SLOVENSKI STANDARD
SIST EN ISO 12894:2003

01-februar-2003

Ergonomija toplotnega okolja - Zdravstveni nadzor oseb, ki so izpostavljene izjemno vročim ali hladnim okoljem (ISO 12894:2001)

Ergonomics of the thermal environment - Medical supervision of individuals exposed to extreme hot or cold environments (ISO 12894:2001)

Ergonomie des Umgebungsklimas - Medizinische Überwachung von Personen, die einer extrem heißen oder kalten Umgebung ausgesetzt sind (ISO 12894:2001)

Ergonomie des ambiances thermiques - Surveillance médicale des personnes exposées a la chaleur ou au froid extremes (ISO 12894:2001)

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ICS:

13.100	Varnost pri delu. Industrijska higiena	Occupational safety. Industrial hygiene
13.180	Ergonomija	Ergonomics

SIST EN ISO 12894:2003 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 12894

June 2001

ICS 13.100; 13.180

English version

Ergonomics of the thermal environment - Medical supervision of individuals exposed to extreme hot or cold environments (ISO 12894:2001)

Ergonomie des ambiances thermiques - Surveillance médicale des personnes exposées à la chaleur ou au froid extrêmes (ISO 12894:2001)

Ergonomie des Umgebungsklimas - Medizinische Überwachung von Personen, die einer extrem heißen oder kalten Umgebung ausgesetzt sind (ISO 12894:2001)

This European Standard was approved by CEN on 15 June 2001.

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 Management Centre 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 Management Centre 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

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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 December 2001, and conflicting national standards shall be withdrawn at the latest by December 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 12894:2001 was approved by CEN as a European Standard without any modification.

INTERNATIONAL STANDARD

ISO 12894

First edition
2001-06-15

Ergonomics of the thermal environment — Medical supervision of individuals exposed to extreme hot or cold environments

Ergonomie des ambiances thermiques — Surveillance médicale des personnes exposées à la chaleur ou au froid extrêmes

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 12894 was prepared by Technical Committee ISO/TC 159, *Ergomomics*, Subcommittee SC 5, *Ergonomics of the physical environment*.

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

Introduction

This International Standard is one of a group of standards which specify methods for measuring and evaluating hot, moderate and cold thermal environments. International Standards or Technical Reports, which describe the evaluation of hot and cold thermal environments, give advice on the acceptability of these environments for human exposure, taking account of the activity level and the effects of clothing worn. That advice is given on the basis that the individuals concerned are healthy, that is, without any medical factor which might predispose them to ill effects from the thermal environment. Furthermore, biological variability prevents the accurate prediction of the response of any particular individual to climatic extremes. For these reasons, it is necessary to provide appropriate medical supervision for individuals who are to be exposed to extreme thermal environments. This International Standard describes a method to determine the degree of medical supervision relevant to different types of exposure, in order to limit the risk of any individual suffering from ill health.

Ergonomics of the thermal environment — Medical supervision of individuals exposed to extreme hot or cold environments

1 Scope

This International Standard provides advice to those concerned with the safety of human exposures to extreme hot or cold thermal environments. Extreme thermal environments are those which result in a high rate of heat gain or loss by the body. A precise definition of such environments cannot easily be given, as the change in body heat storage depends on clothing and activity as well as the parameters of the climatic environment. As a guide, the boundaries of extreme environments might be considered to be as follows: for hot environments, a wet bulb globe temperature of 25 °C; for cold environments an air temperature of 0 °C or below.

Extreme environments can only be tolerated for limited periods of time before a risk of ill health results. Control measures are necessary to ensure the safety of those so exposed, one of which is the provision of appropriate medical supervision prior to and during exposures.

This International Standard is intended to assist those with responsibility for such exposures to reach decisions about the appropriate level of medical supervision in different situations. This International Standard should be read and used in the context of other relevant guidance and legislation.

This guidance is applicable to laboratory and occupational exposures to extreme environments. In either case an assessment should be made of the expected thermal stress on the individual, but the detailed arrangements for medical supervision will differ. Control of occupational exposures must also satisfy national health and safety legislation.

The laboratory or climatic chamber studies for which this International Standard will be relevant include those in which people may be exposed to high or low ambient conditions or local heating or cooling. Studies may, for example, investigate physiological or psychophysical responses to the environment or the benefit of clothing or other protective equipment. Scientific investigations and demonstrations for teaching purposes are included in the scope. In some countries, such studies are subject to specific legislation and, in all cases, experimental exposures should be conducted in the context of accepted ethical criteria as detailed in relevant national and international statements (see informative annex A and the bibliography).

Extremes of environment may be only one component of the total physiological stress imposed in a study. In such cases, appropriate advice must also be obtained with regard to any medical supervision required prior to exposure to the other stressors involved, for example whole body vibration.

In some cases, ergonomic investigations are conducted in the field, for example, to document the physiological stress of particular occupations. If the overall stress of the task is increased as a result of the proposed study, this International Standard will be relevant.

This International Standard does not apply to the use of hypo or hyper thermia in the course of medical investigation or treatment.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to

investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 9886, *Evaluation of thermal strain by physiological measurements.*

ISO 13731, *Ergonomics of the thermal environment — Vocabulary and symbols.*

3 Terms and definitions

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

3.1
independent medical officer
qualified medical practitioner identified in a study protocol as responsible for the arrangements for medical fitness assessment and health monitoring in support of a study to which this International Standard applies and who is not the principal investigator

3.2
experimenter
the member of the investigation team who is in overall control of a particular experimental session

3.3
medical fitness assessment
procedure by which the state of past and present health of an individual is reviewed to identify any possible medical predisposition to harm from exposure to extreme thermal environments

3.4
health monitoring
process in which the acute effects on the individual resulting from exposure to an extreme thermal environment are observed and interpreted by someone with appropriate training, utilizing physiological monitoring and clinical observation

NOTE The purpose is to detect any indications that an individual may no longer be adequately tolerating the exposure conditions, and therefore to prevent any serious ill health arising, if necessary by removal of the individual from the exposure.

3.5
occupational physician
qualified medical practitioner who has received appropriate training and who is responsible for the supervision of the health at work of employees in one or more enterprise

3.6
principal investigator
where more than one person is responsible for the design of a study a principal investigator should be nominated and he or she will normally be responsible for obtaining ethical approval for a study and for ensuring that adequate arrangements are made for medical supervision of the experimental subjects

NOTE In the case of multicentre studies with a centrally agreed protocol, the person organizing the study, i.e. the promoter, may be responsible for seeking ethical approval.

4 Principles of medical supervision of individuals

4.1 General

The use of the relevant International Standards, given in clause 2, for the assessment of the thermal environment, will allow exposures to be controlled in such a way that the risk of illness arising is minimized. Where body core temperature is maintained in the band 36,0 °C to 38,0 °C then serious general health effects, resulting from

changes in body heat storage, are unlikely, although not entirely unknown. Core temperature is defined in ISO 13731 and described in ISO 9886. In this International Standard, where reference is made to values of core temperature, it is intended that these will have been obtained from valid measurement sites, such as those described in ISO 9886.

If core temperature departs from the range previously specified, there is a progressively increasing risk of acute ill health, specifically heat stroke (heat hyperpyrexia) or profound hypothermia, either of which can be life threatening. Disorders resulting from changes in body heat storage are not, however, the only types of ill health that can arise in extreme thermal environments. For example, in the cold, asthmatic attacks may occur, (particularly in association with exercise), angina may be precipitated, and rhinitis, coughs and nose bleeds have all been reported. Also peripheral cooling can result in frostbite. In the heat, blood flow redistribution can result in episodes of low blood pressure and the risk of collapse before significant heat gain has occurred.

The main illnesses which can arise from changes in body heat storage in hot or cold environments are summarized in informative annex B. This also gives information on the other health effects which can occur in hot and cold conditions.

ISO 9886 and ISO 13731 apply only to healthy subjects in whom the normal physiological control of body temperature is unimpaired. Also, they are unable to take account of the variability of responses between different individuals, although some large differences, such as those between acclimatized and unaclimatized individuals, are considered. For these reasons, it will be important, in the circumstances described below, to include a system of medical supervision of the exposed individuals in risk management. Such supervision may entail both medical fitness assessment prior to exposure and health monitoring during exposure.

4.2 Ergonomic investigations

4.2.1 Introduction

Ergonomic investigations may be conducted in the laboratory or in the field. In either case, the protection of the individuals participating in the studies must be a major consideration.

4.2.2 Laboratory studies

4.2.2.1 General

Studies should be conducted according to accepted ethical guidelines, for example, as contained in the “Helsinki Declaration” (see [8] in the bibliography). The study protocol should be approved by a local research ethics committee. The Principal Investigator and each Experimenter should be aware of their duties towards the subjects both in the design and conduct of the investigations. They should ensure that only individuals who have given their consent participate in the studies and that subjects are free to withdraw from participation during the course of an investigation if they so wish. The application of these principles is described in annex A.

The protocol should describe any arrangements for medical fitness assessment or health monitoring and identify an independent medical officer responsible for the implementation of these arrangements. The medical officer may advise on any likely risks to the subjects and on the level of fitness assessment and monitoring appropriate to the intended study. The medical officer may delegate specific duties to appropriately qualified individuals, for example, health monitoring during exposures may best be done by experienced laboratory staff with appropriate training in first aid and basic resuscitation techniques. The medical officer will act as the final arbiter in questions of fitness of particular individuals to participate in a study.

The medical officer should have practical experience of observing the effects of thermal stress on people, as well as a sound theoretical knowledge of these effects. This may be obtained by cooperation with a research team, or in the course of formal training in applied physiology or related disciplines.

4.2.2.2 Medical fitness assessment

Medical fitness assessment should take place prior to exposure to extreme hot or cold environments. This should take account of the intended exposure conditions and is centred on the individual. It is intended to determine