INTERNATIONAL STANDARD

ISO 7919-1

Second edition
1996-07-15

Mechanical vibration of non-reciprocating machines — Measurements on rotating shafts and evaluation criteria —

Part 1: General guidelines

Vibrations mécaniques des machines non alternatives — Mesurages sur les arbres tournants et critères d'évaluation —

Partie 1: Directives générales

Reference number
ISO 7919-1:1996(E)

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.

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.

International Standard ISO 7919-1 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Subcommittee SC 2, *Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures*.

This second edition of ISO 7919-1 cancels and replaces the first edition (ISO 7919-1:1986), which has been technically revised.

ISO 7919 consists of the following parts, under the general title *Mechanical vibration of non-reciprocating machines — Measurements on rotating shafts and evaluation criteria*:

— *Part 1: General guidelines*

— *Part 2: Large land-based steam turbine generator sets*

— *Part 3: Coupled industrial machines*

— *Part 4: Gas turbine sets*

— *Part 5: Machine sets in hydraulic power generating and pumping plants*

Annex A forms an integral part of this part of ISO 7919. Annexes B, C, D and E are for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

Introduction

Machines are now being operated at increasingly high speeds and loads, and under increasingly severe operating conditions. This has become possible, to a large extent, by the more efficient use of materials, although this has sometimes resulted in there being less margin for design and application errors.

At present, it is not uncommon for continuous operation to be expected and required for 2 or 3 years between maintenance operations. Consequently, more restrictive requirements are being specified for operating vibration values of rotating machinery, in order to ensure continued safe and reliable operation.

ISO 10816-1 establishes a basis for the evaluation of mechanical vibration of machines by measuring the vibration response on non-rotating, structural members only. There are many types of machine, however, for which measurements on structural members, such as the bearing housings, may not adequately characterize the running condition of the machine, although such measurements are useful. Such machines generally contain flexible rotor shaft systems, and changes in the vibration condition may be detected more decisively and more sensitively by measurements on the rotating elements. Machines having relatively stiff and/or heavy casings in comparison to rotor mass are typical of those classes of machines for which shaft vibration measurements are frequently to be preferred.

For machines such as steam turbines, gas turbines and turbocompressors, all of which may have several modes of vibration in the service speed range, measurements on non-rotating parts may not be totally adequate. In such cases, it may be necessary to monitor the machine using measurements on the rotating and non-rotating parts, or on the rotating parts alone.

The guidelines presented in this part of ISO 7919 are complemented by those given in ISO 10816-1. If the procedures of both standards are applied, the one which is more restrictive generally applies.

Shaft vibration measurements are used for a number of purposes, ranging from routine operational monitoring and acceptance tests to advanced experimental testing, as well as diagnostic and analytical investigations. These various measurement objectives lead to many differences in methods of interpretation and evaluation. To limit the number of these differences, this part of ISO 7919 is designed to provide guidelines primarily for operational monitoring and acceptance tests.

During the preparation of this part of ISO 7919, it was recognized that there was a need to establish quantitative criteria for the evaluation of machinery shaft vibration. However, there is a significant lack of data on this subject at present and, consequently, this part of ISO 7919 has been structured to allow such data to be incorporated as it becomes available.

Specific criteria for different classes and types of machinery will be given in the relevant parts of ISO 7919 as they are developed.