AS 3709—1989
ISO 1940/1—1986

Australian Standard®

Vibration and shock—Balance quality of rotating rigid bodies

[ISO title: Mechanical vibration—Balancing quality requirements of rigid rotors, Part 1: Determination of permissible residual unbalance]

This Australian Standard was prepared by Committee AV/9, Vibration and Shock — Application. It was approved on behalf of the Council of Standards Australia on 29 March 1989 and published on 13 October 1989.

The following interests are represented on Committee AV/9:

Australian Environment Council
Australian Gas Association
Australian Road Research Board
Confederation of Australian Industry
CSIRO, National Measurement Laboratory
Department of Defence
Department of Minerals and Energy, N.S.W.
Institute of Quarrying
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University of Technology, Sydney

This Standard was issued in draft form for comment as DR 88200.

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First published as AS 3709—1989.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 5674 9

PREFACE

This Standard was prepared by the Standards Australia Committee on Vibration and Shock—Application. It is identical with and has been reproduced from ISO 1940/1—1986, *Mechanical vibration—Balance quality requirements of rigid rotors, Part 1: Determination of permissible residual unbalance*.

For the purpose of this Australian Standard, the ISO text should be modified as follows:

(a) Substitute a point(.) for a comma (,) as a decimal marker.

(b) The references to other publications should be replaced by references to Australian Standards.

Reference to International Standard	*Australian Standard*
ISO	AS
1925 Balancing—Vocabulary	2641 Vibration and shock—Balancing—Vocabulary
2953 Balancing machines—Description and evaluation	4732 Vibration and shock—Balancing machines—Description and evaluation

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Vibration and shock—Balancing quality of rotating rigid bodies

0 Introduction

Balancing is the process of attempting to improve the mass distribution of a body so that it rotates in its bearings without unbalanced centrifugal forces. Of course, this aim can be attained only to a certain degree; even after balancing, the rotor will possess residual unbalance.

The measuring equipment available today enables unbalance to be reduced to low limits. However, it would be uneconomical to exaggerate the quality requirements. It has therefore become necessary to determine to what extent the unbalance should be reduced, and where the optimum economic and technical compromise on balance quality requirements would be struck.

It is not readily possible to draw conclusions as to the permissible residual unbalances from any existing recommendations on the assessment of the vibratory state of machinery, since there is often no easily recognizable relation between the rotor unbalance and the machine vibrations under operating conditions. The amplitude of the once-per-revolution vibrations is influenced by characteristics of the rotor, of the machine, of the structure and of the foundation, and by the proximity of the service speed to the various resonance frequencies, etc. Moreover, the machine vibrations may be due only in part to the presence of rotor unbalance.

1 Scope and field of application

This part of ISO 1940 gives recommendations for determining unbalance and for specifying related quality requirements of rigid rotors; it specifies

a) a representation of unbalance in one or two planes;

b) methods for determining permissible residual unbalance;

c) methods for allocating it to the correction planes;

d) methods for identifying the residual unbalance state of a rotor by measurement;

e) a summary of errors associated with the residual unbalance identification.

In table 1 and figure 2 recommendations are given, based on worldwide experience, concerning the balance quality requirements of rigid rotors, according to their type, mass and maximum service speed.

This part of ISO 1940 is also intended to facilitate the relations between manufacturer and user and machines. Terminology specified in this part of ISO 1940 may be used for establishing technical specifications. (For definitions, see ISO 1925.)

Detailed consideration of errors associated with the determination of residual unbalance is not included in this part of ISO 1940 (ISO 1940/2 will deal with these errors). This part of ISO 1940 does not define permissible residual unbalances for flexible rotors; these are covered in ISO 5343. The methods for balancing are not described.

The recommended balance quality grades are not intended to serve as acceptance specifications for any rotor group, but rather to give indications of how to avoid gross deficiencies as well as exaggerated or unattainable requirements; they may also serve as a basis for more involved investigations, for example, when a more exact determination of the required balance quality by measurement in the laboratory or in the field is necessary. If due regard is paid to the recommended limits, satisfactory running conditions can most probably be expected. However, there may be cases when deviations from these recommendations become necessary, e.g. because of unusual construction or geometry.

2 References

ISO 1925, *Balancing — Vocabulary*.

ISO 2371, *Field balancing equipment — Description and evaluation*.

ISO 2953, *Balancing machines — Description and evaluation*.

ISO 5343, *Criteria for evaluating flexible rotor balance*.

ISO 5406, *The mechanical balancing of flexible rotors*.