International Standard

ISO 11228-3

# Ergonomics — Manual handling —

## Part 3: Repetitive movements and exertions of the upper limbs

*Ergonomie — Manutention manuelle —*

*Partie 3: Mouvements répétitifs et efforts des membres supérieurs*

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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.

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 159, *Ergonomics,* Subcommittee SC 3, *Anthropometry and biomechanics.*

This second edition cancels and replaces the first edition (ISO 11228-3:2007), which has been technically revised.

The main changes are as follows:

— addition of an assessment method in Annex B (see Clause B.3 and Figure B.1);

— addition of different methods presented in Table C.1, providing guidance to the user for application;

— addition of inclusion and validation criteria for the different methods in Table C.2.

A list of all sections in the ISO 11228 series can be found on the ISO website.

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.

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# Introduction

Repetitive movements and forceful exertions of the upper limbs (repetitive work) can cause pain and fatigue, which can lead to musculoskeletal disorders, and deteriorated posture and movement co-ordination. These outcomes can increase the risk of errors and can result in hazardous situations and reduced productivity and quality. Repetitive work, and its consequences, can be prevented through the use of ergonomic design and organization of work.

Risk factors in repetitive work include the frequency of actions, exposure duration, postures and movement of body segments, forces associated with the work, work organization, job control, demands on work output (e.g. quality, task precision), psychosocial factors and level of training or skill. Additional factors can include environmental factors, such as climate, noise, vibration and illumination.

The recommendations provided by this document are based on current scientific evidence concerning the physiology, biomechanics and epidemiology of manual work. The knowledge is, however, limited, and the suggested guidelines are subject to change as evidence emerges. Those recommendations concerning health risks and control measures are mainly based on research involving in North American and European populations and how work methods affect musculoskeletal loading, discomfort or pain and endurance or fatigue. These recommendations can be used for guidance purposes. Countries can generate their own recommendations based on studies of national populations. For the evaluation of working postures, refer to ISO 11226.

The changes in this edition of this document include the introduction of a general assessment method, the presentation of several different risk assessment tools along with inclusion, validation and application criteria. A set of criteria have been defined regarding the selection and validation status of the tools and methods presented. The tools are presented in Annex C. This document does not have a mass threshold or limit. However, if the masses handled are 3 kg or more, the user is directed to also consult ISO 11228-1.

This document is intended to provide information for all those involved in the design or redesign of work, jobs and products (e.g. machinery).

For more detailed background information on the methods for assessment, a list of secondary references can be purchased at each National Standards Body.

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# Ergonomics — Manual handling —

# Part 3: Repetitive movements and exertions of the upper limbs

## 1 Scope

This document specifies requirements and provides recommendations for repetitive work tasks involving repetitive movements and exertions of the upper extremity. It provides guidance on the identification and assessment of risk factors commonly associated with repetitive movements and exertions of the upper limbs, thereby allowing evaluation of the related health risks to the working population.

The recommendations apply to the adult working population and are intended to give reasonable protection for nearly all healthy adults.

This document does not address the manual handling of objects while using lift-assistive devices such as exoskeletons and does not address the needs of pregnant women or persons with disabilities.

## 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 6385, *Ergonomics principles in the design of work systems*

ISO 11226, *Ergonomics — Evaluation of static working postures*

ISO 11228-1, *Ergonomics — Manual handling — Part 1: Lifting, lowering and carrying*

ISO 11228-2, *Ergonomics — Manual handling — Part 2: Pushing and pulling*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6385, ISO 11226, ISO 11228-1, and ISO 11228-2 and the following 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**
**repetitive manual task**
task executed by the upper limbs and characterized by repeated, relatively short work cycle times (up to several minutes) or a task during which the same, or very similar, working actions are repeated for more than 30 % of the task time

Note 1 to entry: Different tools can define different duration and other operative factors in assessing repetitive manual tasks.

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