INTERNATIONAL STANDARD

ISO 11228-2

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Ergonomics — Manual handling —

Part 2: Pushing and pulling

Ergonomie — Manutention manuelle —

Partie 2: Actions de pousser et de tirer

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11228-2 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 3, *Anthropometry and biomechanics*.

ISO 11228 consists of the following parts, under the general title *Ergonomics — Manual handling*:

— *Part 1: Lifting and carrying*

— *Part 2: Pushing and pulling*

— *Part 3: Handling of low loads at high frequency*

Introduction

Pain, fatigue and disorders of the musculoskeletal system can result from awkward and/or forceful manual handling tasks such as the pushing or pulling of objects. Musculoskeletal pain and fatigue can themselves influence postural control and increase the likelihood of hazardous working practices, leading to an increased risk of injury, as well as a reduction in productivity and the quality of work output. Good ergonomic design can provide an approach for avoiding these adverse effects.

This part of ISO 11228 provides two methods for identifying the potential hazards and risks associated with whole-body pushing and pulling. Its content is based on current knowledge and understanding of the musculoskeletal risk factors associated with these types of handling tasks. In addition to providing an ergonomics approach for the assessment of push/pull tasks, it proposes recommendations for reducing the risk of injury or ill health.

The assessment and control of risks associated with other aspects of manual handling are to be found in ISO 11228-1, ISO 11228-3 and ISO 11226.

Ergonomics — Manual handling —

Part 2: Pushing and pulling

1 Scope

This part of ISO 11228 gives the recommended limits for whole-body pushing and pulling. It provides guidance on the assessment of risk factors considered important to manual pushing and pulling, allowing the health risks for the working population to be evaluated. The recommendations apply to the healthy adult working population and provide reasonable protection to the majority of this population. These guidelines are based on experimental studies of push/pull tasks and associated levels of musculoskeletal loading, discomfort/pain, and endurance/fatigue.

Pushing and pulling, as defined in this part of ISO 11228, is restricted to the following:

— whole-body force exertions (i.e. while standing/walking);

— actions performed by one person (handling by two or more people is not part of the assessment, but some advice is given in Annex C);

— forces applied by two hands;

— forces used to move or restrain an object;

— forces applied in a smooth and controlled way;

— forces applied without the use of external support(s);

— forces applied on objects located in front of the operator;

— forces applied in an upright position (not sitting).

This part of ISO 11228 is intended to provide information for designers, employers, employees and others involved in the design or redesign of work, tasks, products and work organization.

2 Terms and definitions

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

2.1
initial force
force applied to set an object in motion (i.e. force required to accelerate the object)

2.2
pulling
human physical effort where the motive force is in front of the body and directed towards the body as the body stands or moves backwards