argument. The Court agrees and will order Statements 5 and 6 stricken.

**d. Statements 7-10**

Mr. Heary's statement in Statement 10 regarding violation of free speech rights will be stricken as an impermissible legal conclusion. The balance of Statements 7 through 10 are within Mr. Heary's competence and will not be stricken.

**e. Statement 12**

In Statement 12, Mr. Heary makes statements regarding the insurance coverage history of his company. He is competent to make the factual statements asserted. East Coast's motion to strike will be denied as to Statement 12.

**f. Statements 13-15**

These statements contain Mr. Heary's response to a specific term in East Coast's proposed injunction and are statements reasonably within his competence. East Coast's motion to strike will be denied as to these statements.

**g. Statements 16-18**

East Coast complains that "Mr. Heary is engaging in hyperbole and false assumptions based on his reading of the Proposed Injunction. His argument is better left to counsel to brief and should be stricken."

The last sentence of Statement 17 and the first sentence of Statement 18 consist of legal argument, and will be stricken.

**h. Statements 26-32**

East Coast complains that Mr. Heary is testifying on topics beyond his personal knowledge in Statements 26 through 32.

East Coast is partially correct. The following will be stricken for lack of foundation: Statements 28 and 29; the last sentence of Statement 30 and the portions of Statement 30 in which he speculates regarding the Defendants' motivations or decisions; and Statement 31 and the portion of Statement 32 in which Mr. Heary speculates on Defendants' motivation to drive Heary Bros. out of business.

**2. Frederick Heary's December 2003 Reply affidavit**

Plaintiffs attached an affidavit from Frederick Heary dated December 22, 2003 to their Reply to the proposed injunction. East Coast objects to Statements 11 and 12 of the affidavit, complaining that Mr. Heary's declaration of the parameters of his company's intended advertising pending appeal in this matter are a misrepresentation "of the important facts found by the Court in its decision." Mr. Heary is competent to testify as to his company's interpretation of this Court's Order and his position regarding the scope of advertising permitted under the Order. East Coast's motion to strike will be denied as to Statements 11 and 12 of Mr. Heary's December 2003 affidavit.

**3. November 2003 affidavit of Robert Rapp**

Plaintiffs attached the November 25, 2003 affidavit of Robert Rapp, an officer of Plaintiff National Lightning Protection Corp., to its Objections to Proposed Injunction (Doc. #363). East Coast objects to a number of statements asserted in the affidavit, many of which are duplicative of statements in Mr. Heary's November 2003 affidavit. The objections are addressed in turn.

**a. Statement 2**

East Coast objects to Mr. Rapp's statement and related argument that East Coast has conceded the existence of foreign safety standards. Mr. Rapp's statement is primarily legal argument and will be stricken.

**b. Statement 5**

East Coast objects to Mr. Rapp's interpretation of the Court's October 2003 Order as it affects his ability to advertise that his ESE systems comply with foreign standards and that the systems have provided effective lightning protection to structures.

Mr. Rapp is competent to testify on these issues. East Coast's motion to strike will be denied as to Statement 5.

**c. Statements 6-10**

East Coast asserts that Statements 6-10 are essentially the same as Statements 7-10 in Mr. Heary's November 2003 affidavit, and objects for the reasons stated with regard to the latter. Mr. Rapp's testimony in Statement 9 regarding violation of free speech rights and the last sentence of Statement 10 regarding international trade will be stricken as legal argument. East Coast's motion to strike will be denied as to the balance of Statements 6-10.

**d. Statement 12**

East Coast objects to Statement 12 for the same reason it objected to Statement 12 of Mr. Heary's November 2003 affidavit. Because Mr. Rapp is competent to make the factual statement asserted, East Coast's motion to strike will be denied as to Statement 12.

**e. Statements 13-15**

East Coast objects to Statements 13-15 for the same reasons it objected to Statements 13-15 of Mr. Heary's November 2003 affidavit. Because the statements are reasonably within Mr. Rapp's competence, the motion to strike will be denied as to Statements 13-15.

**f. Statements 16-18**

East Coast objects to Statements 16-18 for the same reasons it objected to Statements 16-18 of Mr. Heary's November 2003 affidavit. The first sentence of Statement 18 consists of legal argument and will be stricken. East Coast's motion to strike will be denied as to the balance of Statements 16-18.

**g. Statements 27-32, 34**

Again, East Coast refers the Court to its objections to statements in Mr. Heary's November 2003 affidavit and asks that Mr. Rapp's statements be stricken for the same reasons.

Mr. Rapp's statements lack foundation and are argumentative and will thus be stricken.

**4. Robert Rapp reply affidavit dated December 22, 2003**

East Coast objects to several statements included in Robert Rapp's affidavit dated December 22, 2003, attached to Plaintiffs' Reply to East Coast's Proposed Injunction. The objections are addressed in turn.

**a. Statement 13**

Statement 13 contains a recital of Mr. Rapp's understanding of certain holdings of this Court's October 2003 Order. It does not include legal argument and will not be stricken. East Coast's motion to strike will be denied as to Statement 13.

**b. Statement 14**

As East Coast complains, Statement 14 does include a legal conclusion and will be stricken on that basis.

**c. Statement 15**

East Coast objects to Statement 15 because Mr. Rapp is offering legal conclusions. The Court agrees and will grant the motion to strike Statement 15.

**d. Statements 17-18**

East Coast objects to Statements 17 and 18, alleging that the statements Mr. Rapp makes are factual and further that the statements "appear to be made in bad faith, and constitute a highly reckless representation of the important facts already found by the Court." Mr. Rapp's statements, however, are expressly his "belief" based on his reading of the Court's Order. He is competent to testify as to his understandings.

**5. Arnaud Lefort letter affidavit**

Plaintiffs attached an apparently redacted letter dated December 1, 2003 signed by Arnaud Lefort, Chairman of the Board of Indelec, the manufacturer of the Prevectron ESE air terminal sold by Mr. Rapp. East Coast moves to strike the letter because it is unauthenticated and redacted, and further because the affidavit/letter purports to establish a scientific foundation for the French safety standard applicable to ESE systems. East Coast notes that Mr. Lefort was never disclosed as an expert on any topic.

Mr. Lefort's letter/affidavit exceeds the scope of the supplemental briefing permitted by this Court and will be stricken.

**D. Plaintiffs' Cross-Motion to Strike Portions of Defendant's Supplemental Submission (Doc. #374)**

On October 7, 2004, East Coast filed Supplemental Affidavits and Materials Regarding Plaintiffs' Violation of Court Order (Doc. #370). On October 18, 2004, Plaintiffs filed a Cross-Motion to Strike Portions of Defendant's Supplemental Submission (Doc. #374). In the Cross-Motion, Plaintiffs object to several statements included in the affidavit of Jennifer Morgan, an East Coast Vice-President, in which she introduced documents submitted pursuant to this Court's September 27, 2004 Order (Doc. #361) permitting the filing of supplemental materials regarding East Coast's complaints that Plaintiffs had continuously violated this Court's October 23, 2003 Order.

**1. Morgan Affidavit Paragraph 4, Attachments 3, 4, 6 and 7**

Ms. Morgan states that these attachments are internet advertisements presented by Heary Brothers distributors. She provides the website from which each advertisement was accessed. East Coast provided these documents to demonstrate that Plaintiffs' distributors continued to advertise a specified measurable zone of protection after entry of the October 2003 Order. Plaintiffs complain that Ms. Morgan does not state that she has personal knowledge that the entities placing the internet advertisements are distributors of Heary Brothers, and that except for the entity identified in Attachment 6, the entities are not distributors of Heary Brothers' products.

The reference in Ms. Morgan's affidavit to "distributor(s)" will be stricken from the descriptions included under Paragraph 3, Attachments 3, 4, and 7.

**2. Morgan Affidavit Paragraph 4, Attachment 8**

Plaintiffs complain that Ms. Morgan has established no foundation for, and has failed to authenticate, Attachment 8, which Morgan described as "A Heary Bros. 'Certificate of Test and Guarantee,' sent by Heary Bros. to a potential customer, Virtua Health Support Services

Center in Marlton, NJ." East Coast does not address this allegation in its Response. Attachment 8 will be stricken.

**3. Morgan Affidavit Paragraph 4, Attachment 9**

Ms. Morgan avers that Attachment 9 contains "Specifications for ESE systems that I printed from the McGraw-Hill Construction Product Newsletter ("Dodge Scan") on the dates specified on the documents." Plaintiffs do not object to the Affidavit, but rather dispute East Coast's arguments which reference the Attachment. Having established no basis for striking Attachment 9, Plaintiff's Cross-Motion will be denied as to that attachment.

**4. Morgan Affidavit, Paragraph 4, Attachment 2**

Ms. Morgan describes Attachment 2 as: "Relevant pages from the Manufacturer's Installation Standard for Lightning Protection Systems Using Early Streamer Emission Air Terminals, HBP-21, downloaded from the Lightning Preventor of America site, www.lightningpreventor.com." Plaintiffs state that Attachment 2 is actually product descriptions and specifications "for use in conjunction with designing ESE systems pursuant to" the Manufacturer's Installation Standard. The page from HBP-21 included in Attachment 2 specifies zones of protection based on "over 25 years of successful field experience with ESE systems."

Plaintiffs move to strike the Attachment document because it is not advertisement, but rather "instructions" for installation. As Plaintiffs concede, Ms. Morgan does not state that the document is advertisement, although East Coast argues that the material is included in advertising materials for Plaintiffs' ESE systems. Plaintiffs fail to establish a basis for exclusion of this document. The Cross-Motion will denied as to Paragraph 4, Attachment 2 of Ms. Morgan's affidavit.

**5. Morgan Affidavit, Paragraph 4, Attachment 1**

Ms. Morgan describes the document included under Attachment 1 as "A Preventor brochure obtained from the Heary Bros. booth at a trade show in Salt Lake City, Utah on May 23, 2004." Plaintiffs request to strike this document as "misleading" because it is

incomplete and because "the current version of Plaintiffs' brochure as of August 12, 2004 is attached to the Heary Affidavit as Exhibit B."

The Court permitted East Coast to submit supplemental materials and affidavits relevant to its claim that Plaintiffs have violated the intent of the October 2003 Order. Plaintiffs do not explain why the brochure offered by East Coast is incomplete; moreover, simply because a newer brochure has been made available does not by itself render an older brochure inadmissible. Plaintiffs' Cross-Motion will be denied with respect to Attachment 1.

**E. Defendant East Coast Lightning Equipment, Inc.'s Motion and Memorandum of Points and Authorities to Strike Facts Asserted in Affidavit of Counsel Re: Objection to East Coast's Proposed Injunction (Doc. #384)**

East Coast moves to strike certain statements of Plaintiffs' counsel Linda Joseph attached to Plaintiffs' Sur-Surreply (Doc. #373). East Coast refers to Ms. Joseph's statements regarding an article authored by Defendants' expert, Dr. Uman, in the December 2002 issue of the *American Meteorological Society*. East Coast requests that most of paragraphs 4 and 5, and all of paragraph 6 of Ms. Joseph's October 14, 2004 affidavit be stricken because she wrongly concludes that the Uman article states that U.S. safety standards are not based on the physics of lightning, and otherwise lacks specific facts and offers only conclusory statements.

As noted above, language in East Coast's proposed injunction requiring Plaintiffs to advertise that ESE systems configured in a manner inconsistent with NFPA 780 are dangerous will be omitted as beyond the scope and the holding of the October 2003 Order. Ms. Joseph's averments dealing with the basis for NFPA 780 are similarly beyond the scope of the October 2003 order. East Coast's motion to strike will be granted on that basis.

Accordingly,

**IT IS ORDERED** that Defendant East Coast Lightning Equipment, Inc. will submit a form of Injunction and Judgment incorporating the revisions set forth in section III (7) above within ten (10) days of the date of this Order.

**IT IS FURTHER ORDERED DENYING** Defendant East Coast Lightning Equipment, Inc.'s Motion . . . [for] Sanctions for Bad Faith Affidavits (Doc. #368).

**IT IS FURTHER ORDERED** that Defendant East Coast Lightning Equipment, Inc.'s Amended Motion to Strike Facts Asserted in Plaintiffs' Supporting Affidavits Re: Objection to East Coast's Proposed Injunction (Doc. #369) is **GRANTED IN PART** and **DENIED IN PART** as explained in this Order.

**IT IS FURTHER ORDERED** that Plaintiffs' Cross-Motion to Strike Portions of Defendant's Supplemental Submission (Doc. #374) is **GRANTED IN PART** and **DENIED IN PART** as explained in this Order.

**IT IS FURTHER ORDERED GRANTING** Defendant East Coast Lightning Equipment, Inc.'s Motion . . . to Strike Facts Asserted in Affidavit of Counsel Re: Objection to East Coast's Proposed Injunction (Doc. #384).

DATED: 9/9, 2005.

Roslyn O. Silver
United States District Judge