International Standard

ISO 22567

General requirements for establishing muscular strength databases

Exigences générales relatives à l'établissement de bases de données sur la force musculaire

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This document was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 3, *Anthropometry and biomechanics.*

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Introduction

Human muscular strength, also referred to as muscular strength, is the force which the muscles can develop during their contraction. Muscular strength refers to the amount of force a human can produce via muscle or muscle group activation with a single maximal effort, depending on posture and direction of force transferred to the environment. Muscular strength measurement is of two types namely, static (isometric) and dynamic (e.g. isotonic). Isometric strength refers to the muscular force generated during an isometric contraction, where the muscles produce tension without changing their length and, without movement of the joint. Static muscular force is usually larger than dynamic force. The dynamic force, depending on the velocity of the shortening muscles, amounts to about 50 % to 90 % of the maximal static force. Generally, it is a common practice to measure the static strength to compare different populations or to set the limits for force application. Muscular strength depends not only on the muscle mass, but also on health and training, technique and experience, and motivation. The personal and task factors that influence muscular strength are age, gender, posture, body mass, reach distance, arm and wrist orientations, speed of exertion, and duration and frequency of efforts. This strength is maximum at a young age, and it goes on decreasing with age.

Muscular strength databases of different populations help in formulating design criteria and safe limits. However, direct inference of muscular strength to safe levels should be restricted since knowledge on their association is often limited. One of the major difficulties in generating international databases on muscular strength parameters of various populations is that the available studies cannot be comparable with each other. Because, either the definitions of parameters differ, or the methods used for measurement can also be different. Muscular strength is a vector quantity, and therefore, in its measurement, magnitude as well as direction of application of force are important parameters.

This document will help different researchers and national standard bodies in generating internationally compatible muscular strength databases. It provides necessary information, such as characteristics of the user population, sampling methods, measurement items and statistics, to make international comparison possible among various population segments.

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General requirements for establishing muscular strength databases

1 Scope

This document specifies general requirements for establishing muscular strength databases and their associated reports, which contain measurements taken in accordance with ISO 25033-1.[1)]

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 7250-1, *Basic human body measurements for technological design — Part 1: Body measurement definitions and landmarks*

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

ISO 25033-1, *Basic muscular strength measurements for technological design — Part 1 Muscular strength measurements definitions, instrumentation, and protocol*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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/

3.1
population segment
group of people having one or more common background characteristics that influence their anthropometric distributions

3.2
user population
population segment (3.1) or segments for whom a technological design is intended

3.3
random sample
sample established by following a set of procedures to ensure that each and every individual in the population has an equal chance of being selected

3.4
stratified sample
sample established by a procedure in which the population is divided into sub-populations (strata), each one of which contributes with a specified number of randomly selected individuals

1) ISO 25033-1 is in accordance with ISO 7250-1 and includes strength parameter definitions, measurement setups, protocol for data collection and other details.

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