

ICS 17.160
CCS J 04



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

GB/T 11348.4-2015

**Mechanical vibration -- Evaluation of machine vibration by
measurements on rotating shafts -- Part 4: Gas turbine sets
with fluid-film bearings**

(English Translation)

Issued on: December 31, 2015

Implemented on: July 1, 2016

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine**

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Foreword

GB/T 11348 Mechanical vibration of non-reciprocating machines -

Measurements on rotating shafts and evaluation criteria consists of the following five parts:

- Part 1: General guidelines;
- Part 2: Large land-based steam turbine generator sets;
- Part 3: Coupled industrial machines;
- Part 4: Gas turbine sets with fluid-film bearings;
- Part 5: Machine sets in hydraulic power generating and pumping plants.

This Part is the 4th part of GB/T 11348.

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

This Part replaces GB/T 11348.4-1999 Mechanical vibration of non-reciprocating machines - Measurements on rotating shafts and evaluation criteria - Part 4: Gas turbine sets.

Compared with GB/T 11348.4-1999, the main modifications are as follows:

- modified standard's name from "Mechanical vibration of non-reciprocating machines - Measurements on rotating shafts and evaluation criteria - Part

- 4: Gas turbine sets" to "Mechanical vibration of non-reciprocating machines - Measurements on rotating shafts and evaluation criteria";
- added the acceptance criterion agreed by the supplier and the user before gas turbine installation;
 - added the evaluation on vibration of gas turbine under transient operating conditions;
 - modified the translation of "vibration amplitude" in Edition 1999 to "vibration value";
 - modified examples of using boundary values for different regions in the clause of evaluation regional boundaries (see 4.2.2.4);
 - modified "when new machine does not establish valid baseline data, the ALARM limit recommended under its stable operating working rotation speed" to "may be less than the zone B/C boundary" (see 4.2.3.2);
 - added a second ALARM of setting of TRIPS (see 4.2.3.3);
- Mechanical vibration - Evaluation of machine vibration
by measurements on rotating shafts -
- Part 4: Gas turbine sets with fluid-film bearings

1 Scope

This Part of GB/T 11348 establishes provisions for evaluating the severity of in-situ, broad-band shaft vibration measured radial (i.e. transverse) to the shaft axis at, or close to, the main bearings. These are in terms of:

- vibration under normal steady-state operating conditions;
- vibration during other (non-steady-state) conditions when transient changes are taking place, including run up or run down, initial loading and load changes;
- changes in vibration which can occur during normal steady-state operation.

This Part is applicable to heavy-duty gas turbine sets used in electrical and

mechanical drive applications, with fluid-film bearings, outputs greater than 3 MW and an operating speed range under load between 3000 r/min and 30000 r/min. This includes gas turbines coupled to other rotating machinery either directly or through a gearbox. In some cases, this Part is not applicable to the evaluation of the vibration of the coupled equipment (see the list of exclusions in this clause).

EXAMPLE For single-shaft combined-cycle power units in which a gas turbine is coupled to a steam turbine and/or generator, the evaluation of the gas turbine vibration is according to this Part, but that of the steam turbine and generator is according to GB/T 11348.1 or ISO 7919-3.

This Part is not applicable to the following:

a) aero-derivative gas turbines (including gas turbines with dynamic properties similar to those of aeroderivatives);

NOTE ISO 3977-3 defines aero-derivatives as aircraft propulsion gas generators adapted to drive mechanical, electrical or marine propulsion equipment. Large differences exist between heavy-duty and aero-derivative gas turbines, for example in casing flexibility, bearing design, rotor to stator mass ratio and mounting structure. revolution rotational frequency component. Consequently, it can be difficult to identify the effects of the crack propagation by looking at the change in the broad-band vibration only. Therefore, although monitoring the change in broad-band vibration gives some indication of potential problems, it can be necessary in certain applications to use measurement and analysis equipment which is capable of determining the trends of the vibration vector changes which occur for individual frequency components. This equipment can be more sophisticated than that used for normal supervisory monitoring and its use and application requires specialist knowledge. The specification of detailed criteria for measurements of this type is beyond the scope of this Part (see 4.5).

4.4 Supplementary procedures/criteria

The measurement and evaluation of vibration given in this Part may be supplemented or replaced by measurements made on non-rotating parts (see GB/T 6075.4). There is no simple way to relate shaft vibration to bearing housing vibration, or vice versa. The difference between the shaft absolute and shaft relative measurements is related to the bearing housing vibration, but generally is not numerically equal to it because of the relative dynamic flexibility of the bearing oil film and support structure at the operating speed, the different positions at which the probes are mounted and the influence of phase angle differences. Thus, when the criteria of this Part and those of GB/T 6075.4 are both applied in the assessment of machine vibration, independent shaft and bearing housing (or pedestal) vibration measurements shall be made. If application of the different criteria leads to different assessments of vibration severity, the more restrictive zone classification generally applies, unless there is significant experience to the contrary.

4.5 Evaluation based on vibration vector information

The evaluation considered in this Part is limited to broad-band vibration without reference to frequency components or phase. In most cases, this is adequate for acceptance testing and for operational monitoring purposes. However, for long-term condition monitoring purposes and for diagnostics, the use of vibration vector information is particularly useful for detecting and defining changes in the dynamic state of the machine. In some cases, these changes would go undetected when using only broad-band vibration measurements (see GB/T 6075.1-2012, Annex D).

Phase- and frequency-related vibration information is being used increasingly for monitoring and diagnostic purposes. The specification of criteria for this, however, is beyond the scope of this Part. They are dealt with in greater detail in ISO 13373 (all parts), which give provisions for the vibration condition