INTERNATIONAL STANDARD

ISO 7919-4

Second edition
2009-10-01

AMENDMENT 1
2017-08

Mechanical vibration — Evaluation of machine vibration by measurements on rotating shafts —

Part 4: Gas turbine sets with fluid-film bearings

AMENDMENT 1

Vibrations mécaniques — Évaluation des vibrations des machines par mesurages sur les arbres tournants —
Partie 4: Turbines à gaz à paliers à film fluide

AMENDEMENT 1

Reference number
ISO 7919-4:2009/Amd.1:2017(E)

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

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.

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*.

A list of all parts in the ISO 7919 series can be found on the ISO website.

Mechanical vibration — Evaluation of machine vibration by measurements on rotating shafts —

Part 4:
Gas turbine sets with fluid-film bearings

AMENDMENT 1

Foreword

Replace the complete text of the Foreword with the following:

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 7919-4:1996), 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;

— closer alignment of this part of ISO 7919 with ISO 10816-4.

A list of all parts in the ISO 7919 series can be found on the ISO website.

Introduction

Replace the first sentence with the following:

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.

Second paragraph

Replace the reference to “ISO 10816-1” with “ISO 20816-1”.

Clause 1, *EXAMPLE*

Delete “ISO 7919-2 or”.

Replace the list after the example with the following:

This part of ISO 7919 is not applicable to the following:

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

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. Different criteria therefore apply for these two turbine types.

b) gas turbines with outputs greater than 40 MW and with rated speeds of 1 500 r/min, 1 800 r/min, 3 000 r/min or 3 600 r/min (see ISO 20816-2);

c) gas turbines with outputs less than or equal to 3 MW (see ISO 7919-3);

d) gas turbine driven rotodynamic pumps (see ISO 7919-3 and ISO 10816-7);

e) coupled steam turbines and/or generators with outputs less than or equal to 40 MW (see ISO 7919-3);

f) coupled steam turbines and/or generators with outputs greater than 40 MW and speeds of 1 500 r/min, 1 800 r/min, 3 000 r/min or 3 600 r/min (see ISO 20816-2);

g) coupled steam turbines and/or generators with outputs greater than 40 MW and speeds other than 1 500 r/min, 1 800 r/min, 3 000 r/min or 3 600 r/min (although generators seldom fall into this category) (see ISO 7919-3);

h) synchronizing clutches which couple the gas turbine to a steam turbine or generator (see ISO 20816-2);

i) coupled rotary compressors (see ISO 7919-3);

j) gearbox vibration (see this clause);

k) rolling element bearing vibration of any driven equipment.

Last paragraph

Replace the reference to “ISO 10816-1” with “ISO 20816-1”.

Clause 2

Replace this clause with the following:

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10816-4:2009, *Mechanical vibration — Evaluation of machine vibration by measurements on non-rotating parts — Part 4: Gas turbine sets with fluid-film bearings*

ISO 20816-1:2016, *Mechanical vibration — Measurement and evaluation of machine vibration — Part 1: General guidelines*

Clause 3, first and last paragraphs

Replace the reference to “ISO 7919-1” with “ISO 20816-1”.

4.1, first sentence

Replace the reference to “ISO 7919-1” with “ISO 20816-1”.

4.2.2.4

Delete the first paragraph.

Second paragraph

Replace “for other gas turbine sets” with “for gas turbine sets”.

NOTE 1

Replace the reference to “ISO 7919-1” with “ISO 20816-1”.

In the first sentence of the paragraph after NOTE 1, delete “Table A.1 and”.

In the first sentence of the third paragraph after NOTE 1, delete “Table A.1 and”.

In item b) of the list, delete “in Table A.1 and”.

4.2.4.3, fourth paragraph

Replace the reference to “ISO 10814” with “ISO 21940-31”.

4.3, fifth paragraph

Replace the reference to “ISO 7919-1” with “ISO 20816-1”.

4.5, first paragraph

Replace the reference to “ISO 10816-1:1995” with “ISO 20816-1:2016”.

Annex A

Replace the first two sentences with:

The values given in Figure A.1 apply to radial shaft relative vibration measurements at, or close to, the bearings, when taken under steady-state operating conditions at normal operating speed.

Second paragraph

Replace the text with:

The criteria given Figure A.1 are given in terms of the peak-to-peak shaft vibration at a particular measurement position (see Method B of ISO 20816-1:2016, Annex B). If the outputs from a pair of orthogonal transducers at the measurement plane are used to derive S_{max} (see Method C of ISO 20816-1:2016, Annex B), smaller zone boundary values should be used which are dependent on the shaft orbit. As a general guideline, the values given in Figure A.1 should be divided by a factor of 1,85.

Delete Table A.1.

Figure A.1

Delete the sentence “For gas turbines … given in Table A.1.”.

Annex B, first sentence

Delete “Table A.1 and”.

Second paragraph

Replace the paragraph with the following:

Assume that a particular gas turbine set with a normal operating speed of 3 000 r/min and output less than 40 MW is supported by plain cylindrical bearings of 180 mm diameter and 0,1 % clearance ratio. In this case, the total (diametral) clearance of the bearing is 180 µm.

Third paragraph

Replace “Table A.1” with “Figure A.1”.

Bibliography

Replace the list of references with the following:

[1] ISO 2041, *Mechanical vibration, shock and condition monitoring — Vocabulary*

[2] ISO 3977-3, *Gas turbines — Procurement — Part 3: Design requirements*

[3] ISO 7919-3, *Mechanical vibration — Evaluation of machine vibration by measurements on rotating shafts — Part 3: Coupled industrial machines*

[4] ISO 10817-1, *Rotating shaft vibration measuring systems — Part 1: Relative and absolute sensing of radial vibration*

[5] ISO 13373-1, *Condition monitoring and diagnostics of machines — Vibration condition monitoring — Part 1: General procedures*

[6] ISO 13373-2, *Condition monitoring and diagnostics of machines — Vibration condition monitoring — Part 2: Processing, analysis and presentation of vibration data*

[7] ISO 13373-3, *Condition monitoring and diagnostics of machines — Vibration condition monitoring — Part 3: Guidelines for vibration diagnosis*

[8] ISO 20816-2, *Mechanical vibration — Measurement and evaluation of machine vibration — Part 2: Land-based gas turbines, steam turbines and generators in excess of 40 MW, with fluid-film bearings and rated speeds of 1 500 r/min, 1 800 r/min, 3 000 r/min and 3 600 r/min*

[9] ISO 21940-12, *Mechanical vibration — Rotor balancing — Part 12: Procedures and tolerances for rotors with flexible behaviour*

