
Mechanical vibration — Rotor balancing —

Part 14:

Procedures for assessing balance errors

Vibrations mécaniques — Équilibrage des rotors —

Partie 14: Modes opératoires d'évaluation des erreurs d'équilibrage



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 21940-14 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 first edition of ISO 21940-14 cancels and replaces ISO 1940-2:1997, of which it constitutes a technical revision. The main change is extension of the applicability to rotors with flexible behaviour.

ISO 21940 consists of the following parts, under the general title *Mechanical vibration — Rotor balancing*:

- *Part 1: Introduction*¹⁾
- *Part 2: Vocabulary*²⁾
- *Part 11: Procedures and tolerances for rotors with rigid behaviour*³⁾
- *Part 12: Procedures and tolerances for rotors with flexible behaviour*⁴⁾
- *Part 13: Criteria and safeguards for the in-situ balancing of medium and large rotors*⁵⁾
- *Part 14: Procedures for assessing balance errors*⁶⁾
- *Part 21: Description and evaluation of balancing machines*⁷⁾
- *Part 23: Enclosures and other protective measures for the measuring station of balancing machines*⁸⁾

1) Revision of ISO 19499:2007, *Mechanical vibration — Balancing — Guidance on the use and application of balancing standards*

2) Revision of ISO 1925:2001, *Mechanical vibration — Balancing — Vocabulary*

3) Revision of ISO 1940-1:2003 + Cor.1:2005, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances*

4) Revision of ISO 11342:1998 + Cor.1:2000, *Mechanical vibration — Methods and criteria for the mechanical balancing of flexible rotors*

5) Revision of ISO 20806:2009, *Mechanical vibration — Criteria and safeguards for the in-situ balancing of medium and large rotors*

6) Revision of ISO 1940-2:1997, *Mechanical vibration — Balance quality requirements of rigid rotors — Part 2: Balance errors*

7) Revision of ISO 2953:1999, *Mechanical vibration — Balancing machines — Description and evaluation*

8) Revision of ISO 7475:2002, *Mechanical vibration — Balancing machines — Enclosures and other protective measures for the measuring station*

- *Part 31: Susceptibility and sensitivity of machines to unbalance*⁹⁾
- *Part 32: Shaft and fitment key convention*¹⁰⁾

9) Revision of ISO 10814:1996, *Mechanical vibration — Susceptibility and sensitivity of machines to unbalance*

10) Revision of ISO 8821:1989, *Mechanical vibration — Balancing — Shaft and fitment key convention*

Introduction

The balance quality of a rotor is assessed in accordance with the requirements of ISO 1940-1 or ISO 11342 by measurements taken on the rotor. These measurements might contain errors which can originate from a number of sources. Where those errors are significant, they should be taken into account when defining the required balance quality of the rotor.

ISO 1940-1 and ISO 11342 do not consider in detail balance errors or, more importantly, the assessment of balance errors. Therefore this part of ISO 21940 gives examples of typical errors that can occur and provides recommended procedures for their evaluation.

Mechanical vibration — Rotor balancing —

Part 14:

Procedures for assessing balance errors

1 Scope

This part of ISO 21940 specifies the requirements for the following:

- a) identifying errors in the unbalance measuring process of a rotor;
- b) assessing the identified errors;
- c) taking the errors into account.

This part of ISO 21940 specifies balance acceptance criteria, in terms of residual unbalance, for both directly after balancing and for a subsequent check of the balance quality by the user.

For the main typical errors, this part of ISO 21940 lists methods for their reduction in an informative annex.

2 Normative references

The following referenced documents are indispensable for the application 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 1925, *Mechanical vibration — Balancing — Vocabulary*¹¹⁾

ISO 1940-1, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances*¹²⁾

ISO 11342, *Mechanical vibration — Methods and criteria for the mechanical balancing of flexible rotors*¹³⁾

ISO 21940-21, *Mechanical vibration — Rotor balancing — Part 21: Description and evaluation of balancing machines*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1925 apply.

4 Balance error sources

4.1 General

Balancing machine balance errors can be classified into:

- a) systematic errors, in which the magnitude and angle can be evaluated either by calculation or measurement;
- b) randomly variable errors, in which the magnitude and angle vary in an unpredictable manner over a number of measurements carried out under the same conditions;

¹¹⁾ To become ISO 21940-2 when revised.

¹²⁾ To become ISO 21940-11 when revised.

¹³⁾ To become ISO 21940-12 when revised.