

Instrumentation for the measurement of vibration exposure of human beings —

**Part 3: Specification for
instrumentation for measuring
vibration exposure to the whole body**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Mechanical Engineering Standards Policy Committee (GME/-) to Technical Committee GME/21, upon which the following bodies were represented:

- Department of Trade and Industry (National Engineering Laboratory)
- Electricity Supply Industry in England and Wales
- Engineering Equipment and Materials Users' Association
- Institute of Sound and Vibration Research
- Institution of Mechanical Engineers
- Lloyd's Register of Shipping
- Ministry of Defence
- Power Generation Contractors' Association (BEAMA Ltd.)
- Society of British Aerospace Companies Ltd.
- Society of Environmental Engineers
- Society of Motor Manufacturers and Traders Limited

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Abrasive Industries Association
- Association of Consulting Engineers
- British Aggregate Construction Materials Industries
- British Agricultural and Garden Machinery Association Ltd.
- British Gas plc
- British Hydraulic Tool Manufacturers' Association
- British Lawnmower Manufacturers' Federation
- British Occupational Hygiene Society
- British Railways Board
- Department of the Environment (Building Research Establishment)
- Forestry Commission
- Health and Safety Executive
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- Institute of Naval Medicine
- Institution of Civil Engineers
- Medical Research Council
- Motor Industry Research Association
- Portable Electric Tool Manufacturers' Association
- Silsoe Research Institute
- Steel Casting Research and Trade Association
- University College of Swansea
- University of Salford
- Coopted members

This British Standard, having been prepared under the direction of the General Mechanical Engineering Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 30 September 1991

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The following BSI references relate to the work on this standard:
Committee reference GME/21
Draft for comment 90/77694 DC

ISBN 0 580 20066 3

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This British Standard has been prepared under the direction of the Mechanical Engineering Standards Policy Committee. This Part of BS 7482 together with Part 1, specifies the measurement instrumentation for the measurement of vibration transmitted to the whole body.

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, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

Part 1 of this British Standard gives general requirements for all instruments for the measurement of human exposure to vibration. This Part gives additional requirements to be met by instrumentation for the measurement of human exposure to whole-body vibration and repeated shock.

1 Scope

This Part of BS 7482, together with Part 1 specifies measuring instrumentation for the measurement of vibration as recommended in BS 6841:1987 and BS 7085:1989. It applies to instrumentation for the measurement of vibration transmitted to the whole body. It does not cover instrumentation for the measurement of building vibration and low frequency motion associated with motion sickness. This Part of BS 7482 specifies electrical and vibration tests to verify compliance with the characteristics specified. It also specifies the method for sensitivity calibration.

The purpose of this British Standard is to ensure consistency and compatibility of results and reproducibility of measurements realized with different instrumentation for the measurement of whole-body vibration exposures.

A collection of instruments may be realized which fulfils the necessary requirements for measurement of whole-body vibration exposure provided that Part 1 and this Part of BS 7482 are complied with.

2 Definitions

For the purposes of this British Standard, the definitions given in BS 7482-1, BS 3015 and ISO 5805:1981 apply together with the following.

2.1

vibration dose value (VDV)

vibration experienced over a period of time which is expressed as follows:

$$\text{VDV} = \left\{ \int_0^T a^4(t) dt \right\}^{1/4} \text{ m} \cdot \text{s}^{-1.75}$$

where

VDV is the vibration dose value (in $\text{m s}^{-1.75}$);

$a(t)$ is the frequency-weighted acceleration (in m s^{-2});

T is the total period of the day (in s) during which vibration may occur.

3 Characteristics

3.1 Frequency-weighting

The instrumentation shall have at least one of the frequency-weighting characteristics specified in Table 1 and an appropriate frequency-weighting designated "Flat" (see Table 2).

NOTE Tolerances are given in Table 3. The analytical expressions for band-limiting filters and band-pass filters to realize these frequency-weightings are given in Table 4, representation is given in Figure 1. Other optional weighting characteristics may be included.

Table 1 — Overall frequency-weightings (from BS 6841:1987)

Frequency		W_b	W_c	W_d	W_e	W_g
Nominal	Exact					
Hz	Hz					
0.5	0.501	0.334	0.843	0.853	0.862	—
0.63	0.631	0.367	0.929	0.944	0.939	—
0.8	0.794	0.381	0.972	0.992	0.941	—
1.0	1.000	0.385	0.991	1.011	0.880	0.424
1.25	1.259	0.386	1.000	1.008	0.772	0.503
1.6	1.585	0.392	1.007	0.968	0.632	0.589
2.0	1.995	0.417	1.012	0.890	0.511	0.677
2.5	2.512	0.494	1.017	0.776	0.409	0.779
3.15	3.162	0.662	1.022	0.642	0.323	0.897
4.0	3.981	0.889	1.024	0.512	0.253	1.004
5.0	5.012	1.025	1.013	0.409	0.202	1.050
6.3	6.310	1.055	0.974	0.323	0.160	1.009
8.0	7.943	1.025	0.891	0.253	0.125	0.890
10.0	10.00	0.974	0.776	0.202	0.100	0.750
12.5	12.59	0.907	0.647	0.161	0.080	0.615
16.0	15.85	0.810	0.512	0.125	0.063	0.486
20.0	19.95	0.708	0.409	0.100	0.050	0.391
25.0	25.12	0.600	0.325	0.080	0.040	0.313
31.5	31.62	0.492	0.256	0.063	0.032	0.248
40.0	39.81	0.393	0.199	0.049	0.025	0.194
50.0	50.12	0.313	0.156	0.039	0.019	0.153
63.0	63.10	0.239	0.118	0.030	0.015	0.1116
80.0	79.43	0.171	0.084	0.021	0.011	0.083

NOTE This table is reproduced from BS 6841.