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

**中华人民共和国国家标准**

**GB/T 15544.1-2013/IEC 60909-0: 2001**

**Replace GB/T 15544-1995**

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**Short-circuit current calculation in three-phase  
a.c. systems—Part 1: Calculation of currents**

**三相交流系统短路电流计算 第 1 部分：电流计算**

(IEC 60909-0: 2001 SHORT-CIRCUIT CURRENTS IN THREE-PHASE AC  
SYSTEMS -Part 0: Calculation of currents)

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China**

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## Foreword

GB/T 15544 *Short-circuit current calculation in three-phase a.c. systems* is divided into 5 Parts.

—Part 1: Calculation of currents

—Part 2: Factors for the calculation of short-circuit currents

—Part 3: Electrical equipment data

—Part 4: Currents during two separate simultaneous line-to-earth short-circuits and partial short-circuit currents flowing through earth.

—Part 5: Numerical example

This Part is Part 1 of GB GB/T 15544.

This Part is drafted according to the rules provided in GB/T 1.1-2009.

This part replaces GB/T 15544-1995 *Short-circuit Current Calculation in Three-phase A.C. Systems*. Compared with GB/T 15544-1995, this part has the following technical changes in addition to the editorial:

—Delete the limit of “nominal voltage 380V~220kV” in the scope of application (see 1.1, and 1.2 in 1995 version);

—Delete the “asymmetrical breaking current” in the terms and definitions (see 3.9.2. in 1995 version);

—Add the “thermal equivalent short-circuit current” in the terms and definitions (see 1.3.23);

—Change the recommended values of voltage coefficients (see table 1, and Table 1 in 1995 version);

—Change the calculation methods of the impedance correction factor of generator-transformer sets (see 3.7, and 10.3.2.7 and 10.3.2.8 in 1995 version);

—Add the impedance correction factor of network transformers (see 3.3.3);

—Change the calculation methods of resistive component in generator impedance (see 3.6.1, and 10.3.2.6 in 1995 version);

—Delete the condition that “the sum of branch short-circuit current takes up 80% of the total short-circuit current” in method A of computing R/X value (see 9.1.3.2 in 1995 version);

—Add the calculation of the short-circuit current at the transformer low voltage side and the single-phase breaking current at the high voltage side (see 4.6.5);

—Add the calculation formula of short-circuit current at three-phase short-circuit of the asynchronous motor terminal (see table 3, and table 2 in 1995 version);

—Add the calculation methods of short-circuit current thermal effect (see 4.8);

—Add the sentence that “in high-voltage DC power transmission systems, computing the short-circuit current of AC systems shall pay special consideration to the effect of capacitor banks and filters” (see 3.10).

—This part adopts the transformation equivalent to IEC 60909-0: 2001 Short-circuit Currents in Three-phase A.C. Systems - Part 0: Calculation of Current. The national documents consistently corresponding to the international normative references

—GB/T 156 2007 Standard voltages (IEC 60038 : 2002, MOD)

—GB 311.1-2012 Insulation co-ordination - Part 1: Definitions, principles and rules (IEC 60071-1: 2006, MOD)

—GB/T 2900.73 2008 Electrotechnical terminology--Earthing and protection against electric shock (IEC 60050-195: 1998, MOD)

—GB/T 2900.74-2008 Electrotechnical terminology--Circuit theory (IEC 60050-131 : 2002. MOD)

—GB/T 2900.83 -2008 Electrotechnical terminology--Electrical and magnetic devices (IEC 60050-151 : 2001, IDT)

This Part is proposed by China Electricity Council.

This Part is under the jurisdiction of National Technical Committee for Standardization of short circuit current calculation (SAC/TC 424)

Drafting organizations of this Part: National Electric Power Dispatching and

Communication Center, China Electric Power Research Institute and Xi'an Jiaotong University.

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## **Introduction**

For easy use of IEC 60909 standard and for ease of standard supplement and revision, the National Technical Committee on Short-circuit Current Calculation of Standardization Administration of China (SAC/TC 424) decides through research to revise GB/T 15544 to be series standards: the revised GB/T 15544.1 is identical to IEC 60909-0; GB/T 15544.2 to IEC 60909-1; GB/T 1554.3 to IEC 60909-2; GB/T 15544.4 to IEC 60909-3; and GB/T 15544.5 to IEC 60909-4.

# Short-circuit current calculation in three-phase a.c. systems—Part 1: Calculation of currents

## 1 General

### 1.1 Scope

This part of GB/T 15544 is applicable to the calculation of short-circuit currents:

- in low-voltage three-phase a.c. systems
- in high-voltage three-phase a.c. systems

operating at a nominal frequency of 50 Hz or 60 Hz.

Systems at highest voltages of 550 kV and above with long transmission lines need special consideration.

This part establishes a general, practicable and concise procedure leading to results, which are generally of acceptable accuracy. For this calculation method, an equivalent voltage source at the short-circuit location is introduced. This does not exclude the use of special methods, for example the superposition method, adjusted to particular circumstances, if they give at least the same precision. The superposition method gives the short-circuit current related to the one load flow presupposed. This method, therefore, does not necessarily lead to the maximum short-circuit current.

This part deals with the calculation of short-circuit currents in the case of balanced or unbalanced short circuits.

In case of an accidental or intentional conductive path between one line conductor and local earth, the following two cases must be clearly distinguished with regard to their different physical properties and effects (resulting in different requirements for their calculation):

- line-to-earth short circuit, occurring in a solidly earthed neutral system or an impedance earthed neutral system;



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