

# REPORT RAPPORT BERICHT

**CR 12349**

**June 1996**

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**English version**

**Mechanical vibration - Guide to the health effects  
of vibration on the human body**

**Vibrations mécaniques - Guide  
concernant les effets des vibrations  
sur la santé du corps humain**

**Mechanische Schwingungen -  
Leitfaden über die Wirkung von  
Schwingungen auf die Gesundheit  
des Menschen**

This CEN REPORT has been prepared by Technical Committee CEN/TC 231 "Mechanical vibration and shock" and has been approved by CEN on 1996-05-24.

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**Rue de Stassart 36, B - 1050 Brussels**

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## **Foreword**

This CEN report has been drawn up by Technical Committee CEN/TC 231 "Mechanical vibration and shock", working group 5 "Vibration effects".

Annexes A and B are informative.

## **Introduction**

This CEN report provides a short overview of the current knowledge of the possible effects of vibration on the human body. It is an informative document which presents general background information for the user of the different European Standards on vibration.

Mechanical vibration arises from a wide variety of processes and operations performed in industry, forestry and agriculture, and public utilities. Vibration caused by vehicles, powered processes, hand-held and hand-guided tools, or workpieces can greatly influence the human body. Exposure to harmful vibration can induce several complaints and health disorders, mainly at the upper limbs and the lower back. A comprehensive knowledge of the unwanted effects of vibration on the body is essential to implement appropriate administrative, technical and medical preventive measures.

## **1 Scope**

The aim of this CEN report is to provide information on the possible adverse health effects caused by exposure to vibration at work. The report addresses manufacturers as well as employers and employees using vibrating machinery in order to improve their understanding of the possible health problems arising from occupational exposure to vibration.

This CEN report is limited to the effects on health and does not cover the potential effects of vibration on comfort, human performance or vibration perception. Most of the information on whole-body vibration in this CEN report is based upon data available from research on human response to vibration of seated persons. There are only few data on the effects of vibration on persons in standing, reclining or recumbent positions. The information on both hand-transmitted vibration and whole-body vibration is based upon data from laboratory research on acute effects as well as upon data from epidemiologic studies.

Additional information may be obtained from the scientific literature (see annex A).

## 2 Normative references

This CEN report 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 CEN report only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- CR 1030-1      Hand-arm vibration – Guidelines for vibration hazards reduction – Part 1: Engineering methods by design of machinery
- CR 1030-2      Hand-arm vibration – Guidelines for vibration hazards reduction – Part 2: Management measures at the workplace
- prEN 1299      Vibration isolation of machines – Information for the application of source isolation
- ENV 25349      Mechanical vibration – Guidelines for the measurement and the assessment of human exposure to hand-transmitted vibration (ISO 5349:1986)
- EN 30326-1      Mechanical vibration – Laboratory method for evaluating vehicle seat vibration – Part 1: Basic requirements (ISO 10326-1:1992)
- prEN ISO 10819      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/DIS 10819:1995)

## 3 Hand-transmitted vibration

### 3.1 General

Powered processes and tools which expose operators' hands to vibration are widespread in several industrial activities. Occupational exposure to hand-transmitted vibration can arise from rotating and percussive hand-held power tools used in the manufacturing industry, quarrying, mining and construction, forestry and agriculture, and public utilities. Exposure to hand-transmitted vibration can also occur from vibrating workpieces held in the hands of the operator, and from hand-held vibrating controls such as motorcycle bars or vehicle steering wheels.

Excessive exposure to hand-transmitted vibration may include disturbances in finger blood flow, and in neurological and locomotor functions of the hand and arm. It has been estimated that 1,7 to 3,6 % of the workers in the European countries and the U.S.A. are exposed to potentially harmful hand-transmitted vibration.

The term *hand-arm vibration (HAV) syndrome* is commonly used to refer to the complex of peripheral vascular, neurological and musculoskeletal disorders associated with exposure to hand-transmitted vibration. Workers exposed to hand-transmitted vibration may be affected with neurological and/or vascular disorders separately or simultaneously. Vascular disorders and bone and joints abnormalities caused by hand-transmitted vibration are compensated occupational diseases in several countries. These disorders are also included in an European schedule of recognized occupational diseases.