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

GB/T 15548-2023

Replacing GB/T 15548-2008

**General specification for three-phase synchronous generators
driven by reciprocating internal combustion engine**

往复式内燃机驱动的三相同步发电机通用技术条件

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1 Scope

GB/T 15548-2023 is the Chinese national standard on general specification for three-phase synchronous generators driven by reciprocating internal combustion engine, in the field of electrical engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 27 November 2023 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 June 2024. Classification: ICS 29.160.20, CCS K21. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the basic parameters and dimensions, general requirements, technical requirements, test methods, inspection rules, as well as marking, packaging and warranty period of three-phase synchronous generators driven by reciprocating internal combustion engine. This document is applicable to the manufacture of three-phase synchronous generators driven by reciprocating internal combustion engine.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references

without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 191-2008 Packaging - Pictorial Marking for Handling of Goods

GB/T 755-2019 Rotating Electrical Machines - Rating and Performance

GB/T 997-2022 Classification of Types of Construction, Mounting Arrangements and Terminal Box Position (IM Code) for Rotating Electrical Machines

GB/T 1029-2021 Test Procedures for Three-phase Synchronous Machines

GB/T 1096-2003 Square and Rectangular Keys

GB/T 1958-2017 Geometrical Product Specifications (GPS) - Geometrical Tolerance - Verification

GB/T 1971-2021 Rotating Electrical Machines - Terminal Markings and Direction of Rotation

GB/T 1993-1993 Cooling Methods for Rotating Electrical Machines

GB/T 2820.6-2009 Reciprocating Internal Combustion Engine Driven Alternating Current Generating Sets - Part

3 Terms and Definitions

This document does not have terms or definitions that need to be defined.

4.1 Basic Parameters

4.1.1 The enclosure protection degree of the three-phase synchronous generators driven by reciprocating internal combustion engine (hereinafter referred to as the generators) shall be agreed upon by the user and the manufacturer in accordance with GB/T 4942-2021.

4.1.2 The cooling method of the generators shall be agreed upon by the user and the manufacturer in accordance with GB/T 1993-1993.

4.1.3 The structure and installation type of the generators shall be agreed upon by the user and the manufacturer in accordance with GB/T 997-2022.

4.1.4 The generator quota is a continuous quota based on the continuous working system (S1).

4.1.5 The rated frequency of the generators is

60 Hz, the rated voltage of the generators is 400 V, 450 V, 600 V, 690 V, 3,150 V, 3,300 V, 6,300 V, 6,600 V, 10,500 V, 11, 000V or 13,800 V, the armature winding is a star connection with or without a lead wire at the neutral point, and can also be determined in accordance with the user agreement.

4.1.6 The rated power factor of the generators is 0.8 (lagging).

4.1.7 The rated frequency and rated speed of the generators are as specified in Table 1.

4.1.8 The recommended rated power of the generators shall be in accordance with the provisions of Table 2.

4.2 Dimensions

4.2.1 The installation dimensions and tolerances of the generators shall comply with the provisions of GB/T 4772.1-1999 or GB/T 4772.2-1999.

4.2.2 The shaft extension keys and tolerances of the generators shall comply with the provisions of GB/T 1096-2003.

4.2.3 The corresponding relations among the generator power, speed and center height shall be specified by the product standard.

5 General Requirements

5.1 The generators shall comply with the requirements of this document and be manufactured in accordance with the drawings and technical documents approved by the prescribed procedures.

5.2 Under the following altitudes, ambient air temperatures and ambient air relative humidity conditions, the generators shall be able to maintain the rated operation.

- a) The altitude does not exceed 1,000 m.
- b) The maximum ambient air temperature varies with the seasons, but does not exceed 40 C.
- c) The minimum ambient air temperature is 15 C, except for the following motors, the ambient air temperature shall not be lower than 0 C. 1) Rated output greater than 3,300 kW (or 4,125 kVA), speed greater than or equal to 1,000 r/min; 2) With sliding bearings; 3) Use water as primary or secondary cooling medium.
- d) The average maximum relative humidity of the wettest month at the operating location is 90%, and the average minimum temperature of the month is not higher than 25 C.
- e) When the generators are used for ships, the environmental requirements shall comply with the provisions of GB/T 12975-2021. If the operating conditions do not comply with the above-mentioned provisions, then, the deviation shall be corrected in accordance with the provisions of GB/T 755-2019.

5.3 The generators shall be able to output rated power at rated speed and rated power factor when the voltage changes between 95% ~ 105% of the rated value. When deviating from the rated operation, the performance is allowed to be different from that specified in

the Standard, but when the above-mentioned voltage change reaches the limit and the motor is in continuous operation, the maximum value that is allowed to be exceeded by the temperature rise limit is 10 K.

5.4 The generator and its excitation system shall be able to perform reliable excitation.

5.5 It is advisable to consider many factors that may affect the torsional vibration of the shaft system after the generators and the internal combustion engine are grouped. When necessary, the generator manufacturer shall provide the internal combustion engine manufacturer with the rotor size and rotational inertia and other parameters of the generators, which will be calculated and determined by the internal combustion engine manufacturer.

5.6 Unless measures are taken to ensure that there is no danger, the 3,150 V or higher leading- out terminals and low-voltage leading-out terminals in the generators cannot be in the same leading-out box.

6 Technical Requirements

6.1 The mechanical inspection items of the generators include.

- a) Bearing inspection. when the generators are running, the bearings shall be stable and light, and without stagnation;
- b) Surface quality inspection. the paint on the surface of the generators shall be dry and

6.31 The electromagnetic compatibility of the generators shall comply with the provisions of GB/T 755-2019. When the generators are used for ships, the electromagnetic compatibility shall comply with the provisions of GB/T 12975-2021.

7 Test Methods

7.1 The appearance, assembly quality, external surface paint and various markings of the generators shall be inspected by visual inspection; the rotating shaft and bearing operation inspection shall be carried out by manual rotation. The inspection of motor dimensions shall be carried out in accordance with the provisions of GB/T 4772.1-1999, GB/T 4772.2-1999 and GB/T 1958-2017.

7.2 The determination of insulation resistance between the generator winding and the frame and between the windings, phase sequence inspection, voltage setting range determination, steady- state voltage regulation rate determination, short-time voltage rise test, voltage withstand test, overspeed test, voltage deviation determination when the generators are working under asymmetric load, shaft voltage determination, efficiency determination, thermal test, accidental overcurrent test, overload test, waveform distortion rate determination, harmonic voltage factor determination, and sudden short-circuit mechanical strength shall be carried out in accordance with the provisions of GB/T