AS 2641—1983

Australian Standard®

VIBRATION AND SHOCK—BALANCING—VOCABULARY

This Australian standard was prepared by Committee ME/41, Vibration and Shock. It was approved on behalf of the Council of the Standards Association of Australia on 20 May 1983 and published on 8 August 1983.

The following interests are represented on Committee ME/41:

Association of Consulting Engineers Australia
Australian Gas Association
Australian Mining Industry Council
Australian Shipbuilders Association
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Construction Equipment Importers and Manufacturers of Australia
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University of Queensland

This Standard was issued in draft form for comment as DR 82142.

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First published 1983

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

ISBN 0 7262 3058 8

PREFACE

This standard was prepared by a subcommittee of the Association's Committee on Vibration and Shock as one of a series relating to mechanical vibration and shock. It is based on, and is substantially in agreement with, the corresponding International Standard ISO 1925, Balancing – Vocabulary.

The aim of the standard is to provide a common language for persons working in the field of mechanical vibration and shock, with a view to eliminating ambiguities and misunderstandings.

Except as indicated in this preface, the entries in this standard are identical with those of ISO 1925.

A very few of the definitions in ISO 1925 have been altered in meaning where this was considered to be essential in order to conform to accepted Australian usage.

A few of the definitions common to acoustics have been presented in a different form, using the definitions already available in AS 1633.

In the preparation of this vocabulary, reference was made to the following standards:

AS 1633	Glossary of Acoustic Terms
AS 2606	Vibration and Shock – Vocabulary
ISO 1925	Balancing – Vocabulary

The following standards are referred to in this standard:

ISO 1940	Balance Quality of Roating Rigid Bodies
ISO 2953	Balancing Machines – Description and Evaluation

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
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VIBRATION AND SHOCK — BALANCING — VOCABULARY

SECTION 1. MECHANICS

No	*Term*	*Definition*
1.001	**centre of gravity**	Point in a body through which passes the resultant of the weights of its component particles for all orientations of the body with respect to a uniform gravitational field.
1.002	**principal axis of inertia**	For each set of Cartesian coordinates at a given point the values of the six moments of inertia of a body $I_{x_i x_j}$ $(i,j = 1,2,3)$ are in general unequal; for one such coordinate system the moments $I_{x_i x_j}$ $(i \neq j)$ vanish. The values of $I_{x_i x_j}$ $(i = j)$ for this particular coordinate system are called the principal moments of inertia and the corresponding coordinate directions are called the principal axes of inertia. NOTES: 1. $I_{x_i x_j} = \int x_i x_j \, dm$ for $i \neq j$ $I_{x_i x_j} = \int (r^2 - x_i^2) \, dm$ for $i = j$ where $r^2 = x_1^2 + x_2^2 + x_3^2$ and x_i and x_j are Cartesian coordinates. 2. If the point is the centre of gravity of the body, the axes and moments are called central principal axes and central principal moments of inertia. 3. In balancing, the term 'principal inertia axis' is used to designate the one central principal axis (of the three such axes) most nearly coincident with the shaft axis of the rotor and is sometimes referred to as the 'balance axis' or the 'mass axis'. 4. The mass properties of a rigid body are the following scalar quantities: (a) Mass. (b) Centre of gravity location (three coordinates). (c) Moments of inertia (three axes). (d) Products of inertia (three pairs of axes).
1.003	**equilibrium centre**	The point at which the shaft axis (*see* **shaft axis** 2.007) intersects the plane perpendicular to the shaft axis through the centre of gravity of a rotor, when the rotor is at a standstill.
1.004	**critical speed**	A characteristic speed at which resonances of a system are excited. NOTES: 1. Critical speed of a rotating system is a speed of the rotating system that corresponds to a resonance frequency (it may also include multiples and submultiples of the resonance frequency) of the system, e.g. a critical speed will be reached when the rotational speed in revolution per second equals the resonant frequency in hertz. 2. Where there are several rotating systems, there will be several corresponding sets of critical speeds, one for each mode of the overall system. 3. Depending on the relative magnitudes of the bearing stiffness and mass and the rotor stiffness and mass, the significant effect at a critical speed may be motion of the journals or flexure of the rotor (*see* **flexural critical speed** 6.001 *and* **rigid-rotor-mode critical speed** 6.002).
1.005	**axis of rotation (spin axis)**	The line about which a body rotates. NOTES: 1. If the bearings are anisotropic, there is no stationary axis of rotation. 2. For rigid bearings, the axis of rotation is the shaft axis, but if the bearings are not rigid, the axis of rotation is not necessarily the shaft axis.