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Mechanical vibration — Vibration of rotating machinery equipped with active magnetic bearings —

Part 3: Evaluation of stability margin

*Vibrations mécaniques — Vibrations de machines rotatives équipées de
paliers magnétiques actifs —*

Partie 3: Évaluation de la marge de stabilité



Reference number
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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.

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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 14839-3 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*.

ISO 14839 consists of the following parts, under the general title *Mechanical vibration — Vibration of rotating machinery equipped with active magnetic bearings*:

- Part 1: *Vocabulary*
- Part 2: *Evaluation of vibration*
- Part 3: *Evaluation of stability margin*

Additional parts are currently in preparation.

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Introduction

While passive bearings, e.g. ball bearings or oil-film bearings, are essentially stable systems, magnetic bearings are inherently unstable due to the negative stiffness resulting from static magnetic forces. Therefore, a feedback control is required to provide positive stiffness and positive damping so that the active magnetic bearing (AMB) operates in a stable equilibrium to maintain the rotor at a centred position. A combination of electromagnets and a feedback control system is required to constitute an operable AMB system.

In addition to ISO 14839-2 on evaluation of vibration of the AMB rotor systems, evaluation of the stability and its margin is necessary for safe and reliable operation of the AMB rotor system; this evaluation is specified in this part of ISO 14839, the objectives of which are as follows:

- a) to provide information on the stability margin for mutual understanding between vendors and users, mechanical engineers and electrical engineers, etc.;
- b) to provide an evaluation method for the stability margin that can be useful in simplifying contract concerns, commission and maintenance;
- c) to serve and collect industry consensus on the requirements of system stability as a design and operating guide for AMB equipped rotors.