



BSI Standards Publication

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

Part 4: Gas turbine sets with fluid-film bearings

National foreword

This British Standard is the UK implementation of ISO 10816-4:2009+A1:2017. It supersedes BS ISO 10816-4:2009, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee GME/21/5, Mechanical vibration, shock and condition monitoring - Vibration of machines.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2017
Published by BSI Standards Limited 2017

ISBN 978 0 580 94288 4

ICS 27.040; 17.160

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 1 October 2009.

Amendments/corrigenda issued since publication

Date	Text affected
31 October 2017	Implementation of ISO amendment 1:2017

INTERNATIONAL STANDARD

ISO
10816-4

Second edition
2009-10-01

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



Reference number
ISO 10816-4:2009(E)
Documents
Document Sharing Hub
© ISO 2009



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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
4.2.1 General.....	5
4.2.2 Vibration magnitude at normal operating speeds under steady-state operating conditions	5
4.2.3 Operational limits for steady-state operation	7
4.2.4 Vibration magnitude during non steady-state conditions (transient operation)	8
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.....	11
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

^{A1}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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document 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), which has been technically revised. 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 7919-4.

A list of all parts in the ISO 10816 series can be found on the ISO website.^{A1}

Introduction

ISO 20816-1 gives general guidelines for evaluating the vibration of various machine types when the vibration measurements are made on rotating and on non-rotating (and, where applicable, non-reciprocating) parts of complete machines. 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 20816-1 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.

This page deliberately left blank