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**Drawing method for cloud-to-ground lightning density
distribution maps**

地闪密度分布图绘制方法

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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" Drafting. Please note that some of the contents of this document may involve patents. The issuing agency of this document is not responsible for identifying patents. This document was proposed and managed by the National Standardization Technical Committee for Lightning Protection (SAC/TC258). This document was drafted by: State Grid Electric Power Research Institute Wuhan Nanrui Co., Ltd., State Grid Zhejiang Electric Power Co., Ltd., Guangxi Zhuang National Autonomous Region Lightning Protection Center, State Grid Shaanxi Electric Power Company Electric Power Research Institute, Hebei Meteorological Bureau, State Grid Hubei Electric Power Co., Ltd. Power Research Institute, State Grid Jiangxi Provincial Electric Power Co., Ltd. Electric Power Research Institute, Hefei Aerospace Power Physics Technology Co., Ltd., North China Electric Power Division Research Institute Co., Ltd., Shanghai Electric Power University, State Grid Beijing Electric Power Research Institute, State Grid Liaoning Electric Power Co., Ltd. Division of Electric Power Research Institute. The main drafters of this document. Gu Shanqiang, Wang Jian, Ding Haifang, Jiang Wendong, Zhi Yaoling, Yao Ximei, Pu Lu, Wu Mengheng, Zhao Chun, Wang Pei, Feng Zhiqiang, Hu Jing, Li Zhibao, Li Yu, Bian Xiaoyan, Ye Kuan, Zheng Weigang. Method for drawing the distribution map of CG lightning density

1 Scope

China's national method for drawing cloud-to-ground lightning density distribution maps,

applied together with Amendment 1 of 2025. It specifies the terms and definitions and the classification rules. A lightning density map states how many cloud-to-ground strikes occur per square kilometre per year, and it is the input to every lightning protection decision made in a country: how a transmission line is shielded, whether a building needs a protection system and of what class, how a wind farm's blades are specified, and what the insurance rate is. The map is built from a national lightning location network, which fixes each strike by the arrival times of its radio emission at several sensors. Standardising how the map is drawn matters because the raw counts depend on the network's detection efficiency, which varies with distance from the sensors - so a naive map shows lightning concentrated wherever the sensors happen to be dense.

This document specifies the classification rules of the CG lightning density and describes the method of drawing the CG lightning density distribution map. This document is applicable to the drawing of the CG lightning density distribution map based on the monitoring data of the lightning positioning system.

2 Normative references

The content of the following documents constitutes an indispensable clause of this document through normative references in the text. Among them, dated quotations Only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to This document.

GB/T 24354 General map symbols for public geographic information

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Cloud-to-ground lightning; CG Atmospheric discharge between clouds and ground.

Note. Consists of one or more lightning strikes. [Source: GB/T 21714.1-2015, 3.1, with modification]

3.2 Cloud-to-ground lightning density NG The average number of ground flashes per unit area and unit time.

Note. The unit is times per square kilometer per year [times/(km²·a)]. [Source: GB/T 37047-2018, 3.1.7, with modification]

3.3 Cloud-to-ground lightning density distribution map Calculate the density of ground flashes in a certain area, classify according to certain rules, and use the corresponding color rendering for each level for A graph that characterizes the spatial distribution of ground flash density.

3.4 Lightning location system; LLS Lightning Positioning System By detecting the

electromagnetic radiation signal generated during the lightning discharge process, using a variety of lightning positioning technologies and methods to determine the occurrence of lightning A system of multiple lightning parameters such as time, location, and polarity.

Note. There are multiple lightning sensors (also called sub-stations), data processing and system monitoring centers (also called central stations), product output and display located in different geographical locations. System and supporting communication facilities, etc.

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