

PEER REVIEW

of Sharma “Critical Overview of Lightning Risk Assessment from IEC and NFPA Perspectives” by Mitchell Guthrie

Forwarded below are the results of my review of the subject article published in the inaugural edition of The Connector magazine. Dr. Sharma’s critical overview of the IEC 62305-2: 2024 and NFPA 780, Annex L (2026) risk assessments highlight some aspects of both and suggests how they could be merged into a hybrid assessment that would include positive aspects of both. The comments below are identified according to the specific sections of Dr. Sharma’s article.

Dr Sharma is correct in his observation that NFPA 780 has developed from its origin in 1904 as specifications for protection of structures against lightning and has evolved into an “installation” standard (which now also includes design criteria). This is an important factor as the NFPA standard was almost a century old when the IEC lightning protection standard appeared as a risk-based standard. Given the history and decades old stakeholders, it was determined that the NFPA standard would become the US-implementing document.

Dr. Sharma also points out some big changes in the 2024 Edition of IEC 62305-2 that are not included in NFPA 780. It is important to point out that even though the IEC document is dated 2024 and NFPA 780 dated 2026, the difference in their standards development processes result in the IEC latest changes being too late to be included in the 2026 Edition of NFPA 780. It is anticipated that some IEC 62305-2 (2024) changes, such as adoption of lightning ground strike-point density (assuming national data bases are available for use) and formal recognition of thunderstorm warning systems (TWS), could likely be incorporated into the 2029 Edition of NFPA 780.

In his Introduction, Dr. Sharma indicates “*The absence of formal risk assessment leads to inconsistent protection levels, retrofit-driven upgrades, inspection disputes, and difficulties in justifying investment decisions to non-technical stakeholders.*” As a 46+ year member of NFPA 78/780, including circa 20 years with no formal risk assessment, I would suggest that NFPA’s consistency without requiring a risk assessment characterizes that its applications result in de facto protection levels. These protection levels are similar to LPL II (Chapters 7 and 8) and LPL III (Chapter 4 and other “ordinary structures”). The NFPA standard does not recognize LPL IV. Its implementation of LPL I is generally characterized by a Faraday cage or equivalent.

To address Dr. Sharma’s general observations, we have seen minimal inspection disputes related to protection levels as they are defined in NFPA 780 and justifying investment decisions to non-technical stakeholders is out of the scope of the standard. Currently, the NFPA risk assessment is not mandatory, but an AHJ may make it mandatory for their applications.

In Section 2, Dr. Sharma suggests that the introduction of the unified risk approach makes it easier for engineers to communicate lightning risk components (such as expected annual losses

and frequency of damage) rather than abstract probability values to asset managers and insurers. This could be misleading as the frequency of damage equations include these “abstract” values in the number of dangerous events and the various losses to be considered. In the US implementation, the validity of the factors in the equations should probably be verified and modified where necessary.

Dr. Sharma is correct in his 3.1(i) statement: “*NFPA 780 provides limited guidance for explicit cost-benefit analysis or portfolio-level prioritization. All structures meeting prescriptive triggers may be treated similarly, regardless of differences in asset value or service criticality.*”

This could be addressed in a new annex or an addition to current text if an adequate location is found. To date there has been no requests for such guidance. For cost-benefit analysis or portfolio-level prioritization, I would suggest the use of IEC 62305-2 for guidance unless a stakeholder provides a request for specific information or other guidance in NFPA 780. Such a request could be in the form of a Public Input.

Similarly, in 3.1(ii), “*Prescriptive triggers may lead to over-protection of some low-consequence structures and under-protection of critical assets that narrowly fall outside trigger definitions, especially when local adoption or enforcement is uneven.*” As NFPA 780 provides minimum acceptable requirements, I would not discourage an attempt to protect to a higher protection level if the circumstances suggest such. Dr. Sharma is correct that NFPA 780’s minimum acceptable requirements may not be adequate to address the protection of sensitive internal electrical equipment. This should be addressed by NFPA 780 in the 2029 revision cycle.

In 3.1(iii) Dr. Sharma indicates “*NFPA 780 acknowledges surge protection and bonding, it does not yet provide a comprehensive framework for integrating TWS or other operational risk-reduction measures into design justifications.*” It is suggested that an Annex L Task Force be formed for the 2029 Edition of NFPA 780 to address the incorporation of recently published updates in IEC 62305-2, Edition 3. Some additional consideration should also address surge protection applications (especially internal critical electrical equipment and circuits).

4. *Why practitioners should adopt risk-assessment results in LPS design*

There are no impediments in the US (in UL or NFPA standards) associated with the performance of a lightning risk assessment to assess the need for protection and address the primary sources of risk. This would include either NFPA 780, Annex L or IEC 62305-2 (and possibly hybrid IEC/NFPA) assessments. Any specific authority having jurisdiction (AHJ) should be contacted to confirm any specific restrictions they require. This effort should be coordinated with US standards efforts and could involve current lightning protection industry stakeholders.

5. *A hybrid IEC-NFPA Implementation*

The decision to conduct a Lightning Risk Assessment (LRA) in the US (especially an IEC 62305-2 or the hybrid method proposed) is ultimately up to the Authority Having Jurisdiction.

Given the awareness of the IEC 62305-series of lightning protection standards increasing in the US, it is likely the AHJs could choose 62305-2 as their alternative unless there is a significant marketing effort to sell the hybrid method. The details discussed in 5.1 should be summarized but presentations to US-based AHJs should stress Dr. Sharma's point that his proposal uses NFPA-780 as the implementation backbone. Previous comments that suggest some adoptions such as lightning ground strike-point density and formal recognition of thunderstorm warning systems (TWS) could be included in the next edition of NFPA 780, Annex L.

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