

**BUREAU OF INDIAN STANDARDS**

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**Doc No.: PGD 13 (24938) WC**

**February 2024**

*भारतीय मानक मसौदा*

**यांत्रिक कंपन — सक्रिय चुंबकीय बियरिंग्स वाली घूर्णन मशीनरी का कंपन —  
भाग 3 स्थिरता मार्जिन का मूल्यांकन**

*Draft Indian Standard*

**Mechanical Vibration — Vibration of Rotating Machinery  
Equipped with Active Magnetic Bearings —  
Part 3 Evaluation of Stability Margin**

ICS 17.160

Bearings Sectional Committee, PGD 13

Last date for Comment: 30/04/2024

**NATIONAL FOREWORD**

This Indian Standard which is identical with ISO 14839-3 : 2006 ‘Mechanical vibration — Vibration of rotating machinery equipped with active magnetic bearings — Part 3 Evaluation of stability margin’ issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Bearings Sectional Committee and approval of the Production and General Engineering Division Council.

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

Other parts in this series are:

- Part 1 Mechanical vibration — Vibration of rotating machinery equipped with active magnetic bearings — Part 1 Vocabulary
- Part 2 Mechanical vibration — Vibration of rotating machinery equipped with active magnetic bearings — Part 2 Evaluation of vibration
- Part 4 Mechanical vibration — Vibration of rotating machinery equipped with active magnetic bearings — Part 4 Technical Guidelines
- Part 5 Mechanical vibration — Vibration of rotating machinery equipped with active magnetic bearings — Part 5 Touch Down Bearings

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words ‘International Standard’ appear referring to this standard, they should be read as ‘Indian Standard’.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard which is to be substituted in its place is listed below along with its degree of equivalence for the edition indicated.

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 10814 Mechanical vibration — Susceptibility and sensitivity of machines to unbalance	IS/ISO 21940-31 : 2013 Mechanical vibration - Rotor balancing: Part 31 susceptibility and sensitivity of machines to unbalance	Identical

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (revised)’.

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