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VIBRATION AND SHOCK—HAND-TRANSMITTED VIBRATION—GUIDELINES FOR MEASUREMENT AND ASSESSMENT OF HUMAN EXPOSURE

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The following interests are represented on Committee AV/10:

Association of Australian Acoustical Consultants

Australian Coal Association

Australian Environment Council

Confederation of Australian Industry

Construction Equipment Importers and Manufacturers of Australia

CSIRO, National Measurement Laboratory

Department of Defence

Department of Industrial Relations and Employment, N.S.W.

Federal Chamber of Automotive Industries

National Acoustic Laboratories

Railways of Australia Committee

Royal Institution of Naval Architects

University of Newcastle

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PREFACE

This Standard was prepared by the Association's Committee on Vibration and Shock—Effects, to supersede AS 2763-1985, *Vibration and shock—Hand-transmitted vibration—Measurement and medical screening*. It is aligned with ISO 5349, *Mechanical vibration—Guidelines for the measurement and the assessment of human exposure to hand-transmitted vibration*. The revised Standard incorporates guidelines for the evaluation of hand-transmitted vibration exposure in Appendix A.

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FOREWORD

Intense vibration can be transmitted from vibrating tools, vibrating machinery or vibrating workpieces to the hands and arms of operators. Such situations occur, for example, when a person handles pneumatic and electric handtools and in forestry work when a person handles chainsaws. These vibrations are usually transmitted through the hand and arm to the shoulder. Depending on the situation, they can be transmitted to one arm only or to both arms simultaneously. The vibration of body parts and the perceived vibration are frequently the source of discomfort and possibly reduced proficiency. Continued, habitual use of many vibrating tools has been found to be connected with various patterns of diseases affecting the blood vessels, nerves, bones, joints, muscles, or connective tissues of the hand and forearm.

The vibration exposures required to cause these disorders are not known exactly with respect to vibration intensity and the vibration frequency spectrum or with respect to daily exposure time and the total exposure period. Collection of reliable data on how vibration exposure affects human health has proved to be extremely difficult for many reasons. In view of the complexity of the problem and the paucity of quantitative data concerning the occupational health effect of hand-transmitted vibration, it is difficult to propose a firm Standard regarding the evaluation of such vibration and to recommend limits for safe exposure, particularly in relationship to problems other than vibration white finger (VWF).

In view of the complexity of the problem and the shortage of quantitative data concerning the occupational health effect of hand-transmitted vibration, it is difficult to propose a comprehensive method for assessing vibration exposure. However, based on the limited data available and on experience with current exposure conditions, the information in this Standard represents the best guidance available to protect the majority of workers against serious health impairment and to assist in the development of hand-operated tools the use of which will reduce the risk of vibration induced disorders.

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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out general methods for measuring and reporting hand-transmitted vibration exposure in three orthogonal axes for the one-third octave bands having centre frequencies from 6.3 Hz to 1250 Hz, for octave bands having centre frequencies from 8 Hz to 1000 Hz, and for a frequency-weighted measure covering the frequency range from 5.6 Hz to 1400 Hz.

This Standard provides guidance for the evaluation of hand-transmitted vibration specified in terms of a frequency-weighted vibration acceleration and daily exposure time. It does not define the limits of safe exposure. This guidance is derived from a consensus of opinion based upon data available from both practical experience and laboratory experimentation concerning human response to hand-transmitted vibration. It cannot be taken to define completely safe exposure ranges in which vibration diseases cannot occur.

This Standard does not specify the risk factor of health impairment for different operational processes, tools, and machines.

NOTE: Reference should be made to AS 2973 for information related to vibration-measuring instrumentation.

1.2 APPLICATION. This Standard applies to periodic and to random or non-periodic vibration. Provisionally, this Standard may also be applied to repeated shock type excitation.

NOTE: To facilitate further progress in this field and to allow the quantitative comparison of exposure data, uniform methods for measuring and reporting exposure of human beings to hand-transmitted vibration are desirable. Additional Standards are to be considered for the vibration measurement of specific tools and processes.

Appendix A provides guidelines for the evaluation of hand-transmitted vibration exposures.

Appendix B outlines measures that should be adopted to medically screen people who are either involved or propose becoming involved with hand-transmitted vibration in their occupation. This Appendix also explains some techniques that will normally be useful in reducing the severity of hand-transmitted vibration and the incidence of vibration-induced physiological signs of damage to the hands.

1.3 REFERENCED DOCUMENTS. The documents below are referred to in this Standard.

AS
2670 Vibration and shock—Guide to the evaluation of human exposure to whole-body vibration
2775 Vibration and shock—Mechanical mounting of accelerometers
2973 Vibration and shock—Human response vibration-measuring instrumentation
Z41 Octave, half octave and one-third octave band pass filters intended for the analysis of sound and vibrations

IEC
184 Methods for specifying the characteristics of electro-mechanical transducers for shock and vibration measurements
222 Methods for specifying the characteristics of auxiliary equipment for shock and vibration measurement

ISO
5805 Mechanical vibration and shock affecting man—Vocabulary

DIS
5347 Methods for the calibration of vibration and shock pick-ups
8041 Human response vibration measuring instrumentation