

ICS 21.120.40
CCS J 04



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

GB/T 9239.11-2025

Replacing GB/T 9239.1-2006

**Mechanical vibration - Rotor balancing - Part 11: Procedures
and tolerances for rotors with rigid behaviour
(English Translation)**

Issued on: August 1, 2025

Implemented on: February 1, 2026

**Issued by: State Administration for Market Regulation, Standardization
Administration of China**

Table of Contents

Preface
Introduction
1 Scope
2 Normative references
3 Terms and Definitions
4 Description of balance
5 Common factors
6 Determination of imbalance tolerance
7 Distribution of the permissible residual unbalance to the tolerance plane
8 Distribution of unbalance tolerance to the correction plane
9 Assembled rotor
10 Errors to be considered when detecting the permissible residual unbalance
Appendix A (informative) Example of determining the permissible residual unbalance according to balancing quality grade G and its allocation to the tolerance plane
Appendix B (Informative) Specifications for determining unbalance tolerances based on bearing force limits
Appendix C (Informative) Specifications for determining unbalance tolerances based on existing experience
Appendix D (Informative) Rules for allocating unbalance tolerances from the tolerance plane to the correction plane
Reference

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 11 of GB/T 9239 Mechanical Vibration Rotor Balancing. GB/T 9239 has been published in the following parts.

- Part 2: Vocabulary;
- Part 11: Balancing methods and tolerances for rigid rotors;
- Part 12: Balancing methods and tolerances for rotors with flexible characteristics;
- Part 13: Criteria and safety precautions for field balancing of large and medium-sized

rotors;

--- Part 14: Procedure for evaluating balance errors;

--- Part 21: Description and evaluation of balancing machines;

--- Part 23: Protective covers and other protective measures for measuring stations of balancing machines;

--- Part 31: Machine imbalance variability and imbalance sensitivity;

--- Part 32: Key criteria for balance between shafts and mating parts.

This document replaces GB/T 9239.1-2006 "Mechanical vibration steady-state (rigid) rotor balance quality requirements Part 1: Specification and balance Compared with GB/T 9239.1-2006, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

--- Changed the requirements for selecting the support plane as the reference plane, and added that not all support planes are suitable for reference planes Requirements (see 4.4, 4.4 of the 2006 edition);

---Change the residual unbalance value from "should not be greater than the allowable residual unbalance value" to "should not be greater than the allowable residual unbalance value", and increase Added the requirement that "Upper covers the case of combined unbalanced forces and moments" (see 4.6, 4.6 of the 2006 edition);

--- Added requirements for balancing steps and taking errors into account (see 6.1);

--- The requirement for the rotor residual unbalance tolerance limit value is changed from "should not" to "should not" (see 7.2.2 and 7.2.3, 2006 edition) 7.2.3 and 7.2.4);

--- Changed the requirements for balancing error and added the requirement that the balancing error take into account the error of the components removed from the rotor (see 10.1, 2006 edition 10.1);

--- Change "5%" to "10%" (see 10.3, 10.2.4 of the 2006 edition);

--- Deleted the judgment rules for users to perform balance tests independently (see 10.2.3 of the 2006 edition);

--- Added a method for determining the rotor balance when the unbalance reading exceeds the tolerance (see 10.4.3);

--- Deleted the requirements for inspection on a balancing machine and inspection not on a balancing machine (see 10.3 and 10.4 of the 2006 edition);

--- Added requirements for the uncertainty of unbalance measurement (see 10.4.4).

This document is equivalent to ISO 21940-11:2016 "Mechanical vibration rotor balancing

Part 11: Balancing methods and methods for rigid rotors" Tolerance.

Introduction

Rotor balancing is the process of inspecting the mass distribution of the rotor (or parts or components) and adjusting it if necessary to ensure that the remaining the process of balancing within a specified range. This document provides the balancing method and tolerances for rigid rotors. A rigid rotor is a rotor that is not more than at high operating speeds, the deflection of the rotor is negligible. For a rigid rotor, the force and torque imbalances are of concern.

Note: This refers to the dynamic imbalance of the rotor.

Today's balancing machines are able to reduce the residual unbalance to a very low level. In most cases, reducing the unbalance to a level the limits of what a weighing machine can achieve are not cost-effective, so it is necessary to specify the balance quality requirements for balancing tasks.

In addition to specifying the unbalance tolerance, it is also necessary to consider the errors introduced by the balancing process. This document takes into account the effects of these errors and clearly A distinction is made between the specified permissible residual unbalance and the residual unbalance that can be achieved during the balancing process.

GB/T 9239 Mechanical Vibration Rotor Balancing explains balance in a general way, using specific terms and definitions to help users choose the standard of balancing mainly involves five aspects. introduction, vocabulary, balance, the balancing method and tolerance, balancing machine, and mechanical design for balancing are intended to consist of the following parts.

--- Part 1: Introduction. The purpose is to give the general background of the use of balancing technology in the GB/T 9239 series of documents and to guide the user is familiar with the corresponding parts of the series, including vocabulary, balancing methods and tolerances, balancing machines and machine design for balancing.

--- Part 2: Vocabulary. The purpose is to define the vocabulary used for balancing, to provide an alphabetical index of balancing vocabulary and a diagram of balancing machine terminology Solution Guide.

--- Part 11: Balancing methods and tolerances for rigid rotors. The purpose is to give balancing methods and tolerances for rigid rotors.

The permissible residual unbalance value, the necessary number of correction planes, the allocation of the residual unbalance tolerances of the correction planes, and the How to explain errors in the balancing process.

--- Part 12: Balancing methods and tolerances for rotors with flexible characteristics. The

purpose is to give balancing methods for flexible rotors the typical structure of the flexible rotor is given, the balancing requirements based on its own characteristics are specified, and the balancing methods are listed.

The method provides a method for assessing the final equilibrium state and gives guidance on the imbalance tolerance.

--- Part 13: Criteria and safety precautions for field balancing of large and medium-sized rotors. The purpose is to give the criteria and safety precautions for field balancing of large and medium-sized rotors on their own bearings.

The procedures for field balancing are described. The conditions suitable for field balancing, the required instruments, specific safety measures, and reporting and Requirements for maintaining records.

--- Part 14: Procedure for evaluating balance errors. The purpose is to standardize the procedure for evaluating balance errors and to specify the rotor imbalance Error identification during measurement, evaluation of identified errors and requirement to take errors into account when determining the residual imbalance.

--- Part 21: Description and evaluation of balancing machines. The purpose is to give the requirements for the performance evaluation of balancing machines.

--- Part 23: Protective covers and other protective measures for measuring stations of balancing machines. The purpose is to give protective covers and other protective measures for balancing machines.

The requirements for protective measures are defined, the different levels of protection provided by protective covers and other protective measures are defined, and the scope of application of each level of protection is given.

--- Part 31: Machine imbalance variability and imbalance sensitivity. The purpose is to give the method to determine the sensitivity of mechanical vibration to imbalance.

A method for evaluating the vibration sensitivity of the load is proposed and a guideline for evaluating the vibration sensitivity when the resonant speed is close to the operating speed is provided.

--- Part 32: Key criteria for balancing shafts and mating parts. The purpose is to give the key-connected rotor assembly when balancing the individual components.

Principles.

Mechanical vibration rotor balancing Part 11: Balancing methods and tolerances for rigid rotors