

Second edition
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Mechanical vibration — Evaluation of machine vibration by measurements on non-rotating parts —

Part 4: Gas turbine sets with fluid-film bearings

*Vibrations mécaniques — Évaluation des vibrations des machines par
mesurages sur les parties non tournantes —*

Partie 4: Turbines à gaz à paliers à film fluide



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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
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Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	2
3 Measurement procedures.....	2
4 Evaluation criteria	4
4.1 General	4
4.2 Criterion I: Vibration magnitude	5
4.3 Criterion II: Change in vibration magnitude under steady-state conditions at normal operating speed	10
4.4 Supplementary procedures/criteria	10
4.5 Evaluation based on vibration vector information	10
Annex A (normative) Evaluation zone boundaries	12
Annex B (informative) Example of setting ALARM and TRIP values.....	13
Annex C (informative) Cautionary notes about the use of vibration velocity criteria at low rotational speeds	14
Bibliography.....	16

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10816-4 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 2, *Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures*.

This second edition cancels and replaces the first edition (ISO 10816-4:1998), of which it constitutes a technical revision. The main changes are:

- clarification that the document applies only to gas turbine sets with fluid-film bearings;
- emphasis on acceptance specifications always being agreed on between the supplier and the purchaser of the gas turbine set prior to installation;
- the addition of provisions for evaluating the vibration of coupled gas turbine sets during transient operation;
- introduction of a new annex providing cautionary notes about the use of constant vibration velocity criteria at low frequencies;
- closer alignment of this part of ISO 10816 with ISO 7919-2, ISO 7919-4 and ISO 10816-2.

ISO 10816 consists of the following parts, under the general title *Mechanical vibration — Evaluation of machine vibration by measurements on non-rotating parts*:

- *Part 1: General guidelines*
- *Part 2: Land-based steam turbines and generators in excess of 50 MW with normal operating speeds of 1 500 r/min, 1 800 r/min, 3 000 r/min and 3 600 r/min*
- *Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15 000 r/min when measured in situ*
- *Part 4: Gas turbine sets with fluid-film bearings*
- *Part 5: Machine sets in hydraulic power generating and pumping plants*
- *Part 6: Reciprocating machines with power ratings above 100 kW*
- *Part 7: Rotodynamic pumps for industrial applications, including measurements on rotating shafts*

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Introduction

ISO 10816-1 is the basic part of ISO 10816 giving the general requirements for evaluating the vibration of various machine types when the vibration measurements are made on non-rotating parts. This part of ISO 10816 gives specific provisions for assessing the severity of vibration measured on the bearing housings or pedestals of gas turbine sets. Measurements at these locations characterize the state of vibration reasonably well. Evaluation criteria, based on previous experience, are presented. These can be used for assessing the vibratory condition of such machines.

Two criteria are provided for assessing the machine vibration when operating under steady-state conditions. One criterion considers the magnitude of the observed vibration; the second considers changes in the magnitude. In addition, different criteria are provided for transient operating conditions. However, vibration on non-rotating parts does not form the only basis for judging the severity of vibration. For gas turbine sets, it is also common to judge the vibration based on measurements taken on the rotating shafts. For shaft vibration measurement requirements, see ISO 7919-1 and ISO 7919-4.

The evaluation procedures presented in this part of ISO 10816 are based on broad-band measurements. However, because of advances in technology, the use of narrow-band measurements or spectral analysis has become increasingly widespread, particularly for the purposes of vibration evaluation, condition monitoring and diagnostics. The specification of criteria for such measurements is beyond the scope of this part of ISO 10816. They are dealt with in greater detail in ISO 13373 (all parts), which establish provisions for the vibration condition monitoring of machines.