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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 37047-2022

**Cloud-to-ground lightning density based on lightning location
systems(LLS) - General principles**

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3.1 Terms and Definitions

foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules of Standardization Documents" drafted.

This document replaces GB/T 37047-2018 "General Principles of Ground Lightning Density Based on Lightning Location System (LLS)", and GB/T 37047-

Compared with.2018, the main technical changes except for structural adjustment and editorial changes are as follows.

--- Deleted the terms "ground flash", "cloud flash", "return", "first strike", "subsequent strikes" and "number of strikes" (see 3.1.1 of the.2018 edition~

3.1.6);

--- Changed the definition of the term "lightning location system" (see 3.1.4, 3.1.10 of the.2018 edition);

--- Added the abbreviation "GSP. Lightning Strike Point" (see 3.2);

--- Increase the calculation formula of ground flash density (NG) and lightning strike point density (NSG) (see 4.2);

--- Deleted the method for determining the lightning strike point density (NG) (see 4.7 of the.2018 edition);

--- Added Normative Appendix A "Calculation Process of Ground Lightning Density (NG) and Lightning Strike Point Density (NSG) Based on LLS Data".

This document is revised and adopted IEC 62858.2019 "General Principles of Lightning Locating System (LLS)-based Ground Lightning Density". This document is related to

Compared with IEC 62858.2019, the following structural adjustments have been made.

--- Added 4.2 "Ground Lightning Density (NG) and Lightning Point Density (NSG)", 4.3~4.7 correspond to 4.2~4.6 of IEC 62858.2019;

--- Deleted the informative Appendix A of IEC 62858.2019 "Calculation of Ground Lightning Density when Using Satellite Lightning Monitoring Data", and added

Added Normative Appendix A "Calculation Process of Ground Lightning Density (NG) and Lightning Strike Point Density (NSG) Based on LLS Data".

The technical differences between this document and IEC 62858.2019 and their reasons are as follows.

--- Replaced IEC 62305-1 (see 3.1) with the normatively cited GB/T 21714.1 to adapt to the technical conditions of our country;

--- Replaced IEC 62305-2 (see 3.1) with the normatively cited GB/T 21714.2 to adapt to the technical conditions of our country;

--- Changed the definition of "return detection efficiency" (see 3.1.7), and added the term "ground lightning detection efficiency" (see 3.1.8), so that two are better differentiated;

--- Added the calculation formulas of ground flash density (NG) and lightning strike point density (NSG) (see 4.2) to facilitate the understanding and use of this document;

--- Changed part of the description of the minimum observation period (see 4.4) to make the requirements clearer and easier to operate;

--- Added the method of using lightning strike cases to verify the LLS operating characteristics [see e) in Chapter 5], so as to combine the actual situation in our country, develop

Demonstrate the operational performance verification of the lightning location system;

--- Added Normative Appendix A "Calculation Process of Ground Lightning Density (NG) and Lightning Strike Point Density (NSG) Based on LLS Data".

The following editorial changes have been made to this document.

--- Changed the English of the standard name, the term "ground flash density" in 3.1.1 and 3.2;

--- Changed the English of the abbreviation "IC. Cloud Flash" in 3.2;

--- Deleted some declarative statements in 4.1;

--- The title of 4.4 is changed from "Minimum Observation Period" to "Observation Period" to conform to Chinese language habits;

--- Added examples in 4.4 to facilitate the understanding of "observation years";

---In b) of Chapter 5, a note on detection efficiency has been added to facilitate understanding in the text;

--- Changed the content of informative Appendix B, and explained in detail the two types of calculation methods for the lightning strike point (GSP);

--- Added some references.

Please note that some content of this document may involve patents, and the issuing authority of this document does not assume responsibility for identifying patents.

Introduction

Lightning protection standards (such as GB/T 21714.2) provide methods for lightning risk assessment of buildings (structures).

Ground lightning density (NG) and lightning strike point density (NSG) are the primary input parameters for lightning risk assessment. According to the characteristics of the ground flash, the lightning strike point

The density is greater than or equal to the ground flash density. In areas where lightning strike points are available, lightning strike density should be used for lightning risk assessment.

At present, this parameter is mainly obtained from the data provided by the Lightning Location System (LLS).

There is no one general guideline.

Based on Lightning Location System (LLS)

General rule of ground flash density

1 Scope

This document specifies the method for obtaining the ground lightning density (NG) and the lightning strike point density (NSG) from the Lightning Location System (LLS).

This document applies to the determination of parameters related to lightning risk assessment.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations

documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to

this document.

GB/T 21714.1 Lightning Protection Part 1.General (GB/T 21714.1-2015, IEC 62305-1..2010, IDT)

GB/T 21714.2 Lightning Protection Part 2.Risk Management (GB/T 21714.2-2015, IEC 62305-2.2010, IDT)

3.1 Terms and Definitions

The terms and definitions defined in GB/T 21714.1 and GB/T 21714.2 and the following terms and definitions apply to this document.

3.1.1

NG

Average number of ground flashes per unit area and unit time.

Note. The unit is times per square kilometer year [times/(km².a)].

3.1.2

groundstrike-pointdensity

NSG

Average number of lightning strikes per unit area and unit time.

Note. The unit is units per square kilometer-year [units/(km².a)].

3.1.3

Lightning sensor lightningsensor

A device for measuring electromagnetic radiation signals produced by lightning discharges.

Note. referred to as sensor.

3.1.4

Lightning Location System

By detecting the electromagnetic radiation signal generated in the process of lightning discharge, a variety of lightning location technologies and methods are used to determine the occurrence of lightning.

A system of lightning parameters such as time, location, and polarity.

Note. It consists of multiple lightning sensors (also known as sub-stations), data processing and system monitoring centers (also known as central stations) located in different geographical locations, product output and display