INTERNATIONAL STANDARD

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Mechanical vibration and shock — Human exposure — Biodynamic coordinate systems

Vibrations et chocs mécaniques — Exposition de l'individu — Systèmes de coordonnées biodynamiques

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Contents

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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.

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.

International Standard ISO 8727 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Subcommittee SC 4, *Human exposure to mechanical vibration and shock*.

Annexes A to C of this International Standard are for information only.

Introduction

For many purposes in biodynamics and in human vibration engineering practice, it is necessary to define the point of origin, magnitude, and direction of a mechanical input or response (force or motion) with respect to a specific orthogonal coordinate system. Biodynamic coordinate systems require a defined point of origin within the human body or within an external frame of reference to which an anatomical coordinate system may be related. Applications include the evaluation of human exposure to vibration and shock, the precise definition of the functional location and orientation of biodynamic instrumentation systems, the biodynamic modelling of force and motion inputs to the human body and its parts or segments, and inter-subject or inter-species comparisons of biodynamic data.

For the purpose of data comparison between individuals (or between repeated measurements in the same individual), between persons and human analogues, or between measured data and a standard prescribing boundaries of acceptable mechanical inputs to the human body or its segments, it is imperative that any anatomical coordinate system used originates in and is oriented with respect to recognized, firm, and radiographically or stereotactically determinable (hence, skeletal) anatomical landmarks. This International Standard embodies that fundamental principle: it specifically deprecates using systems loosely defined as centred in the heart or other soft and mobile structures. Precise definition of anatomical coordinate systems is fundamental to biodynamical science, because all biodynamic measurements must ultimately be related to the bony anatomy of the human body.

Mechanical vibration and shock – Human exposure – Biodynamic coordinate systems

1 Scope

This International Standard specifies anatomical and basicentric coordinate systems for biodynamical measurements, for reference purposes in cognate standards development, and for precisely describing human exposure to mechanical vibration and shock. The segmental anatomical coordinate systems defined in this International Standard are for the head, root of the neck (driving-point for the head and neck system), pelvis, and hand. General principles are stated for the establishment of corresponding anatomical coordinate systems for other skeletal body segments. The biodynamic coordinate systems defined in this International Standard can serve as frames of reference for the description and measurement of both translational and rotational vibration and shock motion affecting humans.

NOTES

1 Although defined for human subjects, these anatomical coordinate systems are adaptable, using a knowledge of comparative anatomy, to non-human primates or to other animal species whose skeletal anatomy is recognizably comparable, radiographically, with the relevant anatomy of humans.

2 When the need arises for other segmental anatomical coordinate systems (e.g. for the arm, wrist, leg or foot), these should be defined according to corresponding principles of anatomy and of standardization, and may be proposed for inclusion in subsequent revisions of this International Standard.

3 This International Standard recognizes no difference between male and female skeletal anatomy bearing upon the definition and use of biodynamic coordinate systems. Moreover, the same principles apply when defining anatomical coordinate systems for children, and for non-human mammalian species used in ethical biodynamics research, development, testing and evaluation.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subjected to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1503:1977, *Geometrical orientation and directions of movements.*

ISO 5805:1997, *Mechanical vibration and shock — Human exposure — Vocabulary.*