

ICS 29.160.20
CCS K 20



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

GB/T 20835-2016

**Guides for Magnetization Test of Generator Stator Core
(English Translation)**

Issued on: February 24, 2016

Implemented on: September 1, 2016

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China**

Table of Contents

Foreword...	3
1 Application Scope...	5
2 Normative References...	5
3 Symbols...	5
4 Test Preparation...	7
5 Test Requirements...	9
6 Test Method...	10
7 Core Quality Evaluation Criteria...	13
Annex A (Informative) Stator Core Specific Loss...	14
Annex B (Normative) Test Data Correction...	15

Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 20835-2007, Guides for Magnetization Test of Generator Stator Core. Compared with GB/T 20835-2007, the major changes of this Standard are as follows.

- it adds normative references, i.e. GB/T 2521, Cold-rolled Grain-oriented and Non-oriented Electrical Steel Strip (Sheet), and GB/T 20160, Recommended Practice for Testing Insulation Resistance of Rotating Machinery (Article 2);
- it deletes normative references GB/T 7064, Specific Requirements for Cylindrical Rotor Synchronous Machines, and GB/T 8564, Specification for Installation of Hydraulic Turbine Generator Unit (see Article 2 of edition 2007);
- it modifies the values of stator core stacking factor (see 4.1; 4.1 of edition 2007);
- it adds the calculation formula of actual magnetic induction intensity B [see Formula (7) of 6.4.1];
- it adds the minimum limit of field density during core magnetization test (see 6.4.1);
- it adds the test and its quality evaluation criteria of generator of rated frequency

60 Hz (see 6.4.2 and Article 7);

- it modifies the conversion of stator core specific loss of cylindrical rotor synchronous generator [see Formula (A.1) of Annex A and Formula (A.1) of Annex A of edition 2007];
- it adds Annex B (see Annex B);
- it adds Annex C (see Annex C).

This Standard was proposed by China Electrical Equipment Industry Association.

This Standard shall be under the jurisdiction of China National Standardization Technical Committee on Large Generators (SAC/TC 511).

The drafting organizations of this Standard. Harbin Institute of Large Electrical Machinery, Dongfang Electric Corporation Dongfang Electric Machinery Co., Ltd., Shanghai Electric Power Station Equipment Co., Ltd., Shandong Qilu Electrical Machinery Manufacture Co., Ltd., HydroChina Huadong Engineering Corporation, China Three Gorges Corporation, State Grid Liaoning Province Electric Power Co., Ltd. Electric Power Research Institute, Huadian Electric Power Research Institute Co., Ltd., Toshiba Hydro Power (Hangzhou) Co., Ltd., Zhejiang Fuchunjiang Hydropower Equipment Co, Ltd., Fujian Nandian Co., Ltd., Xiangtan Electric Manufacturing Group Co., Ltd..

Guides for Magnetization

Test of Generator Stator Core

1 Application Scope

This Standard specifies the test preparation, test requirements, test method and core quality evaluation criteria for magnetization test of generator stator core.

This Standard applies to magnetization test of cylindrical rotor synchronous generator and water-turbine generator of voltage class 6.3 kV and above; it is used for the inspection of assembly quality of generator stator core.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2521-2008, Cold-rolled Grain-oriented And Non-oriented Electrical Steel Strip (Sheet)

GB/T 20160, Recommended Practice for Testing Insulation Resistance of Rotating Machinery

3 Symbols

For the purposes of this document, the following symbols apply.

b_v - stator vent width, in m;

B - stator core yoke field density during test, in T;

D_1 - outer diameter of stator core, in m;

D_{i1} - inner diameter of stator core, in m;

f - test power supply frequency, in Hz;

f_0 - reference frequency, 50 Hz (for generator of 50 Hz) or 60 Hz (for generator of

60 Hz), in Hz;

f_1 - measured power supply frequency during test, in Hz;

H - stator yoke magnetic field intensity, in A/m;

h_{ys} - stator core yoke height, in m;

h_s - stator slot depth, in m;

I - excitation coil current, in A;

k_{Fe} - stator core stacking factor;

K_S - power supply capacity factor;

l_u - stator core net length, in m;

l - stator core length, in m;

m - stator core yoke mass, in kg;

n_v - number of stator vents;

P - measured power, in W;

P_1 - stator core specific loss calculated from test, in W/kg;

$PS(1.0)$ - standard specific loss of stator core silicon steel sheet material under 1.0 T, 50 Hz or 60 Hz, in W/kg;

$PS(1.5)$ - standard specific loss of stator core silicon steel sheet material under 1.5 T, 50 Hz or 60 Hz, in W/kg;

Q - stator core yoke sectional area, in m^2 ;

ρ - silicon steel sheet density, in kg/m^3 ;

S - test power supply capacity, in kVA;

t - test duration, in min;

t_0 - environmental temperature, in $^{\circ}C$;

t_i - temperature of the i -th temperature measuring point during test, in $^{\circ}C$;

U_1 - excitation coil voltage, in V;

U_2 - measuring coil voltage, in V;

W_1 - number of turns of excitation coil;

W_2 - number of turns of measuring coil;

Δt_{max} - maximum core temperature rise from the start to the end of test, in K;

Δt_{min} - minimum core temperature rise from the start to the end of test, in K;

wind stator core only.

4.5 Measuring coil voltage

Measuring coil voltage is estimated in accordance with Formula (6); the measuring range of voltmeter is selected based on the estimation.

where,

W_2 - number of measuring coil turns, generally 1 or 2.

4.6 Core temperature measurement

Measurement of core temperature with infrared thermography shall be given precedence. If thermometric elements are embedded, thermocouples or thermometers