

ICS 17.160
CCS J 04



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

GB/T 41850.5-2026

Replacing GB/T 11348.5-2008, GB/T 6075.5-2002

**Mechanical vibration - Measurement and evaluation of machine
vibration - Part 5: Machine sets in hydraulic power generating
and pump-storage plants**

机械振动 机器振动的测量和评价 第5部分：水力发电和抽水蓄能电站机组
(English Translation)

Issued on: July 30, 2026

Implemented on: February 1, 2027

Issued by: State Administration for Market Regulation

Table of Contents

Preface	
Introduction	
1 Scope	
2 Normative References	
3 Terms and Definitions	
4 Machine Layout	
5.1 Overview	
5.2 Measurement Type	
5.3 Measurement of position and orientation	
5.4 Measuring equipment	
5.5 Operating Condition	
6 Vibration Measurement and Evaluation	
6.1 Overview	
6.2 Criterion I. Vibration value	
6.3 Criterion II. Changes in Vibration Magnitude and Phase	
6.4 Operating Limit	
6.5 Comparison of Shaft Vibration and Bearing Housing Vibration Results	
6.6 Evaluation based on vibration vector information	
Appendix A (Normative) Evaluation Area Boundary Values	
A.1 Vibration Limit	
A.2 Application and Measures of Specified Limits	
A.3 Measures to be taken when the limit is exceeded	
A.4 Vibration Measurement Evaluation Example	
Appendix B (Informative) Prerequisites for Vibration Monitoring Trend Analysis	
B.1 General Information and Recommendations	
Appendix C (Informative) Characteristics of Vibration in Bearing Housings and Shafts of Hydraulic Turbine Units	
C.1 General Provisions	
C.2 Vibration frequencies originating from mechanical and electrical sources	
C.3 Mechanical reasons	
C.4 Electrical reasons	
C.5 Hydraulic reasons	

C.6 Additional Incentives

Appendix D (Informative) Databases, Analytical Methods, and Statistical Evaluation

D.1 Collection of vibration measurements of shafts and bearing housings

D.2 Statistical Assessment

Appendix E (Informative) Recommended Specifications for Vibration Data Processing

E.1 Overview

E.2 Reasonable Filtering of Time-Domain Data

E.3 Reasonable Filtering of Frequency Domain Data

E.4 Peak-to-peak value evaluation details

References

Foreword

This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting is scheduled.

The following parts were included.

--Part 1: General Provisions;

--Part 2: For 40 MW and above, using sliding bearings, the rated speeds are 1500 r/min, 1800 r/min, and 3000 r/min.

And 3,600 r/min land-based gas turbines, steam turbines, and generators;

--Part 5: Hydropower and Pumped Storage Power Station Units;

--Part 8: Reciprocating Compressor Systems;

--Part 9: Gear Gear

This document replaces GB/T 11348.5-2008 "Measurement and evaluation of radial vibration of rotating machinery shafts - Part 5: Hydropower plants".

"Measuring and evaluating mechanical vibrations of machines on non-rotating parts - Part 5: Hydraulic vibrations" and GB/T 6075.5-2002 "Measuring and evaluating mechanical vibrations of machines on non-rotating parts - Part 5: Hydraulic vibrations".

"Power Plant and Pumping Station Units" has undergone structural adjustments and editorial changes compared to GB/T 11348.5-2008 and GB/T 6075.5-2002.

In addition, the main technological changes are as follows.

--The vibration measurement evaluation area has been changed (see 6.2, Appendix A of

GB/T 11348.5-2008 and GB/T 6075.5-2002).

Chapter 5);

--Added boundary limits for the A-B/C and C/D regions of bearing housing and shaft vibration under given operating conditions (see Chapter 6);

--Added requirements to the vibration zone boundary evaluation, specifying that the bearing temperature should not exceed the specified limit and the shaft vibration displacement should not exceed the bearing's cold state value.

70% consideration for radial clearance (see Chapter 6);

--Added various measures to be taken when vibration exceeds the limits in the A-B/C and C/D zones (see A.3).

This document is equivalent to ISO 20816-5:2018 "Mechanical vibration - Measurement and evaluation of machine vibration - Part 5: Hydroelectric power generation and..." Pumped storage power station units.

This document was proposed and is under the jurisdiction of the National Technical Committee on Standardization of Mechanical Vibration, Shock and Condition Monitoring (SAC/TC 53).

Introduction

This document provides specific methods for measuring and evaluating the vibration of bearing housings and shafts in hydroelectric and pumped-storage power plants.

Physical guidance.

This document provides two criteria for assessing machine vibration.

- a) The first criterion takes into account the amplitude of the measured vibration;
- b) The second criterion takes into account the changes in the amplitude and phase of the measured vibration.

This document covers the analysis of vibrations of rotating shafts and vibrations of fixed, non-rotating components.

This document establishes vibration criteria for horizontal and vertical axis machines, and provides guidelines for each type of turbine (bulb turbine, mixed-flow turbine, bucket turbine, shaft turbine).

Vibration criteria have been established for propeller-driven pumping turbines in both power generation and pumping operations (depending on the specific conditions). The vibration amplitude criteria provided in this document are based on a unified...

Based on calculations, the given amplitude values are not suitable as guarantee values. It is

recommended that a vibration assessment be conducted by a vibration expert jointly selected by all parties.

To determine the optimal performance of hydraulic machinery, the following points need to be considered comprehensively.

- Relative shaft vibration value;
- Vibration value of bearing housing;
- Percentage of the cold radial clearance of the guide bearing used;
- Ensure that the machine's operating conditions (head and flow rate or head and power) are within the normal operating range.

For vibration amplitudes exceeding the action limits given in Appendix A, recommended measures are provided to determine whether the machine is suitable.

It can operate continuously and for a long time without restrictions.

This document provides details regarding vibrations that occur during machine operation, as well as any possible changes in the amplitude or phase of the vibration values.

Guidelines. The vibration values given in Appendix A are intended as a basis for assessing machine condition and for further investigation as necessary.

This document recommends assessing machine condition by simultaneously considering bearing housing vibration and shaft vibration.

GB/T 41850 "Mechanical Vibration - Measurement and Evaluation of Machine Vibration" provides guidelines for the measurement and evaluation of vibration on non-rotating parts and rotating shafts.

Requirements and guidelines for machine vibration. GB/T 41850 is proposed to consist of the following parts.

- Part 1: General Principles. The purpose is to provide a framework for measuring and evaluating various types of machine vibrations on non-rotating parts and rotating shafts.

General requirements.

- Part 2: For 40 MW and above, using sliding bearings, the rated speeds are 1500 r/min, 1800 r/min, and 3000 r/min.

And a land-based gas turbine, steam turbine, and generator with a speed of 3600 r/min. The aim is to provide information on large-scale land-based gas turbines...

Specific evaluation of vibration of bearing housings and shafts in turbines, steam turbines, and generators.

- Part 4: Gas turbines with fluid diaphragm bearings above 3 MW. The purpose is to provide