

Overview of Global Lightning Protection Codes and Standards

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1.0 Summary: More than 100 published lightning protection (LP) codes and standards are in use by various countries and by agencies within countries. Some LP documents present only minimum safety requirements. Others are very detailed with industry specific and/or applications specific information. This paper describes some major codes and standards in the USA and elsewhere.

2. USA LP Codes and Standards.

- 2.1 The NFPA-780 “Standard for the Installation of Lightning Protection Systems” guideline first appeared in 1904 and since has undergone 26 revisions. The NFPA-780 Technical Committee has broad membership across installer, insurance, labor, manufacturing, government, special expert and other groups. While NFPA-780 has no Force In Law, it is generally recognized as the primary LP document in the USA. The most recent 2004 version of NFPA-780 contains significant upgrading from the earlier 2000 edition. A new Chapter 4.18 provides detailed guidance about surge protection and mandates its use with “shall be installed” language.
- 2.2 In the US Government sector the Department of Energy released in May 2002 “M440.1-1, Electrical Storms and Lightning Protection” which describes LP for explosives facilities at the relevant 81 nuclear sites in the country. The Air Force modified “AFI 32-1065 - Grounding Systems” in Feb. 2003 to provide more detailed guidance for Air Force Space Command mission critical operations.
- 2.3 Private sector LP documents typically are applications-specific. For example “Motorola R-56 Standards and Guidance for Communications Sites” was revised in March 2000 from the earlier Jan. 1994 version. Other recommended practices which are useful for the LP engineer’s library include the “IEEE STD 1100, Powering and Grounding Electronic Equipment”, the “IEEE STD 142, Grounding of Industrial and Commercial Power Systems” and the new Dec. 2005 “FAA STD 019e, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment.”

3.0 Other Nations’ LP Codes and Standards.

An examination of other national LP documents is educational and interesting. General agreement and harmony of design recommendations is apparent. Many country codes such as Singapore’s CP 33, Australia/New Zealand’s AS/ANZ-1786, South Africa’s SABS-03, and the Indian IS-2309 had their original heritage in the “grandfather” document from England, BS-6651. Other national standards such as the German VDE-0185, the Chinese GB 50057, the Russian RD

34.21.122-87, and the Polish PN-86/E-05003/01 were internally generated. Two “renegade” LP standards, the French NF C 17-102 and the Spanish UNE-21186 are government endorsements for unapproved, non-scientific early streamer emitter (ESE) LP air terminal systems.

4.0 CIGRE, CENELEC and the IEC: International Resources.

4.1 The “International Council on Large Electric Systems” (CIGRE) formed Section C4.4 Study Group in 2002. Six subcommittees address lightning phenomenology specific to the electric power industry worldwide. It is notable that the USA Electric Power Research Institute (EPRI) has determined 30% of USA annual power outages are lightning-induced at a yearly cost approaching \$1 billion.

4.2 The “European Commission for Electrotechnical Standardization” (CENELEC) has worked toward European member country code standardization since 1973. It has close links with partners such as the International Telecommunications Union (ITU), the International Organization for Standards (ISO), the American National Standards Association (ANSI), the Japan Industrial Standards Commission (JISC) and the International Electrotechnical Commission (IEC).

4.3 The IEC has made final a five-part authoritative and comprehensive LP standard known as the IEC 62305 Series. It represent the most significant forward movement in LP applied engineering studies in twenty years.

4.3.1 IEC 62305 addresses in detail the below subject matters:

4.3.1.1 Part 1 - Protection of Structures Against Lightning: General Principles.

4.3.1.2 Part 2 - Risk Management.

4.3.1.3 Part 3 - Physical Damage and Life Hazard.

4.3.1.4 Part 4 - Electrical and Electronic Systems within Structures.

4.3.1.5 Part 5 - Services (telecom, powerlines, etc.)

4.3.2 In time the IEC 62305 LP guideline will be adopted in whole, in part, or in addition to existing national LP codes. Such activity already is underway in the UK and in Singapore.

5.0 Conclusion.

All LP Codes and Standards are living documents subject to change. As new and verifiable information about lightning defenses becomes understood, national and international documents will provide additional assistance and direction for safety. All of the above LP citations can be “Goggled” for further information.

6.0 Appendix. Many LP documents can be acquired on-line from the following sources:

6.1 Global Engineering/IHS <http://global.ihs.com>

6.2 NLSI www.lightningsafety.com/nlsi_bus/nlsi_pub1.html

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