ICS 29.240.20
CCS F 20

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 44659.1-2024

Short-circuit current calculation for renewable energy power stations and connection systems - Part 1

新能源场站及接入系统短路电流计算 第1部分：风力发电

Issued on: October 26, 2024 **Implemented on: May 1, 2025**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

Table of Contents

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 for standardization documents" Drafting. This document is Part 1 of GB/T 44659 "Calculation of short-circuit current of new energy stations and access systems". GB/T 44659 has been published. The following parts.

1.Wind power generation;

2.Photovoltaic power generation;

3.Energy storage power station. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the China Electricity Council. This document is under the jurisdiction of the National Technical Committee for

Standardization of Short-Circuit Current Calculation (SAC/TC424). This document was drafted by: China Electric Power Research Institute Co., Ltd., State Grid Corporation of China, Guangdong Power Grid Co., Ltd., East China Branch of China Southern Power Grid Co., Ltd., Xi'an Jiaotong University, Huazhong University of Science and Technology, China Southern Power Grid Digital Power Research Institute Co., Ltd., Goldwind Technology Co., Ltd., Shenzhen Hopewind Electric Co., Ltd., and Guangdong New Energy Storage National Research Institute Co., Ltd. The main drafters of this document are: Sun Huadong, Li Yalou, Zhou Peipeng, Xu Wenjia, Zhang Yantao, Zhang Yuhong, Wang Hongfu, Xiang Zutao, Huo Qidi, Wei Chunxia, Wang Meng, Li Jianhua, Duan Xiangying, Xie Pingping, Guo Tao, Ma Xiyuan, Wenminghao, Zhang Chenhao, Yang Zhiqian, Zhou Dangsheng, Liu Tao, Lü Siqi, Xiang Weihua, Gao Zhixuan, Song Ruihua, Zhang Jian, Chen Qiyu, Mou Jianan, Xue Hengyu, Wang Qiunan, Lu Qiuyu, Chen Yu, Chen Deyang, and Aiskar.

For short-circuit faults in new energy stations and access systems, it is necessary to refine the model and method for short-circuit calculation of new energy stations to improve the High calculation accuracy. Due to the differences in equipment characteristics and station structures of wind power, photovoltaic and energy storage, their short-circuit calculation methods need to be developed separately. Therefore, GB/T 44659 "Calculation of short-circuit current of new energy stations and access systems" was compiled. Divided into components.

1.Wind power generation. The purpose is to clarify the calculation method of short-circuit current of wind farms and access systems.

2.Photovoltaic power generation. The purpose is to clarify the calculation method of short-circuit current of photovoltaic power stations and access systems.

3.Energy Storage Power Station. The purpose is to clarify the calculation method of short-circuit current of energy storage power station and access system. Short-circuit current calculation of new energy stations and access systems Part

1 Scope

Part 1 of China's national standard for calculating short-circuit currents in renewable generation stations and their connection systems. The calculation is fundamental to any power system - it determines the rating of every switch and busbar and the settings of every protection relay - and the established methods were built around synchronous generators, whose fault contribution follows from their physical reactances and is predictable. An inverter-based generator does not behave that way at all. Its fault current is limited by its semiconductors and determined by its control software, typically to little more than its rated current, and it may vary through the fault as the control responds. Applying the classical method to a wind or solar plant therefore gives a substantially wrong answer, and the direction of the error is the dangerous one: protection set on the assumption of a large fault current will not detect a fault at all.

This document specifies the short-circuit current calculation model and method for wind farms and access systems. This document is applicable to the AC network with voltage level of 10(6)kV and above connected via industrial frequency AC mode, and the converter has a current source The short-circuit current calculation of the wind farm with characteristics is carried out by reference to the wind power generation system connected to the AC network of other voltage levels.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 15544.1 Calculation of short-circuit current in three-phase AC systems Part

3.1 Terms and Definitions The terms and definitions defined in GB/T 15544.1 and

GB/T 19963.1 apply to this document.

3.2 Notation

3.2.1 The formulas listed in this document may be calculated using either nominal values or per unit values. When using nominal values, legal measurement units shall be used. A dot above a letter indicates a complex number or phasor; otherwise, it indicates the magnitude of a real number or phasor. The following symbols apply to this document. AC a. Complex number operators c Voltage coefficient DC G3 three-phase generator The grid-connected port of an HV wind turbine, static VAR generator, or energy storage device, or the unit transformer if one exists. High-voltage side k Steady-state value of the AC component of the three-phase short-circuit current "k Initial value of the AC component of the three-phase short-circuit current kG Steady-state value of the AC component of the three-phase short-circuit current provided by the equivalent voltage source "kG Initial value of the AC component of the three-phase short-circuit current provided by the equivalent voltage source