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

GB/T 7409.1-2008

**Excitation systems for synchronous electrical machines --
Definitions**

(English Translation)

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Foreword

GB/T 7409 "Excitation Systems for Synchronous Machines" comprises three parts.

Part 1.GB/T 7409.1 "Excitation Systems for Synchronous Machines-Definitions";

Part 2.GB/T 7409.2 "Excitation Systems for Synchronous Machines-Models for Power System Studies";

Part 3.GB/T 7409.3 "Excitation Systems for Synchronous Machines-Technical Requirements of Excitation System for Large and Medium Synchronous Generators".

This Part is the Part 1 of GB/T 7409 "Excitation Systems for Synchronous Machines".

This Part was developed by amending IEC 60034-16-1.1991 "Rotating Electrical Machines-Part 16.Excitation Systems for Synchronous Machines-Chapter I.

Definition" (English edition), and the amended parts are marked out with vertical line on the right margin.

Appendix A provides the summary list of a comparison between this Part and the clauses of IEC 60034-16-1.1991-02, Appendix B provides the summary list of the technical differences of this Part and IEC 60034-16-1.1991-02 and the relevant reasons for your guidance.

This Part replaces GB/T 7409.1-1997 "Excitation Systems for Synchronous Machines-Definitions".

The major differences of this Part from GB/T 7409.1-1997 are as follows.

- GB/T 7409.1-1997 is identical to IEC 60034-16-1.1991, while GB/T 7409.1-2008 adopts by modifying IEC 60034-16-1.1991;
- The part of definitions in GB/T 7409.3-1997 was supplemented into GB/T 7409.1-2008;
- Definitions in GB/T 7409.1-1997 were amended properly according to the application requirements of GB/T 7409.2-2008 and GB/T 7409.3-2007.

Appendix A and Appendix B of this Part are informative.

This Part shall be under the jurisdiction of and explained by the National Technical Committee on Electric Rotating Machinery of Standardization Administration of China (SAC/TC 26).

Drafting organization of this Part. Harbin electric machinery Co., Ltd. (HEC).

Excitation Systems for Synchronous Electrical Machines -

Definitions

1 Scope

This Part of GB/T 7409 is applicable to the excitation systems of synchronous machines.

2.1 Excitation control system

Include the feedback control systems of synchronous machine and its excitation system.

2.2 Excitation system

The equipment providing the field current of a synchronous machine, including all regulating and control elements, as well as field discharge or suppression equipment and protective devices.

2.3 Exciter

The source of the electrical power providing the field current of the synchronous machine.

Note: Examples of the source are.

- A rotating machine, either DC or AC with associated rectifiers.
- One or several transformers with associated rectifiers

2.4 Excitation control

The control modifying the excitation power, responding to signal characteristics of the stated of the system encompassing the synchronous machine, its exciter and the network to which it is connected.

Note: Synchronous machine terminal voltage is predominantly the controlled quantity.

2.5 Field winding terminal

The place of input to the field winding of the machine.

Note 1: If there are brushes and slip-rings, these are considered to be part of the field winding.

2.25 Voltage response time of excitation system

The time required for suddenly changing the measured voltage value when the generator with

rated load operates at rated speed to make the excitation system output terminal voltage reach

95% of the difference in ceiling voltage and rated field voltage.

2.26 High initial response excitation system

The AC exciter excitation system with voltage response time less than or equal to 0.1s.

2.27 Excitation system forced cut-off

The tripping of synchronous machine caused by faults of excitation system.

2.28 Excitation system forced off ratio for a year F.O.R

The ratio by percentage between the excitation system forced cut-off hours and the sum of handling hours and forced off hours within one year.

2.29 Excitation system abnormal forcing

The abnormal output increase of excitation system caused by the out-of-control of excitation

system.

2.30 Excitation system models

The mathematical formulation of excitation system established in power system stability studies in order to simulate the behaviors of excitation system.

3.1 Rotating exciter

A rotating machine which takes mechanical power from a shaft. This shaft may be driven by the synchronous machine or by another machine.

3.1.1 DC exciter

A rotating exciter employing a commutator and brushes to deliver direct current.

3.1.2 AC exciter

A rotating exciter employing rectifiers to deliver direct current. The rectifiers may be controlled or uncontrolled.

3.1.2.1 AC exciter with stationary rectifiers

An AC exciter with stationary rectifiers whose output is connected to the brushes of the