BUREAU OF INDIAN STANDARDS

MINUTES

Panel for Electrical Installations, CED 46:P13 : Fifth Meeting

Thursday, 31 May 2018 : 1030 h – 1745 h

Lal C. Verman Conference Hall, Manak Bhavan, Bureau of Indian Standards, 9 Bahadur Shah Zafar Marg, New Delhi 110 002.

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Convener: Shri J.N. Bhavani Prasad

Member Secretary: Shri Sanjay Pant
Jt Member Secretaries: Shri S. Arun Kumar
Smt Madhurima Madhav

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PRESENT

Members:

Shri Puneet Gupta (Aeon Integrated Building Design Consultants, New Delhi)
Shri A. K. Rajput (Central Electricity Authority, New Delhi)
Shri Neeraj Kumar (Rep. Central Electricity Authority, New Delhi)
Shri Shiva Suman (Rep. Central Electricity Authority, New Delhi)
Shri C. K. Varma (Central Public Works Department, New Delhi)
Shri Devesh Jaiswal (Rep. DEHN India Pvt Ltd, Gurugram)
Shri Navin Anand (Rep. DEHN India Pvt Ltd, Gurugram)
Shri H. R. Khan (Ministry of New and Renewable Energy, New Delhi)
Shri Arul Prakash (OBO Bettermann India Pvt Ltd, Chennai)
Dr K. Janaki Raman (OBO Bettermann India Pvt Ltd, Chennai)
Shri Satyam Srivastava (Rep. OBO Bettermann India Pvt Ltd, Chennai)
Smt Shruti Goel (Proion Consultants, New Delhi)
Shir Rohit Chashta (Rep. Schneider Electric India Pvt Ltd, Gurugram)

Invitees:

Shri S. Gopa Kumar [CAPE Electric Pvt Ltd, Chennai]
Ms Anju Kaintura (JMV LPS Ltd, Noida)
Ms Manisha Singh (JMV LPS Ltd, Noida)
Indelecsa India Pvt Ltd: Represented by
Shri Vinod Nair (Indelecsa India Pvt Ltd, Bengaluru)
Shri Jeyaram Radhakrishnan (Lightning Protection International Pty Ltd, Australia, Representing Indelecsa India Pvt Ltd)
Dr Franco D'Alessandro (Lightning Protection International Pty Ltd, Australia, Representing Indelecsa India Pvt Ltd)
Shri Jerome Dubim (IndelecSA France, France, Representing Indelecsa India Pvt Ltd)
Shri Anurag Gupta (Allied Power Solutions, Delhi)

From BIS:

Shri Sudheer Bishnoi, Scientist 'E', Eletrotechnical Department (ETD)
Shri Shyam Kumar, Scientist 'B' Eletrotechnical Department (ETD)

Item 0 OPENING REMARKS

The Convener, Shri J. N. Bhavani Prasad extended a warm welcome to all the members to the fifth meeting of the Panel. He mentioned that the meeting was being exclusively held to deal with aspects relating to safety from electricity and lightning protection of buildings. He stressed that with the increasing use of gadgets, the problems being faced are becoming more and complex, and therefore there is a need to focus on the problems associated with its use and come out with simple and implementable solutions. He highlighted that the instances, such as, shock, lightning, surge, etc are not reproducible experimentally and solutions are mostly based on statistical and empirical basis. He then requested all the members present for their effective contribution during the meeting in resolving the various issues which would be discussed in the meeting and come out with acceptable solutions.

With the above remarks and after the formal introduction of the members and invitees present, the Convener suggested to take up the Agenda item-wise.

Item 1 CONFIRMATION OF MINUTES OF THE LAST MEETING

1.1 There being no comments, the Panel confirmed the Minutes of the last (fourth) meeting of the Panel held on 09 October 2015 in New Delhi, as circulated vide BISDG letter No. CED46:P13/A-2.4 dated 15 March 2016.

Item 2 COMPOSITION

The Panel noted its composition as given at Annex 1 to the Agenda, reviewed the same, considered the requests for co-option received, and decided/noted as follows:

a) Shri H. R. Khan and Shri G. Upadhyay would henceforth represent Ministry of New and Renewable Energy, New Delhi as per the nominations received from them during the meeting.

b) OBO Bettermann India Pvt Ltd, Chennai to be represented by Shri Arul Prakash and Dr K Janaki Raman as per the revised nominations received from them vide their letter No. OBO/BIS-CED-46AUTH/2017 dated 17 June 2017.

c) As per the communication received from Military Engineer Services, E-in-C's Branch, Integrated HQ of MoD (Army), New Delhi vide reference 61748/Gen/E4(U) dated 16 February 2018, they would henceforth be represented on the Panel by Shri Jayaprakash, Director (U) and Shri A. K. Dubey, Director (U) as Principal and Alternate Member respectively.

d) As per the email dated 15 march 2016 received from Dehn India Pvt Ltd, Gurugram, they would henceforth be represented on the Panel by Shri Vikas

Almadi and Shri Brijesh Malik as Principal and Alternate Member respectively.

e) Considering the contribution made by Shri S. Gopa Kumar in the revision exercise of the concerned chapter in National Building Code of India 2016 and the continued interest shown by him in the work of the Panel, it was decided to co-opt Cape Electric India Pvt Ltd, Chennai as Shri S. Gopa Kumar who has since left OBO Bettermann India Pvt Ltd, Chennai and started Cape Electric India Pvt Ltd.

f) It was not agreed to co-opt Chettiar Consulting Engineers, Mumbai at present considering that the concerned interest group is adequately represented on the Panel. It was, however, informed that they would be included in the Civil Engineering Department's (CED) database to enable them to receive various documents/circulars issued by CED from time to time to enable them to give their inputs/feedback. They may, even otherwise, send their suggestions if any on any issues for consideration by the Panel.

g) In view of continued non-participation of AECOM India Pvt Ltd, Noida the Panel recommended withdrawal of their representation.

Item 3 COMMENTS RECEIVED ON PRINTED PUBLICATION

3.1 Comments on SP 7 (Part 8/Section 2):2016 'National Building Code of India 2016: Part 8 Building Services, Section 2 Electrical and Allied Installations'

3.1.1 The Panel duly considered the various comments received on SP 7 (Part 8/Section 2):2016 as given under the item of the Agenda, as also the additional comments tabled during meeting. The Panel then discussed/decided in respect of each of the comments as given in Sl No. (a) to (i) below:

a) ***From Indelecsa India (P) Limited, Bengaluru***

<u>Comments:</u> Provide clarification on Clause 11.5.1.1 of the above Part (NBC 2016: Part8/Section 2) which is prohibiting the use of other kind of air-terminal like dissipation system/ESE air-terminal/CSE air-terminal. BIS is requested to review the clause so that a suitable amendment may be issued.

Shri Vinod Nair, explaining their above comment, informed during the meeting that ESE systems had been available in the Indian market for more than 15 years, with a millions of installations around Asia in some of the most lightning-prone areas. He added that there are many thousands of ESE installations in India, protecting historical monuments, aerodromes, military bases, industrial properties, etc. He added that 80 percent of installations of Airport Authority of India has been using the above system provided by Indelecsa and these have replaced their existing conventional systems. He informed that these systems are being used in their buildings as well as high mast towers. He informed that over this period, 70-80 percent of the new Indian project investments of ESE air-terminal have been in area of airports

and industrial facilities. High rise buildings and mixed occupancies have been designed, supplied, installed and maintained by capable ESE lightning protection industry players. He further added that considering the lesser space requirement and effectiveness of these kind of installations, MES, CPWD and DGM&S have opted for ESE LPS installations. With no recorded failures reported to date, ESE systems have demonstrated outstanding effectiveness in protecting the structures on which they have been installed and posed no threat to human life or assets.

Shri S. Gopa Kumar informed that recently various such organizations have started replacing ESE type lightning protection systems (LPS) by the conventional system as per IS/IEC 62305.

The Panel then enquired Shri Nair and his team about the reasons for not accepting ESE systems by IEC and NFPA.

Shri Nair informed that, while IEC has not included ESE systems so far in the IEC 62305:2010 series 'Protection against lightning', NFC 17-102 'Protection against lightning - Early streamer emission lightning protection systems' was first formulated in 1995 as an AFNOR Standard. He added that the current version of the AFNOR standard is of 2011. Shri Nair informed that the French Building Code refers both NFC 17-102 and NF EN 62305. Shri Nair informed that 10 countries including Turkey has adopted NFC 17-102:2011. Shri Nair added that similar approach may also be adopted in NBC 2016 by allowing both the technologies to coexist.

Shri Gopa Kumar informed that even France follows NF EN-62305 as IEC 62305 has been adopted by them as the code of practice standard for lightning protection system. The Code mentioned by ESE vendors NFC 17-102 is an additional French standard for the product which has been formulated to protect the ESE manufacturers' interest. He informed that the claim being made that ESE and the system as per IEC 62305 coexist in France is wrong, as installations in France must confirm NF EN 62305 and additionally user can use whatever they want. Whereas in India ESE devices are installed without confirming any conditions in IS/IEC 62305. Members further added that even NFC 17-102 code prescribes number and location of down conductors as per IEC 62305. It was noted that even Australia and European countries follow lightning protection system as per IEC 62305 series. It was informed by the members that ESE has never been accepted by CENELEC. It was also informed by the members that, IEC 62305 type LPS is mandatory as a replacement of old installations as per ESE.

Members also informed that as per IEC 62305, minimum 2 down conductors with rings are required in case of buildings of height less than 60 m, and minimum 4 down conductors with rings are required in case of buildings of height more than and equal to 60 m. Whereas in case of ESE type installations, the supplier gives only 1 down conductor and that too through electrical shaft. Shri Janaki Raman enquired that it was important to see the practice and observe whether ESE has any effect on bringing down the step

and touch voltage. Shri Nair replied that the contract documents are always as per specifications and the deviations are being rectified by them through commissioning checks. Shri Gopa Kumar however informed that in most of the installations (to the order of 99 percent), provisions in the NFC 17-102 are also not being followed. Shri Nair argued that it was the responsibility of the consultant to ensure the correct installation of any technology. Smt Shruti Goel informed that in France both the systems (ESE and conventional) are provided. Shri Franco however mentioned that any one of the technologies is being used and not the both, as being reported by Smt Goel. Smt Goel also desired that some documentation of the insurance companies may also be referred for the provisions in this regard. Shri Janaki Raman of OBO Bettermann informed that the insurance companies disregard ESE installations. He also mentioned that it was also the responsibility of the vendor to ensure correct installation of LPS as per the good practices given in the relevant Code. Smt Goel also expressed that in absence of validated data for efficacy of such systems as also Indian standard on the subject technology, NBC should not permit use of such systems in the code. To the questions raised by Shri Janaki Raman regarding use of ESE systems in nuclear/atomic energy installations, no specific installations were highlighted in France and other countries by Indelecsa team. Smt Goel informed that NFPA 780 is also moving towards IEC 62305 (Faraday cage systems). She informed that many American countries working in India recommend installation of LPS as per IEC 62305. Shri Franco mentioned that none of the above mentioned standards prohibit use of ESE systems and there is no reference of these systems in the above codes. He added that similar approach may also be followed in NBC 2016 by deleting the sentence where use of ESE type terminals has been prohibited. He further added that the French standard NFC 17-102 has since been revised to include more tests. Smt Goel enquired that whether tests are done only on 100 kA and 200 kA or also on 1 kA and 2 kA which are difficult to capture. Shri Franco answered that the terminals are tested for 3 discharges at 100 kA. The Convener, Shri Bhavani Prasad enquired that whether any test is being done to prove the claim being made to attract/catch the lightning by such systems. Shri Franco mentioned that the test at Clause no. 5 of the NFC 17-102 covers the above performance requirement. He added that all tests as per the NFC 17-102 are being done on each of the product and comes with UL certification. When he was requested to share the test certificates with the Panel, Shri Nair informed that these were available on UL website. Shri Janaki Raman informed the Panel about the claim being made by ESE industry that the level 1 to 4 lightning protection level as per IEC 62305 with a coverage of 100 m radius can be provided using their terminals. He enquired about the laboratory where the above assumed area of coverage being claimed by the ESE industry is tested. Shri Franco in response mentioned that more than 300 000 installation all over the world still continue to exist but then there was no evidential record/test report submitted against the above question to the Panel. He added that in Malaysia, it has been reported that failure of conventional systems has been more than the ESE systems. In response, the Convener, Shri Bhavani Prasad mentioned that it is the collective responsibility of all the experts of the Panel to deliberate and find out the right

solutions to ensure safety of the occupants and the build assets. Ms Manisha of JMV LPS Ltd handed over a letter during the meeting clarifying that they do not support ESE type systems and that they design LPS as per IS/IEC 62305 only. She also informed that Shri Manav who in the name of their company was advocating ESE type systems has already left their organization. She further added that the test in clause 5 of NFC 17-102 is not sufficient to test the coverage, and the radius of protection cannot be calculated in the controlled atmosphere of the laboratory. She added that in absence of any Indian standard for such products, the system should not be permitted for use in India. In response to the point raised by Shri Franco that none of the international standards exclude ESE, the Panel clarified that India is a different country and in the instant matter, exclusions need to be clearly outlined in codal provisions to ensure proper implementation of requirements/provisions of the Code.

After hearing the views of various members of the Panel including the Indelecsa team, the Convener, CED 46:P13 requested the Indelecsa team to give their response to the various comments received from Shri N. Nagarajan (which were enclosed at Annex 3 of the Agenda). The point wise reply given by the Indelecsa team, as also other discussion held in the matter is given below:

1. *These systems are not approved for use in any of the leading standards in the world.*

   In response to the first point of Shri Nagarajan, Shri Franco informed that at International level their proposal vote for a standard for ESE terminal is rejected due to lack of majority. Shri Navin Anand of Dehn India Ltd produced extracts from Singapore standard in which as per the foreword of the standard, non-conventional lightning protection systems (including ESE type air terminals) are not recommended.

2. *United States of America had instituted research on these LPS systems for more than 30 years but have not found any support for the claims made by the Industry. Because of this reason they have not approved these systems in their standards even on trial basis and have repeatedly year after year have confirmed use of the conventional system which is recommended in IS/IEC 62305.*

   In response to the query at point no. 2, Indelecsa informed that the research is basically related to response of sharp and blunt rods in the event of lightning. They mentioned that it has been found that the blunt rods are being struck at the time of lightning event and not the sharp rods, however, there is no general publication of this research.

3. *The additional French Code NFC 17-102 under the French Lightning Protection Standard NF EN 62305 which allows manufacture of ESE system, could not get the same included under IEC LPS standard where they are an active member for more than 30 years. This is probably*

because there is no research available to prove it is a fail safe system and that the system actually protects the area which is claimed by the manufacturers.

Shri Franco reiterated that at International level their proposal vote for a standard for ESE terminal is rejected due to lack of majority. Shri A. K. Rajput enquired about the view of Central Power Research Institute on the above type of technology. Shri S. Gopa Kumar informed that test facility is not available with CPRI to test the performance of these products. It was further added that no testing facility is available in the country to test the air terminals for 10/350 µs. Members also enquired that whether full-fledged testing facility for LPS in India is being planned. She Nair informed that there is no facility in India, however there is one in Spain and ΔT test facility is at Indelec in France. He added that only a German certification of the LPS component as per IEC 62561 (Parts 1 to 7) is being done in India.

4. *The CSE/DAS system do not have any support from any standard in the world.*

   Shri Franco agreed with the statement of Shri Nagarajan at point no. 4 and agreed that CSE/DAS systems may continue to be prohibited in NBC 2016.

5. *The concept of ESE/CSE/DAS are not covered by the provisions of Indian Standards and are actually in contravention of the provisions of Indian Standards.*

   Indelecsa also agreed to Shri Nagarajan's point at Sl No. 5 that the concept of ESE/CSE/DAS are not covered by the provisions of any Indian Standards. The members had a view that even India should not follow any technology/theory not accepted/followed internationally. Shri A. K. Rajput also stressed that these technologies which are being presently produced and tested outside the country should have facilities in India for getting tested. Shri Janaki Raman informed that they have already requested CPRI to create a facility for 10/350 µs testing in India. The Convener, Shri Bhavani Prasad added that CPRI should first validate this technology (ESE) for its acceptance in the Indian standards, as this has not been accepted by most of the countries, as also by the IEC.

6. *Positioning of a metallic conductor on the roof without it being connected to the earth can result in damage as well as fire to the electrical installations if by any chance an electrical charge passes through the conductor and is not connected to the earth because of failure of the system.*

7. *Just because such system is already installed in some building and where no damage has taken place till now cannot be said that the system is functioning satisfactorily since there is no proof that the said building had*

actually encountered a positive or negative lightning charge and the same has been successfully conducted to the earth.

In response to remarks/comments at point no. 6 & 7, it was agreed that the connection of the metallic conductor on the roof to the earth has to be provided as part of correct installation practices. Shri Franco again reiterated that the installation practice is not the responsibility of the technology provider and when being done as per the codal provisions, the protection from lightning is ensured. It was again argued that it was also the responsibility of the vendor to ensure correct installation of LPS as per the good practices given in the relevant Code. He once again added that in Malaysia, more failures have been reported in case of mesh cage provided as per IEC 62305. Shri C. K. Varma enquired about the availability of any report of the 7000 ESE installations having captured the lightning charge of the area covered by them and conducted to the ground. The Convener, Shri Bhavani Prasad clarified that lightning is such a phenomena which cannot be claimed to have actually struck a building and which has been actually conducted to the ground by the particular terminal installed on that building. Shri Janaki Raman clarified that most of these surveys are sponsored surveys by the competing industry. Shri Franco countered that even researches are being sponsored by the industries and their competitors.

8. *Today in India almost all buildings have lot of electrical and electronic installations and any damage due to non-protection of the building will result in damage not only to the services from that building but may also result in collateral damage to other associated services and buildings.*

   Indelecsa team agreed to the above remarks made by Shri Nagarajan.

9. *Only because of this and increased use of ESE/CSE/DAS systems on the pretext that these systems are installed in buildings where no lightning damage has taken place over the decade has resulted in specifically bringing out the risk involved and to fore warn those building users who have installed the ESE/CSE/DAS systems to provide for the conventional system as mandated by BIS and IEC and incorporated in IS/IEC 62305 so that they can save the building from any damage in future.*

10. *Since the probability of a lightning striking the building is very low non damage alone cannot be the reason to approve a system under the standards for use especially when lot of research is taking place world over on this and no one is able to come forward with a positive recommendation for these systems.*

    In view of the foregoing and the lot of research available which specifically bans use of these systems, I do not recommend any change to what has already been stated in NBC.

    In response to remarks/comments made at Sl No. 9 & 10, Indelecsa team

reiterated the Malaysian statistics and added that testing facilities are not available in India for the conventional technology as well. They stated that ESE terminals have been installed in both very highly lightning prone and low lightning prone areas.

The members pointed that even the Australian/New Zealand standard debars use of non-conventional systems including ESE terminals. The members also expressed that by not including any reference to a particular technology, the standard actually excludes those technologies and many countries are working towards writing those exclusions as has already been done by Singapore and Australia. The Panel also enquired that despite being represented on the concerned Australian Committee for more than 20 years, why LPI Australia could not get ESE included as an acceptable technology in the Australian standard. Shri Puneet Gupta enquired about the capability of ESE terminals to arrest side flashing; any test/maintenance record for Indian installations; system involved to disseminate the charge; whether the charge can be grounded with GI/Cu within building without external conductor; and availability of any record of fail-safe ESE installations. Shri Alessandro and Shri Franco agreed that the system does not provide guidelines of side flash and mentioned that this was not an important aspect as side flash/strike are very rare. Smt Shruti Goel and Shri Puneet Gupta informed the Panel that IEC 62305 covers side flashes as well, however the same is not covered in NFC 17-102. They also informed that Infosys mostly adopts conventional LPS systems and in only few cases they have adopted both conventional and ESE type terminals. Shri Nair claimed that all ESE installations are being periodically checked and found to be capable to support the systems. Shri Janaki Raman informed about the letter from Ministry of Defence as per which they have also started replacing their existing ESE systems with conventional systems because of the failures and have also declined further use of ESE systems. Further in the above letter, they have mentioned that National Lightning Safety Institute has made remarks that ESE System is not scientifically proven under natural lightning conditions. The above letter as also other letters/documents provided by the members regarding practice followed worldwide in respect of non-conventional air terminals including ESE air terminals are also enclosed at **Annex 1 (Pg – 20 to 34)**.

1) *Letter from Executive Board of International Conference on Lightning Protection to CENELEC.*
2) *Letter from Centre of Excellence on Lightning Protection, Malaysia*
3) *Court Order in the United States District Court for the District of Arizona in the matter of Heary Bros. Lightning Protection Co. v/s National Fire Protection Association*
4) *Letter No. CFEES/DIXS/178/1/2010 dated 09 June 2010 of Ministry of Defence, Government of India*
5) *Letter No. 62888/Gen-Misc/E4(U1) dated 01 December 2010 of Ministry of Defence, Government of India*
6) *Report published in a paper by Hilton Petaling Jaya dated 08 January 2004 (Forum on Lightning Protection)*

7) *Relevant extract from Australian/New Zealand Standard AS/NZS 1768:2007 'Lightning Protection'*
8) *Relevant extract from Singapore Standard SS 555: Part 1: 2010 'Code of Practice for Protection against Lightning: Part 1 General Principles'*
9) *Letter dated 10 January 2011 from East Coast Lightning Equipment to Chief Electrical Inspector, Govt. of Tamil Nadu*

The Panel felt that the above deliberations were quite worthwhile and have also thrown light on practices adopted worldwide. The Panel was not satisfied with the arguments made by Indelecsa India Pvt Ltd for non-acceptance of ESE LPS systems by IEC, NFPA and in standards of Australia, Singapore and many other countries. In the above scenario, it was agreed that it was important to have views of concerned technical committee of Electrotechnical Department (ETD) of BIS also who have already adopted IEC 62305 as Indian Standards before further consideration in the matter. It was also agreed that any decision has to also consider practices worldwide and any available indigenous data/validation from independent laboratory/research institution.

Considering all the above, the Panel decided not to make any change presently in the provisions in NBC Part 8/Section 2 disallowing ESE/CSE/DAS systems. The Panel referred the matter to ETD for their detailed investigation and inputs for further consideration.

b) *From Shri N. Nagarajan on above Comments of Indelecsa India (P) Limited*

The Panel while framing its view and decision on the above comments of Indelecsa India (P) Limited also considered the inputs provided by Shri N. Nagarajan in the matter [*please see* Sl No. (a)].

c) *From JMV LPS Pvt Ltd, Noida*

The Panel noted the series of comments lodged by Shri Mahesh Chandra Manav of JMV LPS Pvt Ltd on CPGRAMS Portal of Govt. of India, which were received by BIS for grievance redressal and enclosed at Annex 4 of the Agenda. The comments lodged by Shri Mahesh Chandra Manav were not accepted by JMV LPS Pvt Ltd, which was expressed by their representative Ms Manisha who attended the meeting of the Panel. She also informed that Shri Manav has already left their organization and that they do not agree with his views/various comments sent by him on the Code.

The Panel also noted that Shri Manav's above comments were duly addressed by BIS giving him the exact status/position in respect of the work of the Panel and formally agreed to the various replies given by Civil Engineering Department of BIS to his series of complaints on CPGRAMS portal.

It was noted that his comment relating to permitting use of early streamer emission type lightning protection devices which was not agreed by the Panel in the last meeting has already been discussed in detail in this meeting of the Panel and the representatives of JMV LPS Pvt Ltd have informed that they do not endorse use of such systems.

The Panel in the matter also agreed that comments must be specific and duly justified with technical documents/findings and should preferably be sent with with proposed modified wordings.

d) *From Schneider Electric India Pvt Ltd, Gurugram*

The Panel considered the comments received from Schneider Electric India Pvt Ltd as given at Annex 5 of the Agenda. Convener, CED 46:P13, Shri Bhavani Prasad mentioned that the current is totally independent of the characteristic of the protective device and the leakage can reach up to 20-25 mA. He expressed that the options should be made available to the designer to evaluate and suggest use of the appropriate protective device in the design. He also expressed that 30 mA RCCB/RCD may create lot of nuisance of tripping. He further mentioned that use of switch mode devices are highly on increase leading to increased leakage. It was also discussed that shock current is independent of rating and desired that the Code should specify use of appropriate protective device as applicable for a particular situation. Shri Rajput informed that the amended safety regulations of CEA are being also finalized wherein use of different ratings of protective devices would be specified. It was also expressed that there is no practical purpose of specifying such rating of protective devices if manufacturers in the country are not making products/appliances compatible with reduced leakage. In the given scenario, wherein products which allow for very high leakage, protective devices are being by-passed by the electricians. It was agreed that it was important that a more practical approach be followed while framing the Codal provisions. Shri A. K. Rajput of CEA added that there should not be any bifurcation in providing safety provisions for wet and dry areas as houses are being extended and renovated without considering location of such safety installations. Shri Sudheer Bishnoi, Scientist 'E' (Electrotechnical Engineering), BIS informed that IEC 60364 series standards recommend use of 30 mA RCCB/RCD for protection from leakage current and accordingly the draft revision of IS 732 'Code of practice for electrical wiring installation' also suggest the above. He added that the code must specify the good practices required for safe electrical installations. The Panel considered the above suggestion made by him and considering hardly any installation having 20-25 mA leakage current, still opined that use of protective devices must be correlated with specified leakage current of the electrical products. The Panel also considered aspects like use of only one type of protective device in a house and that too not at all locations, no need to distinguish between wet and dry area in a building, need to decide tripping current, type AC RCCB being banned by many countries due to proliferation in DC installations, difficulty in regulating use of socket, use presently specified in the code at

incomer of distribution board, no separate sub-distribution board in many cases, lack of awareness of Type B RCCB/RCD, Schneider manual which specifies 20-25 mA leakage current of appliances, etc.

Considering all the above, the Panel decided that there is a need to give a holistic consideration in the matter and evolve guidelines for use of protective devices coordinated with electrical products in use and their rating. The Panel therefore after detailed deliberations in the matter constituted a group comprising following expert members to draft an Annexure giving above guidelines for suitable incorporation in NBC (Part 8/Section 2):2016:

a) Shri N. Nagarajan (***Coordinator***);
b) Smt Shruti Goel, Proion Consultants, New Delhi;
c) Shri C. K. Varma, Central Public Works Department, New Delhi;
d) Shri Amitabha Sarkar, Schneider Electric India Pvt Ltd, Gurugram;
e) Shri A. K. Rajput, Central Electricity Authority, New Delhi;
f) Shri S. Gopa Kumar, CAPE Electric Pvt Ltd, Chennai;
g) Shri H. R. Khan, Ministry of New and Renewable Energy, New Delhi ;
h) Shri Sudheer Bishnoi, Scientist 'E' (ETD), BIS;
i) Representative of Electrical Research and Development Association (ERDA), Vadodara; and
j) Central Power Research Institute (CPRI), Bengaluru

Shri Gopa Kumar was requested to inform the name of the expert to be contacted from ERDA and CPRI.

The above group was advised to also give recommendations regarding use of protective devices for solar roof top installations and need of residual device for protection from fire.

e) *From T. S. Sethi and Engineering Associates, New Delhi*

The Panel considered the comments received from T. S. Sethi and Engineering Associates as given at Annex 6 of the Agenda and decided as below:

Sl No.	Clause No.	As per NBC	TSSEA Recommendation	Decision of the Panel
1	3.4.6 Electrical Installation - Circuit Integrity Cables (of NBC 2016:Part 4)	All Emergency Power services shall be through fire proof enclosures or circuit integrity cables or through alternate route in the adjoining fire compartment.	Circuit Integrity cables are useful to maintain their integrity during the defined period of fire. The construction of these cables is different as compared with ordinary cables. The conductor is	The Panel noted that the comments were pertaining to Part 4 Fire and Life Safety of NBC 2016. The Panel, however having noted that the comment is related to use of cable for emergency power services and similar provisions are also contained in Part 8/Section 2 considered the comment. The Panel did

			manufactured with a specially designed heat barrier and fire resistant insulation which resists the fire to reach conductor surface. The cable continues to remain into operation at high temperatures like 650°C, 750°C and 950°C as per various conditions of operation and applications. Fire survival cables, withstand 750 degree C readily available may be adequate for the purpose.	not agree to replace use of circuit integrity cables by fire survival cables considering that presently no Indian Standard Specification is available for fire survival cables to ensure their quality and ability to withstand fire. It was clarified that the circuit integrity cable in accordance with IS 16246:2015 'Elastomer insulated cables with limited circuit integrity when affected by fire — Specification' apart from circuit integrity test also prescribes test for fire survival at 750°C for 3h of the inner and outer sheath material.
2	3.4.6.3.1 Oil Filled Substation (of NBC 2016:Part 4)	Oil Filled equipment shall be limited to be installed in Utility Building or in outdoor location such substation shall be at least 7 meter away from the adjoining buildings.	Local Fire office also required 6 mtr fire tender movements are more adequate and same is also mentioned in Clause No. 4.2.1 (12) II part 8.	The Panel noted that the comments were pertaining to Part 4 'Fire and Life Safety of NBC 2016'. The Panel however, considered the comment as being related to space planning for substation. The Panel clarified that the distance of 7m has been specified considering 1m space required for servicing/maintenance and providing fencing, and 6m for the movement of fire tender in case of installations in open locations. It was decided to bring coherence between the provisions of Part 4 and Part 8/Section 2 through appropriate amendment in both the chapters so as to clarify regarding requirements for oil-filled installations in case of both open location and in a utility building.

3	Annex E (Cl. 5.1.4 and 6) (of NBC 2016:Part 4)	In high rise buildings there shall be two rising mains located in separate shaft. Each floor shall have a changeover switch for connection to either of the two mains.	Multiple Type Rising Main in a single shaft with 2 hr. fire enclosure may be adequate for the purpose.	The Panel did not agree to the comments considering the safety issues involved in case of the proposed arrangement.
4	Electrical and Allied Installations Cl 11.5.5 Material and Dimensions for Lightning Protection conductor (of NBC 2016:Part 8/Section 2)	Copper and Aluminium are recommended for exposed areas. Gl may be preferred for temporary installation.	Gl is most preferred material as per IEC/IS 62305.	The Panel decided to include galvanized steel in the first line and delete second line of Clause 11.5.5 of NBC Part 8/Section 2 through an amendment.

f) ***From Kanwar Krishen Associates Private Ltd, New Delhi***

The Panel considered the comments received from Kanwar Krishen Associates Private Ltd and as given at Annex 7 of the Agenda and decided as below:

Sl No.	Clause No.	As per NBC	Review Sought	Decision of the Panel
Part IV Fire and Safety				
1	Cl. 3.4.6.2	**Emergency Power - Circuit Integrity Cables** • All Defined emergency services shall have circuit integrity cables or cables to be provided through fire proof enclosures.	The requirement of Circuit Integrity cables (withstand 750 degree Celsius for 3 hours) is very demanding and appears to be over and above the 2-hour Fire rating specified in the Code for all other Fire Emergency requirements. The Fire Survival cables, readily available, as per current Standards may be adequate for the purpose.	The Panel noted that this comment has already been discussed earlier during the meeting. Please refer to the discussion and decision at Sl No. 1 under 3.1.1(e) above.

Sl No.	Clause No.	As per NBC	Review Sought	Decision of the Panel
2	Cl. 3.4.6.3.1	**Oil Filled Substations** • Oil equipment's Building shall be 7 meters away from the adjoining buildings • Part 8 Clause 4.2.1 (12) ii indicates 6 meters away	6 mtrs as indicated in clause 4.2.1 (12) ii of part 8 is more adequate for fire tender movement. Therefore 6 mtrs should be kept as clear distance b/w Substation and Building	The Panel noted that this comment has already been discussed earlier during the meeting. Please refer to the discussion and decision at Sl No. 2 under 3.1.1(e) above.
3	Annex E (Cl. 5.1.4 and 6)	**Annex E (Cl. 5.1.4 and 6) - Additional requirements for high rise buildings** • In multi-story buildings there shall be two rising mains located in separate shaft. Each floor shall have a changeover switch for connection to either or the two mains - applicable for larger gathering building like office building	Two Rising Mains is technically a better option but having separate shafts is not called for. Two risers in the same shaft with appropriate distance/barrier may be possible.	The Panel noted that this comment has already been discussed earlier during the meeting. Please refer to the discussion and decision at Sl No. 3 under 3.1.1(e) above.
Part – VIII Section – II ELECTRICAL AND ALLIED INSTALLATION				
4	Cl. 4.2.1	**Substations and switch room** 3. Substation in single basement are not allowed. Also floor level of substation shall not be the lowest point of the basement.	Substation in single basements in smaller projects may be allowed subject to the substation not being at the Lowest Level. Small projects with single basement practically do not have outdoor services area spaces.	The Panel did not agree to the comments considering the safety issues involved in case of the proposed arrangement
		5. Substation level shall be 300mm above the highest flood level in the locality.	Floor level of substation can be kept 300 mm above the basement floor level. Facility for automatic removal of water and proper drainage systems is provided as per good practice.	The Panel did not agree to the comments considering the safety issues involved in case of the proposed arrangement

Sl No.	Clause No.	As per NBC	Review Sought	Decision of the Panel
		6. 1200 mm space from top of the equipment to soffit of beam to be provided	1200 mm space does not appear technically feasible. 3.6m height of room clear to slab (if beam free OR 3.6m beam bottom to Slab) is good enough for the equipment.	The Panel did not agree to the comments. The room height has to be decided so as to meet all the requirements, as stipulated in the Code.
5	**Cl. 11.5.5**	**Lightening Protection conductor** Copper and aluminium are recommended. Gl preferred for temporary structures	The Lightening Protection chapter is an extract of IEC/ IS 62305 where Gl conductor is allowed. Gl should be made possible for permanent situation too.	The Panel noted that this comment has already been discussed earlier during the meeting. Please refer to the discussion and decision at Sl No. 4 under 3.1.1(e) above.

g) ***From Shri K. S. Lakshmana Rao, Bellary***

The Panel considered the comments received from K. S. Lakshmana Rao, Bellary as given at Annex 8 of the Agenda regarding accidents (fire) caused due to electrical short circuiting, non-availability of qualified electricians, rigorous testing and BIS product certification of electrical fittings. The Panel opined that Indian Standards are already available for various electrical products as also for their correct installation in buildings to ensure safety from electric shock and fire from short circuit. It was expressed that as Indian Standards are voluntary in nature, the implementation of these standards are not in hands of BIS. CEA Safety Regulations and availability of various provisions in the same regarding utilizing the services of qualified electricians, use of electrical products and fittings conforming to various Indian Standard specifications, use of good and safe installations practices as per various Indian Standard codes of practices/guides was noted. The poor implementation of these regulations by the various state electrical inspectorates was also reported. It was however also agreed that many electrical products are under mandatory BIS certification and therefore are subjected to quality control and required testing in accordance with the laid down Indian Standards. It was noted that Indian Standards/NBC also covers use of various protective devices and provisions on protection of human beings from electric shock. It was agreed that even the BIS standard marked (ISI marked) products need to be properly maintained. The Panel clarified that various types of electrical fittings/cables, etc conforming to the relevant Indian Standards are specified for use in appropriate end-use applications depending upon the vulnerability/fire susceptibility/suitability. Regarding his suggestion to renew age old design of all electrical fittings, the Panel opined that the product specifications are being dealt by the Electrotechnical Engineering Department (ETD) of BIS and suggestions as and when received from R&D/Academic Institutes are being considered by the concerned

technical committees under the department and the standards are amended/revised from time to time. The Panel also noted that NBC also covers in detail the gas supply in buildings in its Part 9/Section 4 'Plumbing Services (including Solid Waste Management), Gas Supply'. Regarding the suggestion of Shri Rao to publish in newspapers an approved design for kitchen, it was opined that safe gas supply installations are ensured by the concerned utilities and necessary information regarding installation and maintenance are being already issued by them. The Panel in view of above decided that no change is required in the Code in view of these comments.

h) ***From Cape Electric Pvt Ltd, Kancheepuram***

The Panel considered the comments as received from Cape Electric Pvt Ltd, Kancheepuram and noted the printing error which has crept in clause 11 of NBC Part 8/Section 2 wherein the text under clause 11.4 is missing. The Panel in the matter decided to incorporate the same (which may be obtained from the draft) through an amendment. As Shri Gopa Kumar pointed that certain editorial modifications were also required in clause 11, he was requested to review the complete clause 11 and suggest such editorial/non-controversial modifications for incorporation through the above amendment.

Shri Gopa Kumar also raised the issue of no automatic disconnection of supply in stand-by (DG) mode and in this regard requested to incorporate new provisions in NBC Part 8/Section 2. He mentioned that the protective devices are not tripping in case of the above mode as there is a mismatch in source impedance and fault current is higher in DG mode. Shri Bhavani Prasad, Convener CED 46:P13 expressed that similar problem can also be experienced with UPS system and therefore it is important that the designer should certify the schematic strategy to check such calculations. It was agreed that in case of commercial power supply fault level comes down in case of DG mode and in case of UPS system there is no fault as it retries itself. It was therefore decided that following aspects which should be taken care in design, need to be discussed in detail and it may be considered to include appropriate guidelines/provisions in the code, in this regard:

1) Automatic disconnection in case of fault current;
2) Automatic disconnection in case of earthing;
3) Earth current flow path; and
4) Loop impedance.

It was also decided that the above aspects need to be covered for all the following types of supply/electrical network:

i) Supply from the grid with 100 percent backup;
ii) All rotary machine supply (Diesel or gas generator);
iii) Electronic generation (solar, UPS, invertor) where fault current is nil;
iv) Isolation transformer with any of the above or unearth system (where impedance is high).

The Panel decided that Shri S. Gopa Kumar would prepare an initial proposal which would then be finalized by the group as constituted at Sl No. (d) above for the consideration of the Panel in its next meeting.

i) ***From Jay & Co. India Pvt Ltd, New Delhi***

The Panel considered the comments from Jay & Co. India Pvt Ltd, New Delhi as tabled during the meeting and given at **Annex 2 (Pg – 35 to 36)**. It was noted that the above comments were regarding incorporation of provisions for seismic supports (hangers and supports) for cable trays, cable trunking/ducting systems and busbar trunking systems. The Panel also noted that NBC (Part 8/Section 2) in its clause 5.3.8.3 specifies that seismic supports shall be provided for busbar trunking having continuous straight lengths of more than 24 m at a single stretch. The Panel further noted that for cable trays and cable trunking and ducting systems, the Code has given reference to relevant Indian Standards formulated by Electrotechnical Department (ETD) of BIS for cable tray systems and cable ladder systems, cable trunking and ducting systems and busbar trunking systems. Having noted all the above, the Panel requested Smt Shruti Goel and Shri Puneet Gupta to examine the comments and suggest regarding need for any change in the Code in view of the above comments, for appropriate action in the matter in consultation with the Convener.

The Panel while disposing of the above comments agreed that NBC (Part 8/Section2) has been received very well by the stakeholders. They expressed that it is very important that the provisions of the code are duly implemented by the States in all sincerity for ensuring safe and reliable electrical supply.

The Panel noted that the revised IS 732 which is under print also covers verification of LV system as per IEC 60364-6. Smt Shruti Goel in this regard raised her apprehension that the electrical approvals in the country are restricted up to the substation level and there is no verification for distribution system within the buildings which give rise to accident including fire. Shri Bhavani Prasad expressed that there is no system in place to check/certify that the electrical installations continue to be safe while in use. Members agreed that there is also a gap in the field of certification of professionals, safety engineer as also in the registration of certifiers due to which the implementation of the codal provisions are not up to the mark, and requested CEA for appropriate action in the matter. Shri A. K. Rajput informed that Central Electricity Authority is coming up with a programme for licensing people for certifying installations which would be presently applicable for installations above a certain wattage.

Item 4 DISSEMINATION OF INFORMATION ABOUT PUBLICATION OF NATIONAL BUILDING CODE OF INDIA 2016 AND ITS NEW/REVISED CONTENTS

4.1 The Panel lauded the extensive steps being taken by BIS for wide publicity of the revised state-of-the-art NBC 2016. The Panel desired that more such

programmes be organized by BIS and professional bodies in the field so that maximum utilization of the Code may be made by the stakeholders for effective implementation in building construction activities in the country and for reviewing and modifying the regulatory documents. It was agreed that the above was particularly important to ensure safe, orderly, accessible and sustainable buildings and building services.

Item 5 ANY OTHER BUSINESS

6.1 The BIS Secretariat and the members complimented the Convener, Shri J. N. Bhavani Prasad for excellently conducting the meeting and providing leadership in formulating the decisions of the Panel on the very contentious issues. The Member-Secretaries also thanked all the members for their keen interest and valuable inputs including during the deliberations in the meeting.

6.2 There being no other business to transact, the meeting, thereafter, ended with a hearty vote of thanks to the Chair.

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ANNEX 1

[*Item 3.1.1* (a)]

DOCUMENTS/EXTRACTS FROM INTERNATIONAL STANDARDS PROVIDED BY MEMBERS HIGHLIGHTING CONCERNS RAISED REGARDING USE OF NON-CONVENTIONAL AIR TERMINALS INCLUDING ESE TERMINALS

1) *Letter from the Executive Board of International Conference on Lightning Protection to CENELEC*

International Conference on Lightning Protection
EXECUTIVE BOARD

University of Rome "La Sapienza", via Eudossiana, 18, 00184 Rome, Italy, tel.:+39 06 445 85 814

2010.11.02

To CENELEC
Avenue Marnix 17
B - 1000 Brussels.

Att.: The President, Mr. David Dossett, and the General Director, Mrs. Elena Santiago.

Re.: <u>The national ESE Lightning Protection Standards versus the approved EN Standards:</u>

Referring to our former correspondence, the **I**nternational **C**onference on **L**ightning **P**rotection (ICLP) together with its offspring **S**impósio **I**nternacional de **P**rotecao contra **D**echarges **A**tmosfericas (SIPDA) are the only scientific/technical organs solely devoted to the subjects **Lightning** and **Lightning Protection** trying to promote scientific research concerning lightning phenomena as well as methods in practice for improving protection of people, animals and properties against the effects of lightning.

ICLP is represented by a group of about 20 professors, from different countries over the world, specializing in lightning phenomena, and forming the Scientific Committee of ICLP*.
Regular international conferences on lightning phenomena and lightning protection of structures and services are organized by ICLP in order to provide an interdisciplinary forum for the exchange of scientific knowledge and information among scientists and engineers who are engaged in research and practical application on lightning protection and to ensure the effective transfer of new knowledge from lightning research into practice for the benefit of our societies.

During our recent conference held last month in Cagliari (http://www.diee.unica.it/iclp2010/), non-conventional lightning protection methods were again thoroughly discussed and the Scientific Committee got repeated questions concerning the outcome of the conflict between the existing national ESE lightning protection standards, the approved IEC/EN standards, and CENELECs actions to solve the problems involved, especially due to the continuous published evidences proving the non existence of efficiencies as claimed by the ESE manufacturers..

Due to the general and worldwide interests in "Safety and Health" and in this connection the achievement of an efficient protection against lightning hazards, we would like, for general information, to ask CENELEC to clarify its decisions regarding the solution of the problems involved and answers concerning the implication of the decisions of CENELECs last BT meeting.
According to the minutes of BTs last meeting April 2010, item 2.7.5, D136/011, it appears to us that BT has recognized the existence of conflicts between the national ESE standards and the approved EN Lightning Protection Standard, EN 62305 (1-4), based on the information provided by CLC/TC 81X.

Therefore, according to the CENELEC internal regulations, the national ESE standards should have been withdrawn before 2009.02.01.

* More information can be found on ICLPs homepage: www.iclp-centre.org.

1(2)

International Conference on Lightning Protection
EXECUTIVE BOARD
University of Rome "La Sapienza", via Eudossiana, 18, 00184 Rome, Italy, tel.:+39 06 445 85 814

This and CENELECs following decisions, D136/012, D136/013 and D136/014, prepared before the BT meting, raise the following questions:

1. Do BTs decisions imply that the national ESE standards now are out of force, and consequently have been ordered withdrawn according to the requirements in CENELECs internal regulations?

2. Or, does it imply that the national ESE standards, in spite of the requirements in CENELECs internal regulations, still are in force until the standards have been modified according to CENELECs decisions, and if yes, for how long a time have this be permitted?

3. Does CENELECs decision to re-edit the national ESE standards and remove any reference to the EN approved standard imply that the national ESE standards in the future, if approved, entirely will be a product standard?

4. Or, does CENELECs decisions imply, that the national ESE standards still will have the scope **"Protection of structures and of open areas against lightning using early streamer emission air terminals"** and thus be in conflict with the scope of EN 62305 (1-4)?

5. And finally, why has CENELEC as the European Standard Organization proposed to offer the International Standard Organization IEC a technology that has been proven not to be more efficient than ordinary lightning rods[†] and a technology that IEC repeatedly has refused to incorporate in its Lightning Protection Standards.

We are kindly looking forward to your immediate response and explanations.

Sincerely yours,

President of ICLP
Prof. Farhad Rachidi

Vice President
Prof. Vernon Cooray

[†] As also recognized by CIGRE (International Council on Large Electric Systems) and the European COST Action P18 "The Physics of Lightning Flash and Its Effects".

2) *Letter from Centre of Excellence on Lightning Protection, Malaysia*

UNIVERSITI PUTRA MALAYSIA

CENTRE OF EXCELLENCE ON LIGHTNING PROTECTION

Advisory Committee Member

To Whom It May Concern:

Dear Sirs,

Re: Warning Against the Use of ESE Systems

We hereby take the responsibility to inform you concerning the use of Early Streamer Emission (ESE) devices, which have been widely used in lightning protection systems in Malaysia.

Over the years, there are many recorded accidents pertinent to structures with non-conventional and non-verified lightning protection systems. As we all know, neither manufacturers nor independent parties have been able to prove the acclaimed effects of ESE technology under natural lightning conditions and thus there are no concrete hypotheses and evidence to show the efficiency of ESE rods.

Our firm decision in giving the warning against the use of ESE systems, which has no acceptance by the international scientific community, is in line with the decision made by International Conference on Lightning Protection (ICLP) Executive Board in their letter to the Union Technique de l'Electricite (France), dated on 6th April 2006 (attached).

Finally, we hope that you will take necessary actions in addressing the issue and we will be willing to provide all necessary information required.

Sincerely Yours,

Dr. Mohd Zainal Abidin Ab Kadir
Chairman
Centre of Excellence on Lightning Protection (CELP)

Copy to:
- Advisory Committee Members

Centre of Excellence on Lightning Protection (CELP)
Faculty of Engineering, Universiti Putra Malaysia, 43400 Serdang, Selangor, MALAYSIA

Advisory Committee Members

Dr. Mohd Zainal Abidin Ab. Kadir (UPM, Malaysia) - **CHAIRMAN**
Dr. Chandima Gomes (SATRIC, Sri Lanka)
Prof. M H Shwehdi (KFUPM, Saudi Arabia)
Prof. Mary Ann Cooper (Illinois University, USA)
Dr. Ron Holle (Vaisala, USA)
Mr. Z A Hartono (Lightning Research Pt., Malaysia)
Mr. Richard Kithil (NLSI, USA)
Mr. S Gopa Kumar (LPCI, India)
Prof. G R Nagabhushana (Indian Institute of Science, India)
Dr. Arturo Galvan Diego (Instituto De Investigaciones Electricas, Mexico)
Dr. Munir Ahmed (TARA, Bangladesh)
Prof. Francisco Roman Campos (National University of Colombia, Colombia)
Prof. Vernon Cooray (Uppsala University, Sweden)
Dr. Chris Andrew (Indooroopilly Medical Centre, Australia)
Prof. Vladimir Rakov (Florida University, USA)

Centre of Excellence on Lightning Protection (CELP)
Faculty of Engineering, Universiti Putra Malaysia, 43400 Serdang, Selangor, MALAYSIA

3) *Court Order in the United States District Court for the District of Arizona in the matter of Heary Bros. Lightning Protection Co. v/s National Fire Protection Association*

US

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ARIZONA

Heary Bros. Lightning Protection Co., Inc. et al., Plaintiffs, vs. National Fire Protection Association, Inc.;, et al., Defendants.	)	No. CIV 96-2796 PHX/ROS **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

4) *Letter No. CFEES/DIXS/178/1/2010 dated 09 June 2010 of Ministry of Defence, Government of India*

फोन : PHONE : 23907166, 23817255

फैक्स FAX : (011) 23814968

सभी पत्रादि निदेशक सी.ई.ई.एस के पते से भेजे जाने चाहिए।
All correspondence to be addressed to Director CEES

No.CFEES/DIXS/178/1/2010
भारत सरकार, रक्षा मंत्रालय
पर्यावरण एवं विस्फोटक सुरक्षा केंद्र
ब्रि.एस.के.मजुमदार मार्ग, तिमारपुर, दिल्ली
Govt. of India, Min. of Def.
Centre for Environment & Explosive Safety, (CFEES)
Brig SK Mazumdar Marg
Timarpur, Delhi-110054.

दिनांक :
Dated : 09 JUNE 2010

The Director Works (U1)
E-in-c's Branch
Integrated HQ of MoD (Army)
Kashmir House, Rajaji Marg
New Delhi-110011.

Kind Attn: Shri V.K Gulati , SE

SUB: LIGHTNING PROTECTION- EARLY STREAMER EMISSION (ESE) TYPE
Ref.: Your letter no 62888/Product approval/E4(U1)

The use of Early Streamer Emission (ESE) type Lightning Protection System (LPS) i explosive bldgs in MoD esstt was discussed in Electrical Installation & Lightining Protectio (EI&LP) Panel meeting of STEC and same was not approved by STEC as members were of th view that lot of literature is available on internet against the use of these ESE type LPS and n international standards is available for the same. The Centre for Air-brone systems (CABS DRDO, Banglore also recommended not to use these system and to use convinational type c systems as approved by STEC in STEC Pamphlet No 17.

(Dr.S.C. Agarwal)
Head DIXS
For Director

5) *Letter No. 62888/Gen-Misc/E4(U1) dated 01 December 2010 of Ministry of Defence, Government of India*

FAX

Tele: 23018523
Fax: 23019113
E-Mail:jtdg.e4@gmail.com

Sub Dte of Utility (E4)
Dte of Works,
E-in-C's Branch
Integrated HQ of MoD (Army),
Kashmir House, Rajaji Marg,
New Delhi-110011

No.62888/Gen-Misc/E4 (U1) 01 Dec 2010

E-in-C's Branch
List 'A'

PROVISION OF MODERN LIGHTNING PROTECTION SYSTEM (EARLY STREAMER EMISSION BASED LIGHTNING PROTECTION SYSTEM)

1. Reference this HQ letter No.62888/Gen-Misc/E4 (U1) dated 25 Feb 10.

2. Early Streamer Emission (ESE) based Lightning Protection System is a modern/new technology for arresting lightning surge.

3. National Lightning Safety Institute (NLSI) has made remarks that ESE system is not scientifically proven under natural lightning conditions.

4. The matter was referred to CFEES for their advice for use of ESE type lightning protection vide this HQ letter No. 62888/Gen-Misc/E4 (U1) dated 12 May 10. CFEES has intimated that lot of literature is available on internet against the use of ESE type lightning protection systems and no international standard is available for the same (copy of CFEES letter No. CFEES/DIXS/178/1/2010 dated 09 Jun 10 is attached for ready reference).

5. In view of above, ESE system is not to be provided for the time being. As such pl ensure that ESE type lightning protection is not, presently, included in the BPs/AEs of new works.

6. Pl ack receipt.

(VK Gulati)
SE
Dir Works (Utility)

Encl: As above

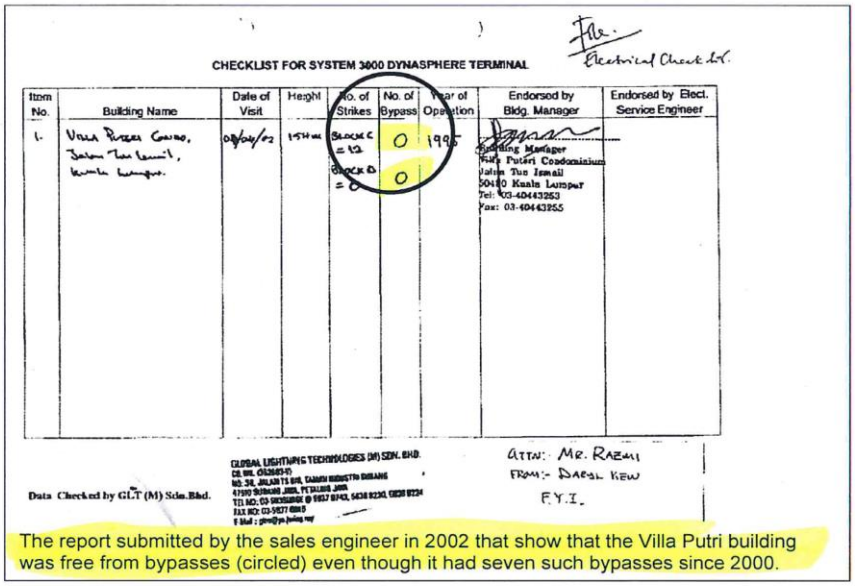
Copy to:-

E-in-C's Branch List 'B' - For info and na pl.

E2 Design- For info and na pl with reference to our letter No.62888/Gen-Misc/E4 (U1) dated 11 Nov 08 and 08 Sep 10.

6) *Report published in a paper by Hilton Petaling Jaya dated 08 January 2004 (Forum on Lightning Protection)*

FORUM ON LIGHTNING PROTECTION, Hilton Petaling Jaya, 8th January 2004



CHECKLIST FOR SYSTEM 3000 DYNASPHERE TERMINAL

File: Electrical Check list

Item No.	Building Name	Date of Visit	Height	No. of Strikes	No. of Bypass	Year of Operation	Endorsed by Bldg. Manager	Endorsed by Elect. Service Engineer
1.	Villa Putri Condo, Jalan Tun Ismail, Kuala Lumpur.	05/06/02	154m	Block C = 12	0	1995	Building Manager Villa Putri Condominium Jalan Tun Ismail 50480 Kuala Lumpur Tel: 03-40443253 Fax: 03-40443255	
				Block D = 0	0			

Data Checked by GLT (M) Sdn.Bhd.

GLOBAL LIGHTNING TECHNOLOGIES (M) SDN. BHD.

ATTN: MR. RAZALI
FROM:- DARYL KEW
F.Y.I.

The report submitted by the sales engineer in 2002 that show that the Villa Putri building was free from bypasses (circled) even though it had seven such bypasses since 2000.

5.13 Discrediting scientific works

This method was carried out by the sales engineers around 1998 when UMIST published a high voltage test report that discredited the ESE air terminal. The sales engineers alleged that the experiment was rigged by the academics and that resulted in the ESE air terminal performing poorer than the Franklin rod. However, such tactics failed as other universities and laboratories obtained similar results that discredit the claims made for the ESE air terminals.

Earlier in 1995, the ESE vendors also attempted to discredit our photographs which had been submitted to CIGRE. They had alleged that the buildings had been struck by lightning before the ESE air terminals were installed. However, western academics had defended our photographs since they were familiar with the subject. In 1999, we submitted the "before" and "after" event photographs in our report[34] to the NFPA to show indisputable proof that the ESE air terminals had failed to protect the buildings they were installed on.

Similar attempts were made to discredit our photographs since 1993 and they were more successful at this with the local populace.

[34] Hartono, Z. A., and Robiah, I., "**A Long Term Study on the Performance of Early Streamer Emission Air Terminals in a High Isokeraunic Region**", Report submitted to the Third Party Independent Evaluation Panel on the Early Streamer Emission Lightning Protection Technology, National Fire Protection Association (USA), February 1999

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7) *Relevant extract from Australian/New Zealand Standard AS/NZS 1768:2007 'Lightning Protection'*

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Lightning protection

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out guidelines for the protection of persons and property from hazards arising from exposure to lightning. The recommendations specifically cover the following applications:

(a) The protection of persons, both outdoors, where they may be at risk from the direct effects of a lightning strike, and indoors, where they may be at risk indirectly as a consequence of lightning currents being conducted into the building.

(b) The protection of a variety of buildings or structures, including those with explosive or highly-flammable contents, and mines.

(c) The protection of sensitive electronic equipment (e.g. facsimile machines, modems, computers) from overvoltages resulting from a lightning strike to the building or its associated services.

The nature of lightning and the principles of lightning protection are discussed and guidance is given to assist in a determination of whether protective measures should be taken.

This Standard is applicable to conventional lightning protection systems (LPSs) that comprise air terminals, downconductors, earth termination networks and surge protective devices (SPDs). Nothing contained within this Standard either endorses or implies the endorsement of non-conventional LPSs that comprise air terminals that claim enhanced performance or downconductors that claim enhanced magnetic screening over conventional systems.

The performance of such systems is outside the scope of this Standard. Irrespective of claimed performance, air terminals shall be placed in accordance with Section 4 to comply with this Standard.

1.2 APPLICATION

This Standard does not override any statutory requirements but may be used in conjunction with such requirements.

Compliance with the recommendations of this Standard will not necessarily prevent damage or personal injury due to lightning but will reduce the probability of such damage or injury occurring.

1.3 INTRODUCTION

Thunderstorms are natural phenomena and there are no proven devices and methods capable of preventing lightning flashes. Direct and nearby cloud-to-ground lightning discharges can be hazardous to persons, structures, installations and many other things in or on them. Consideration should always be given to the application of lightning protection measures.

8) *Relevant extract from Singapore Standard SS 555: Part 1: 2010 'Code of Practice for Protection against Lightning: Part 1 General Priniciples'*

National Foreword

This Singapore Standard was prepared by the Technical Committee on Lightning Protection under the purview of the Electrical and Electronic Standards Committee.

The review of CP 33 : 1996 – 'Code of practice for lightning protection' resulted in the development of SS 555 which comprises the following parts under the general title 'Code of practice for protection against lightning':

Part 1: General principles
Part 2: Risk management
Part 3: Physical damage to structures and life hazard
Part 4: Electrical and electronic systems within structures

The four parts replace CP 33 : 1996.

SS 555 : Part 1 : 2010 is a modified adoption of International Standard IEC 62305-1 : 2006 (Edition 1.0), 'Protection against lightning – General principles'. It provides guidelines for lightning protection of structures and their installations, their contents including persons within the structures and services connected to the structures.

The committee considered methods for artificially increasing the range of attraction of a lightning conductor but on the evidence available, was unable to make a recommendation. It was noted that none of the reference codes used in the drafting of this Code recommends the use of such methods. The codes referred to were IEC 62305 Parts 1 to 4, BS EN 62305 Parts 1 to 4 and AS 1768: 2007.

Attention is drawn to the following:

1. Where the words 'International Standard' appear, they should be read as 'Singapore Standard'.

2. The reference to International Standards shall be replaced by the following Singapore Standards:

International Standard	Corresponding Singapore Standard
IEC 62305	SS 555
IEC 62305-1	SS 555-1
IEC 62305-2	SS 555-2
IEC 62305-3	SS 555-3
IEC 62305-4	SS 555-4

3. The comma has been used throughout as a decimal marker whereas in Singapore Standards it is a practice to use a full point on the baseline as the decimal marker.

4. The modifications to the International Standard IEC 62305-1 are given in Annex ZA. To facilitate identification, the affected text of the International Standard which is to be changed is indicated by a left marginal bar adjacent to it.

A national Annex ZB providing Singapore's lightning intensity information is included to give the user data for risk management calculation which is essential for the appropriate design of a lightning protection system. Acknowledgement is made to the National Environment Agency (NEA) for providing the information in Annex ZB and for their assistance in processing the data on lightning intensity.

9) ***Letter dated 10 January 2011 from East Coast Lightning Equipment to Chief Electrical Inspector, Govt. of Tamil Nadu***

EAST COAST LIGHTNING EQUIPMENT INC

January 10, 2011

Chief Electrical Inspector
Government of Tamilnadu
TVK Industrial estate,
Guindy, Chennai - 600032
India

Sub: Usage of ESE Lightning protection system in the state.

Dear Sir,

It has come to out attention that there is discussion of adding guidelines for the installation of so-called ESE lightning protection systems to construction standards in India. Our firm has a long history of involvement with similar efforts regarding these systems in the United States. We have found that design professionals who suggest the use of a so-called ESE lightning protection system are not aware of the history behind these devices. I hope that this information is helpful to you.

First you should be aware in 2003, after many years of court proceedings, a US Federal Court found that two vendors of the ESE or single mast systems **engaged in false advertising** by claiming that their ESE lightning rods provide a significantly-expanded, measurable zone of protection far greater than conventional lightning rods, without having any basis for making such a claim. The Court found that these companies' claimed expanded zones of protection have not been proven – that **is they are not backed up by any testing or science.** The court issued a permanent injunction that prohibits them from advertising expanded zones of protection for their ESE lightning rods. This injunction was upheld by the Federal Court of Appeals in 2008. A copy of this Injunction and Order is attached.

You should also be aware that ESE systems have been repeatedly reviewed and rejected by US standards making authorities. ESE systems fail to comply with US standards for lightning protection systems including those issued by Underwriters Laboratories (Standard UL96A), the National Fire Protection Association (NFPA780) and the Lightning Protection Institute. The systems lack sufficient air terminal locations and a satisfactory roof-top network of conductors. They have too few paths to ground and provide for no bonding of roof-top equipment. As such, these systems are ineligible for a third-party review or inspection for compliance with any recognized US standard, leaving the product vendor, a firm that acknowledges that

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EAST COAST LIGHTNING EQUIPMENT INC

their advertising violates federal truth-in-advertising laws, as the sole entity promising product viability.

The NFPA, which has overseen lightning protection standards for more than 100 years, repeatedly reviewed and rejected a proposed standard for ESE systems after conducting a lengthy review. In doing so, the NFPA pointed to an independent review panel's conclusion that:

> *"The ESE lightning protection technology as currently developed in the installation of complete systems does not appear to be technically sound in relation to the claimed areas of protection or the essentials of the grounding system."*

The scientific community of lightning experts is also extremely skeptical of claims of enhanced protective zones made for exotic lightning rods. I encourage you to visit the Lightning Safety Alliance website at www.lightningsafetyalliance.org to view a variety of papers that have been published on this subject. Of particular interest is a 2004 paper from Malaysia that reports on the performance of these devices in installations over many years. **The researchers found that 80 percent of the buildings equipped with these single mast devices suffered lightning damage.**

Various documents relating to this subject are attached to this email. We urge authorities in India to take note of the extensive work already conducting evaluating these devices in the United States. The ESE systems pose a threat to public safety and should not be accepted into construction standards.

Please feel free to give me a call if you have any questions on this subject.

Sincerely,

Mark P. Morgan

Mark Morgan
President

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ANNEX 2
[*Item 3.1.1* (i)]

COMMENTS RECEIVED ON SP 7 (PART 8/SECTION 2):2016 'NATIONAL BUILDING CODE OF INDIA 2016: PART 8 BUILDING SERVICES, SECTION 2 ELECTRICAL AND ALLIED INSTALLATIONS' FROM JAY & CO INDIA PVT LTD

PART 8 BUILDING SERVICES SECTION 2 ELECTRICAL AND ALLIED INSTALLATIONS (V2:pg 32/36)

Seismic supports shall be provided for busbar trunking having continuous straight lengths of more than 24 m at a single stretch.

13.11 Supports and hangers:

13.11.1 The supports shall be designed to handle the load and additional supports shall be provided, to take into account seismic consideration, as per seismic design. The support material should be galvanized steel/aluminium and facilitate ease of installation at site using alternatives such as fully threaded rod/angle section/wire support systems. Test Strength of the system should be adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed and shall also have adequate in-built safety factor. The wire based supporting system should only be used with self-locking lock, unlocking mechanism should not be an integral part of the self-locking lock for safety purpose.

13.11.2 Design supports for multiple raceways/cable trays/bus bars capable of supporting combined weight of supported systems and its contents.

13.11.3 Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

13.12 Seismic Support considerations and exceptions:

13.12.1 Seismic braces being used shall be UL/UL NEBS approved for seismic application and arranged so that they limit motion of the equipment in all directions. Threaded rods/Angle/Channels supporting equipment/cable trays should be designed to resist vertical seismic loads and support equipment.

13.12.2 For Ip=1 electrical distribution systems weighing 7.45 kg/m or less and flexible connectors are provided between the component electrical distribution system are exempted. Trapeze assemblies are used to support electrical distribution systems and the total weight of the system supported by trapeze assemblies is less than 146 N/m are exempted.

13.12.3 Bracing the duct with cables keeps the maximum tension on the support rod to a minimum. Thus, only cable bracing should be used.

13.12.4 Cable tray (or conduits) is suspended by rod hangers 12" or less in length from top of conduit to supporting structure bottom or Cable tray suspended by trapeze support 12" or less in length from top of trapeze to supporting structure bottom are exempted.

13.12.5 All runs must have minimum two transverse and one longitudinal brace. Transverse restraint for ore run may also act as a longitudinal restraint for a run connected perpendicular to it, if the restraint is installed within 24 in. (610 mm) of the turn or combined stresses are within allowable limits. Longitudinal braces shall be allowed to act as transverse braces if they are within 24 in. (610 mm) of the centerline of the cable tray braced laterally.

13.12.6 Conduit/Cable Tray greater than 2 1/2 in. (63.5 mm) trade size and attached to panels, cabinets, or other equipment and subject to seismic relative displacement must be provided with flexible connectors or designed for forces and displacements.

13.12.7 Light fixtures, lighted signs, and ceiling fans not connected to duct or pipe, where supported by chains or otherwise suspended, are not required to be braced for seismic if the support is designed for 1.4 x dead load and an equivalent simultaneous horizontal load. Failure cannot cause the failure of an essential component and the connection must allow a 360 degree motion.

13.12.8 The selection and installation should be done as per Seismic design standards.