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Mechanical vibration, shock and condition monitoring — Vocabulary

Vibrations et chocs mécaniques, et leur surveillance — Vocabulaire

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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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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.

This document was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*.

This fourth edition cancels and replaces the third edition (ISO 2041:2009), which has been technically revised.

The main changes compared to the previous edition are as follows:

— changes in format to conform to the ISO/IEC Directives, Part 2: 2018;

— correction of the formula in 3.1.58 (2.1.58 in the previous edition);

— addition of Figure 4 and Figure 5.

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.

Mechanical vibration, shock and condition monitoring — Vocabulary

1 Scope

This document defines terms and expressions unique to the areas of mechanical vibration, shock and condition monitoring.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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 http://www.electropedia.org/

3.1 General terms

3.1.1
displacement
relative displacement
⟨vibration and shock⟩ time varying quantity that specifies the change in position of a point on a body with respect to a reference frame

Note 1 to entry: The reference frame is usually a set of axes within which a set of coordinates defines the change in position of a point on a body. In general, a rotation displacement vector, a translation displacement vector, or both can represent the displacement.

Note 2 to entry: A displacement is designated as a relative displacement if it is measured with respect to a reference frame other than the primary reference frame designated in a given case.

Note 3 to entry: Displacement can be:

— oscillatory, in which case simple harmonic components can be defined by the displacement amplitude (and frequency), or

— random, in which case the root-mean-square (rms) displacement (and band-width and probability density distribution) can be used to define the probability that the displacement will have values within any given range.

Note 4 to entry: Displacements of short time are defined as transient displacements. Non-oscillatory displacements are defined as sustained displacements, if of long duration, or as displacement pulses, if of short duration.

3.1.2
velocity
relative velocity
⟨vibration and shock⟩ rate of change of displacement

Note 1 to entry: In general, velocity is time-dependent.

Note 2 to entry: The reference frame is usually a set of axes within which a set of coordinates defines the rate of change of displacement of a point on a body. In general, a rotation velocity vector, a translation velocity vector, or both can represent the velocity.

Note 3 to entry: A velocity is designated as a relative velocity if it is measured with respect to a reference frame other than the primary reference frame designated in a given case. The relative velocity between two points is the vector difference between the velocities of the two points.

Note 4 to entry: Velocity can be:

— oscillatory, in which case simple harmonic components can be defined by the velocity amplitude (and frequency), or

— random, in which case the root-mean-square (rms) velocity (and band-width and probability density distribution) can be used to define the probability that the velocity will have values within any given range.

Note 5 to entry: Velocities of short time duration are defined as transient velocities. Non-oscillatory velocities are defined as sustained velocities, if of long duration.

3.1.3
acceleration
relative acceleration
⟨vibration and shock⟩ rate of change of velocity

Note 1 to entry: In general, acceleration is time-dependent.

Note 2 to entry: The reference frame is usually a set of axes within which a set of coordinates defines the rate of change of velocity of a point on a body. In general, a rotation acceleration vector, a translation acceleration vector, or both and the Coriolis acceleration can represent the acceleration.

Note 3 to entry: An acceleration is designated as a relative acceleration if it is measured with respect to a reference frame other than the inertial reference frame designated in a given case. The relative acceleration between two points is the vector difference between the accelerations of the two points.

Note 4 to entry: In the case of time-dependent accelerations, various self-explanatory modifiers, such as peak, average and rms (root-mean-square), are often used. The time intervals over which the average or root-mean-square values are taken should be indicated or implied.

Note 5 to entry: Acceleration can be:

— oscillatory, in which case simple harmonic components can be defined by the acceleration amplitude (and frequency), or

— random, in which case the rms acceleration (and band-width and probability density distribution) can be used to define the probability that the acceleration will have values within any given range.

Note 6 to entry: Accelerations of short time duration are defined as transient accelerations. Non-oscillatory accelerations are defined as sustained accelerations, if of long duration, or as acceleration pulses, if of short duration.

3.1.4
standard acceleration due to gravity
g_n
standard acceleration of free fall
unit, 9,806 65 metres per second-squared (9,806 65 m/s^2)

Note 1 to entry: The value was adopted in the International Service of Weights and Measures in 1901 (Resolution of the 3rd CGPM) as the standard for acceleration due to gravity.

Note 2 to entry: This "standard value" (g_n = 9,806 65 m/s^2 = 980,665 cm/s^2 approximately 386,089 in/s^2 approximately 32,174 0 ft/s^2) should be used for reduction to standard gravity of measurements made in any location on Earth.

Note 3 to entry: Frequently, the magnitude of acceleration is expressed in units of g_n.

Note 4 to entry: The actual acceleration produced by the force of gravity at or below the surface of the Earth varies with the latitude and elevation of the point of observation. This variable is often expressed using the symbol g. Caution should be exercised if this is done so as not to create an ambiguity with this use and the standard symbol for the unit of the gram.

Note 5 to entry: Historically, this value of g_n was the conventional reference for calculating the now obsolete unit kilogram force.

3.1.5
force
dynamic influence that changes a body from a state of rest to one of motion or changes its velocity

Note 1 to entry: A force could also change a body's size or shape if the body resists motion.

Note 2 to entry: Force is expressed in newtons. One newton is the force required to give a mass of one kilogram an acceleration of one metre per second squared.

3.1.6
restoring force
reactive force caused by the elastic property of a structure when it is being deformed

3.1.7
jerk
rate of change of acceleration

3.1.8
inertial reference system
inertial reference frame
coordinate system or frame which is fixed in space or moves at a constant velocity without rotational motion and thus, not accelerating

3.1.9
inertial force
reactive force exerted by a mass when it is being accelerated

3.1.10
oscillation
variation, usually with time, of the magnitude of a quantity with respect to a specified reference when the magnitude is alternately greater and smaller than the specified reference

Note 1 to entry: See *vibration* (3.2.1).

Note 2 to entry: Variations with time such as shock processes or creeping motions are also considered to be oscillations in a more general sense of the word.

3.1.11
environment
all external conditions influencing a system at any given moment

Note 1 to entry: See *induced environment* (3.1.12) and *natural environment* (3.1.13).

3.1.12
induced environment
conditions external to a system generated as a result of the operation of the system

3.1.13
natural environment
conditions generated by the forces of nature and the effects of which are experienced by a system when it is at rest as well as when it is in operation