

# Ergonomic principles related to mental work-load —

## Part 1: General terms and definitions (ISO 10075: 1991)

The European Standard EN ISO 10075-1:2000 has the status of a  
British Standard

ICS 01.040.13; 13.180

## National foreword

This British Standard is the official English language version of EN ISO 10075-1:2000. It is identical with ISO 10075:1991.

The UK participation in its preparation was entrusted to Technical Committee PH/9, Applied ergonomics, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

### Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

### Summary of pages

This document comprises a front cover, an inside front cover, the EN ISO title page, the EN ISO foreword page, the ISO title page, pages ii to iii, a blank page, pages 1 to 5 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

### Amendments issued since publication

Amd. No.	Date	Comments

This British Standard, having been prepared under the direction of the Health and Environment Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 September 2000

ICS 01.040.13; 13.180

English version

**Ergonomic principles related to mental work-load - Part 1:  
General terms and definitions (ISO 10075:1991)**

Principes ergonomiques concernant la charge de travail  
mental - Partie 1: Termes généraux et leurs définitions (ISO  
10075:1991)

Ergonomische Grundlagen bezüglich psychischer  
Arbeitsbelastung - Teil 1: Allgemeines und Begriffe (ISO  
10075:1991)

This European Standard was approved by CEN on 18 June 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Central Secretariat: rue de Stassart, 36 B-1050 Brussels**

## **Foreword**

The text of the International Standard from Technical Committee ISO/TC 159 "Ergonomics" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 122 "Ergonomics", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2001, and conflicting national standards shall be withdrawn at the latest by January 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## **Endorsement notice**

The text of the International Standard ISO 10075:1991 has been approved by CEN as a European Standard without any modification.

# INTERNATIONAL STANDARD

**ISO**  
**10075**

First edition  
1991-10-01

---

---

## **Ergonomic principles related to mental work-load — General terms and definitions**

*Principes ergonomiques concernant la charge de travail mental —  
Termes généraux et leurs définitions*



Reference number  
ISO 10075:1991(E)

## 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 10075 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Sub-Committee SC 1, *Ergonomic guiding principles*.

Annex A forms an integral part of this International Standard.

## **Introduction**

This International Standard represents an extension of ISO 6385:1981, *Ergonomic principles of the design of work systems*, 3.7 to 3.9 — with special respect to mental work-load, describing terms and concepts in more detail because of the specific consequences that have to be taken into account in this domain.





# Ergonomic principles related to mental work-load — General terms and definitions

## 1 Scope

This International Standard defines terms in the field of mental work-load, covering mental stress and mental strain, and specifies the relations between the concepts involved.

It applies to the design of working conditions with respect to mental work-load and is intended to promote a common usage of terminology between experts and practitioners in the field of ergonomics as well as in general.

It does not address methods of measurement and principles of task design, which are or will be dealt with in other International Standards.

## 2 General concepts

Any activity — even a predominantly physical one — can impose mental stress<sup>1)</sup>. "Mental stress" in this case is a term employed to designate any external influence impinging upon human beings and affecting them mentally. Mental stress induces processes of increasing or decreasing mental strain within human beings. The immediate consequences of mental strain are facilitating effects on the one hand, and mental fatigue and/or fatigue-like states on the other. As an indirect consequence of mental strain there may be practice and training effects. The consequences of mental strain mentioned here may differ in form and intensity, depending on individual and situational preconditions.

In this International Standard the expression "mental" is used wherever processes of human experience and behaviour are referred to. "Mental" in this sense refers to cognitive, informational, and emotional processes in the human being. The term mental is used because these aspects occur interrelatedly and can and should not be dealt with separately in practice.

## 3 Definitions

**3.1 mental stress:** The total of all assessable influences impinging upon a human being from external sources and affecting it mentally<sup>2)</sup>.

**3.2 mental strain:** The immediate effect of mental stress within the individual (not the long-term effect) depending on his/her individual habitual and actual preconditions<sup>2)</sup>, including individual coping styles.

**3.3 consequences of mental strain<sup>3)</sup>**

**3.3.1 facilitating effects**

**3.3.1.1 warming-up effect:** A frequent consequence of mental strain which soon after the activity has started results in a reduction of the effort required to perform that activity relative to the effort required initially.

1) See annex A, clause A.4.

2) See annex A.

3) The order of defining the following terms does not imply any functional relationship.

**3.3.1.2 activation:** An internal state with differential degrees of mental and physical functional efficiency.

**NOTE 1** Mental strain can lead to different degrees of activation, depending on its duration and intensity. There is a domain in which activation is optimal, e.g. neither too low nor too high, ensuring best functional efficiency. It should be borne in mind that a too sudden increase in strain can lead to undesirable overactivation.

**3.3.2 impairing effects:** Impairing effects should be distinguished by their temporal pattern of recovery and the means to achieve this. They may also differ by their symptoms. Impairing effects can be more general or more specific, taking time for recuperation or variation in activity for recovery.

**3.3.2.1 mental fatigue:** A temporary impairment of mental and physical functional efficiency, depending on the intensity, duration, and temporal pattern of the preceding mental strain. Recovery from mental fatigue is achieved by recuperation rather than changes in activity.

**NOTE 2** This reduced functional efficiency becomes apparent, for example, in feelings of tiredness, less favourable relationships between performance and effort, type and frequency of errors, etc. The extent of this impairment is also determined by individual preconditions.

**3.3.2.2 fatigue-like states:** States within the individual as effects of mental strain resulting from situations offering little variety. They quickly disappear after changes in the task and/or the environment/situation have been introduced. These states include monotony, reduced vigilance, and mental satiation.

**NOTE 3** As a rule, in common with mental fatigue, feelings of tiredness also occur in fatigue-like states.

However, they differ from mental fatigue by their transitoriness. Particularly marked interindividual differences can be found with these fatigue-like states.

**3.3.2.2.1 monotony:** A slowly developing state of reduced activation which may occur during long, uniform, repetitive tasks or activities, and which is mainly associated with drowsiness, tiredness, decrease and fluctuations in performance, reductions in adaptability and responsiveness, as well as an increase in variability of heart rate.

**3.3.2.2.2 reduced vigilance:** A slowly developing state with reduced detection performance (e.g. when monitoring radar screens or instrument panels) in monitoring tasks offering little variation.

**NOTE 4** Monotony and reduced vigilance can be differentiated with respect to the circumstances of their causal conditions, not with respect to their effects.

**3.3.2.2.3 mental satiation:** A state of nervously unsettled, strongly emotional rejection of a repetitive task or situation in which the experience is of "marking time" or "not getting anywhere".

**NOTE 5** Additional symptoms of mental satiation are anger, decreased performance, and/or feelings of tiredness, and a tendency to withdraw. Mental satiation in contrast to monotony and reduced vigilance is characterized by an unchanged or even increased activation level, coupled with a negative emotional quality.

### 3.3.3 Other effect

**3.3.3.1 practice effect:** An enduring change in individual performance, associated with learning processes, following from repeatedly coping with mental strain.

## Annex A (normative)

### Additional explanations of terms and concepts

**A.1** Figure A.1 is intended to illustrate the relations between mental stress, individual factors, and actual mental strain and its immediate effects. The representation is a simplified one, ignoring potential reciprocal effects, and grouping together different conditions producing mental stress as well as different individual factors. For each group, only examples are listed; the listings are thus not exhaustive. The sequential order of the examples listed does not imply any rank order.

**A.2** Besides the consequences of strain mentioned in this International Standard, there are other consequences of mental strain, e.g. boredom, feelings of being overloaded, which are not dealt with in this International Standard, due to large interindividual variation, or to as yet inconclusive results of research. The same applies to possibly unfavourable long-term effects of repeated exposure to mental strain being either too high or too low.

**A.3** Depending on the preceding activity or the initial conditions in the individual, the same situation may lead to mental stress with either increased or decreased mental strain. For example, reading a book imposes mental stress leading to increased mental strain; however, reading the same information as a change from prolonged intense discussions may impose mental stress leading to a decrease in mental strain.

**A.4** Linguistic difficulties may arise from a difference in meaning between the technical language used by specialists and colloquial language. Whereas in colloquial language stress has a slightly negative connotation, in this International Standard stress is quite neutrally regarded as including all assessable factors impinging upon an individual from outside and which influence this individual mentally. As a consequence "Mental stress" within its meaning as a technical term also includes external influences which in colloquial usage would be described as a "relief from strain".

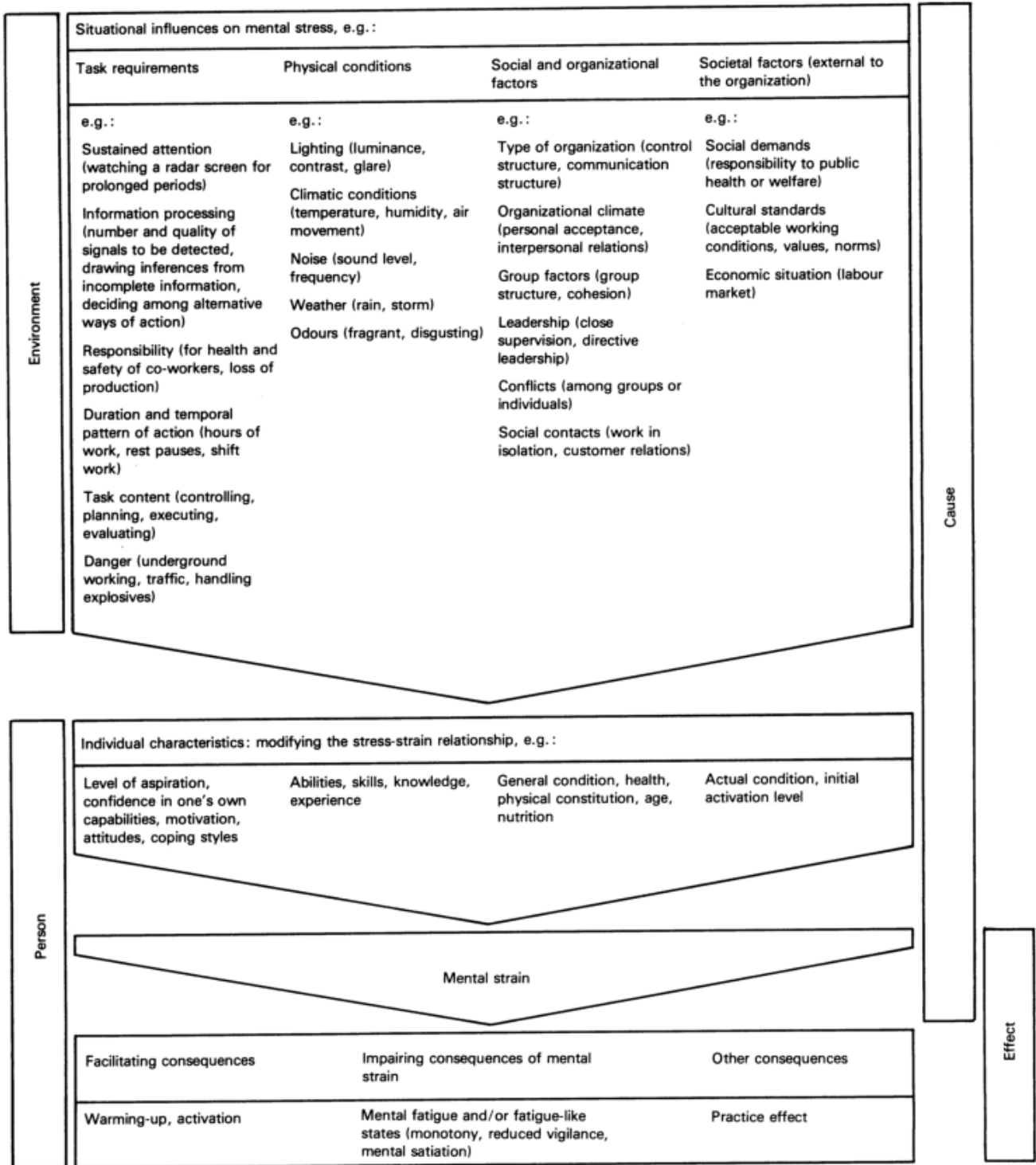


Figure A.1 — Stress-strain relationship in mental work-load

## Alphabetical index

### A

activation 3.3.1.2

### C

consequences of mental strain 3.3

### F

facilitating effects 3.3.1  
fatigue-like states 3.3.2.2

### I

impairing effects 3.3.2

### M

mental fatigue 3.3.2.1  
mental satiation 3.3.2.2.3  
mental strain 3.2  
mental stress 3.1  
monotony 3.3.2.2.1

### P

practice effect 3.3.3.1

### R

reduced vigilance 3.3.2.2.2

### W

warming-up effect 3.3.1.1

---

---

---

## **BSI — British Standards Institution**

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

### **Revisions**

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

### **Buying standards**

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

### **Information on standards**

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

### **Copyright**

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager. Tel: 020 8996 7070.