

Mechanical vibration and shock — Hand-arm vibration — Method for the measurement and evaluation of the vibration transmissibility of gloves at the palm of the hand

The European Standard EN ISO 10819 : 1996 has the status of a
British Standard

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The preparation of this British Standard was entrusted by Technical Committee PH/3, Protective clothing, to Subcommittee PH/3/8, Protective gloves, upon which the following bodies were represented:

- British Agrochemicals Association Ltd.
- British Apparel and Textile Confederation
- British Clothing Industry Association
- British Iron and Steel Producers' Association
- British Leather Confederation
- British Railways Board
- British Rubber Manufacturers' Association Ltd.
- British Safety Industry Federation
- British Textile Technology Group
- Chemical Industries Association
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- Health and Safety Executive
- Home Office
- Institution of Fire Engineers
- Ministry of Defence
- National Association of Glove Manufacturers
- RAPRA Technology Ltd.
- SATRA Footwear Technology Centre
- Safety Equipment Association
- Textile Services Association Ltd.
- Trades Union Congress

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National foreword

This British Standard has been prepared by Subcommittee PH/3/8 in co-operation with GME/21 and is the English language version of EN ISO 10819 : 1996 *Mechanical vibration and shock — Hand-arm vibration — Method for the measurement and evaluation of the vibration transmissibility of gloves at the palm of the hand*, published by the European Committee for Standardization (CEN). It is identical with ISO 10819 : 1996 published by the International Organization for Standardization (ISO).

EN ISO 10819 : 1996 was produced as a result of international discussion in which the UK took an active part. The experience gained by organizations in the UK (Health and Safety Executive, and Institute of Sound and Vibration Research) whilst developing a test facility, in accordance with the draft standard, showed the standard to be unreliable in a number of ways.

- At the time of publication, this standard has not been thoroughly tested. There is some evidence that the standard has been interpreted differently at test houses around the world. It is not clear that results obtained in different test houses are comparable, i.e. use of the standard may not give reproducible test results.
- Gloves may amplify vibration at low frequencies even though they attenuate at other frequencies. In the interests of safety, users of this standard are encouraged to draw this problem to the attention of the users of such gloves.
- The standard is insensitive to large differences in glove performance at high frequencies. This may not be important according to current knowledge of vascular injury but should not be overlooked, particularly in respect of other injuries.
- Considerable expertise and experience, and more specialized equipment than is implied, is needed before tests can be carried out in strict accordance with this standard.

The UK and Russia disapproved publication of this standard.

Users of this standard should note that Technical Committee ISO/TC 108/SC 4 has passed a Resolution to update the document taking into account the experience of users. This standard may be subject to early and substantial revision.

Cross-references

Publication referred to	Corresponding British Standard
EN 420	BS EN 420 : 1994 <i>General requirements for gloves</i>
ENV 25349	DD ENV 25349 : 1993 <i>Mechanical vibration. Guidelines for the measurement and the assessment of human exposure to hand transmitted vibration</i>
ENV 28041	DD ENV 28041 : 1993 <i>Human response to vibration. Measuring instrumentation</i>
ISO 2041	BS 3015 : 1991 <i>Glossary of terms relating to mechanical vibration and shock</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, pages 2 to 16, an inside back cover and a back cover.

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English version

Mechanical vibration and shock — Hand-arm vibration — Method for the measurement and evaluation of the vibration transmissibility of gloves at the palm of the hand

(ISO 10819 : 1996)

Vibrations et chocs mécaniques — Vibrations
main-bras — Méthode pour mesurer et évaluer le
facteur de transmission des vibrations par les gants
à la paume de la main
(ISO 10819 : 1996)

Mechanische Schwingungen und Stöße —
Hand-Arm-Schwingungen — Verfahren für die
Messung und Bewertung der
Schwingungsübertragung von Handschuhen in der
Handfläche
(ISO 10819 : 1996)

This European Standard was approved by CEN on 1996-03-19. 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.

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Foreword

The text of EN ISO 10819 : 1996 has been prepared by Technical Committee CEN/TC 162, Protective clothing including hand and arm protection and lifejackets, the secretariat of which is held by DIN, in collaboration with Technical Committees ISO/TC 108, Mechanical vibration and shock, and CEN/TC 231, Mechanical vibration and shock.

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 1996, and conflicting national standards shall be withdrawn at the latest by December 1996.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

There are five annexes to this standard whereof annex A is normative and annexes B, C, D and ZA are for information only.

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

Introduction

This European Standard was developed in response to the growing demand to protect people from the risks of vibration damage caused by exposure to hand-transmitted vibration.

In the field of personal protective equipment (PPE), gloves are being marketed which are intended to reduce the magnitude of vibration exposure.

On present evidence, there have been no circumstances in which gloves have been shown to provide adequate attenuation of vibration to prevent vibration injuries.

Within the current state of knowledge, gloves do not provide significant attenuation in the frequency range below 150 Hz. Some gloves may provide amplification in this frequency range. Also, the use of gloves might alter the gripping force which would alter the transmission of vibration into the arms thus increasing the risk of damage. However, it must be emphasized that an important purpose of gloves is to keep the hands warm and dry, as this may help to limit some vibration-induced effects.

This standard describes a method of measuring the vibration transmissibility of gloves in the laboratory, but as far as possible under conditions typical of use at actual working places. The measurement is performed at the palm of the hand and so does not give the transmission of vibration to the fingers. However, when evaluating the protective effects of a glove, it must be remembered that in many work situations, vibration is transmitted not only to the palm but also to the fingers. A different measurement procedure will be required to establish the vibration transmissibility of gloves at the fingers.

This standard describes a method of measuring the vibration transmissibility of gloves worn by a test subject. For the measurement of the vibration transmissibility of resilient materials which are used to cover handles of tools or make gloves, EN ISO 13753 should be consulted.

1 Scope

This European Standard specifies a method for the laboratory measurement, the data analysis and reporting of the vibration transmissibility of gloves in terms of vibration transmission from a handle to the palm of the hand in the frequency range from 31,5 Hz to 1250 Hz.

The standard is intended to define a screening test for the vibration transmission through gloves. It is recognized that many factors influence the transmission of vibration through gloves. Therefore the transmissibility value according to this standard is not sufficient to assess the health risk due to vibration.

The transmissibility of vibration is measured and reported for two input spectra, which are representative of the vibration of some tools, and may be reported as a function of frequency.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 420	<i>General requirements for gloves</i>
ENV 25349	<i>Mechanical vibration — Guidelines for the measurement and the assessment of human exposure to hand-transmitted vibration</i> (ISO 5349 : 1986)
ENV 28041	<i>Human response to vibration — Measuring instrumentation</i> (ISO 8041 : 1990)
EN 61260	<i>Electroacoustics — Octave-band and fractional-octave-band filters</i> (IEC 1260 : 1995)
ISO 2041	<i>Vibration and shock — Vocabulary</i>
ISO 5805	<i>Mechanical vibration and shock affecting man — Vocabulary</i>

3 Definitions

The terminology used in this standard is in accordance with ISO 2041, ISO 5805 and ENV 25349. Additionally for the purpose of this standard, the following definition applies:

transmissibility

The ratio of the accelerations measured at the surface of the hand and at the reference point. Transmissibility values greater than 1 indicate that the glove amplifies the vibration. Values lower than 1 indicate that the glove attenuates the vibration.

4 Symbols and abbreviations

The following symbols and abbreviations are used:

a_w	r.m.s. frequency-weighted acceleration, measured by means of a weighting filter or calculated from acceleration spectrum (see ENV 28041 and ENV 25349);
a_{ws}	r.m.s. frequency-weighted acceleration for vibration spectrum s ($s = M$ or H , see clause 6.2);
R	subscript used to denote measurements taken at the reference point, i.e. at the handle;
p	subscript used to denote measurements taken at the palm of the hand;
b	subscript used to denote measurements taken with bare hand', i.e. without glove;
g	subscript used to denote measurements taken with gloved hand', i.e. between glove and hand.

Examples of combined subscripts:

a_{wMPg}	weighted acceleration for vibration spectrum M , measured at the palm of the hand with glove;
TR_{sb}	transmissibility for vibration spectrum s measured with bare hand ($TR_{sb} = a_{wsPb}/a_{wsRb}$);
TR_{sg}	transmissibility for vibration spectrum s measured with gloved hand ($TR_{sg} = a_{wsPg}/a_{wsRg}$);
TR_s	corrected vibration transmissibility of glove for vibration spectrum s ($TR_s = TR_{sg}/TR_{sb}$);
$\overline{TR}_s$	mean corrected transmissibility of glove for vibration spectrum s (see clause 7.1).

5 Measuring principle and equipment

5.1 General principle and set-up

The method uses a vibration excitation system ('shaker') equipped with a special handle (see annex B) to measure the gripping force and a device for measuring the feed force. The vibration in the direction of the excitation is measured at two points simultaneously: at the surface of the handle and by means of an adaptor containing an accelerometer between hand and glove, i.e. inside the glove. In order to compensate for the frequency response of the adaptor, the vibration transmissibility of the glove is calculated as the difference in vibration transmissibility from handle to hand with and without glove.

The measuring set-up is shown in figure 1. The acceleration at the reference point (at the handle) and the vibration at the hand shall be measured simultaneously.

The values of the gripping force and the feed force have to be displayed continuously, to enable the operator to adjust them to the required values.