INTERNATIONAL STANDARD

ISO 21940-21

Second edition
2022-11

Mechanical vibration — Rotor balancing —

Part 21: Description and evaluation of balancing machines

Vibrations mécaniques — Équilibrage des rotors —
Partie 21: Description et évaluation des machines à équilibrer

Reference number
ISO 21940-21:2022(E)

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Published in Switzerland

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Foreword

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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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

ISO 21940-21 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 21940-21:2012), which has been technically revised.

The main changes are as follows:

— the introduction of new computer based technology into balance machine indication systems;

— the introduction of additional tests for repeatability and speed range (see Annex F and Annex G);

— the introduction of greater clarification for use with automated and special purpose machines.

A list of all parts in the ISO 21940 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The purpose of this document is to provide a common framework for the specification, comparison and evaluation of balancing machines.

It describes a proforma on which the baseline balancing machine characteristics can be presented by the manufacturer enabling users to compare products from different manufacturers. Additionally, guidelines are given on the information by which users provide their data and requirements to a balancing machine manufacturer.

This document describes the tests to be performed during the acceptance testing of a balancing machine and later, on a periodic basis, to ensure that the balancing machine is capable of handling the actual balancing tasks. For periodic tests, simplified procedures are specified.

Methods and requirements for preparing proving rotors (which can be of Type A, Type B or Type C, or a user defined proving rotor e.g. based on a user supplied part) are specified, allowing a wide range of applications to be covered.

The accuracy of all balance machines is inherently non-linear over their mass and speed range. In normal practice, a hard bearing balance machine is calibrated over a particular part of its speed and mass range, but outside that its accuracy cannot be assumed. As a consequence, a rotor specific calibration should be performed to establish the machine accuracy at a specific speed and for a rotor of a particular mass. This is normal practice for soft bearing machines or where the manufacturer states that rotor specific calibration should be carried out.

Mechanical vibration — Rotor balancing —

Part 21: Description and evaluation of balancing machines

1 Scope

This document sets out the requirements for evaluating hard and soft bearing balancing machines that support and rotate:

a) rotors with rigid behaviour at balancing speed (as described in ISO 21940-11);

b) rotors with shaft elastic behaviour and balanced in accordance with low speed balancing procedures (as described in ISO 21940-12).

2 Normative references

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 21940-2, *Mechanical vibration — Rotor balancing — Part 2: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21940-2 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Capacity and performance data of the balancing machine

4.1 General

The manufacturer shall specify the data listed in 4.2 for horizontal or 4.3 for vertical balancing machines. Information to be provided by the user to the balancing machine manufacturer is summarized in Annex A.

4.2 Data for horizontal balancing machines

4.2.1 Rotor mass and unbalance limitations

The maximum rotor mass, m, which can be balanced, shall be stated over the range of balancing speeds (n_1, n_2, ...).

The maximum moment of inertia of a rotor (given by, $m\,r^2$ where m is the rotor mass and r the radius of gyration) with respect to the shaft axis, which the machine can accelerate in a stated acceleration time, shall be given for the range of balancing speeds (n_1, n_2, ...) together with the corresponding cycle rate (see Table 1, Note 2).