

Ergonomics of design and use of visual display terminals (VDTs) in offices —

Part 4: Specification for keyboards

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Personal Safety Equipment Standards Policy Committee (PSM/-) to Technical Committee PSM/39, upon which the following bodies were represented:

- AERC Institute of Engineering Research
- British Airways
- British Industrial Truck Association
- British Occupational Hygiene Society
- British Telecommunications plc
- Business Equipment and Information Technology Association
- Chartered Institution of Building Services Engineers
- Engineering Employers' Federation
- Ergonomics Society
- Health and Safety Executive
- ICE (Ergonomics) Ltd.
- Institute of Management Services
- Institute of Occupational Medicine
- Loughborough University of Technology
- Ministry of Defence
- National Union of Mineworkers
- Society of Motor Manufacturers and Traders Limited
- Society of Occupational Medicine
- Trades Union Congress

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Foreword

This Part of BS 7179 has been prepared under the direction of the Personal Safety Equipment Standards Policy Committee. It specifies requirements based on ergonomics factors for keyboards used in visual display terminals (VDTs).

The keyboard is extensively used to input information to computer systems found in offices. It is used in conjunction with the display, and together these two items of equipment have a significant impact on the user of office computer systems. The design and use of the keyboard is inter-related with other design issues such as the workplace and the display.

This Part of BS 7179 is primarily concerned with the users operating the keyboard rather than the design of the keyboard *per se*. The emphasis is therefore on specifying factors affecting the user performance rather than specifying the physical characteristics of the equipment which might be assumed to give rise to the desired human performance outcome. A test method is included to enable an assessment of the ease of use of a keyboard to be made. However, in order to help manufacturers provide good keyboards, much of the standard deals with the design of the keyboard itself based on current known good practice.

Other Parts of this standard are:

- *Part 1: Introduction;*
- *Part 2: Recommendations for the design of office VDT tasks;*
- *Part 3: Specification for visual displays;*
- *Part 5: Specification for VDT workstations;*
- *Part 6: Code of practice for the design of VDT work environments.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, 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.

1 Scope

This Part of BS 7179 specifies requirements based on ergonomics factors for keyboard layout arrangements of alphabetic and numeric keys, the physical characteristics of the individual keys and the overall design of the housing containing the keys. Its provisions cover keyboards used in an office environment for typical office tasks. A test method is included to assess the ease of use of keyboards.

Specialist keyboards such as those used in control rooms or in technical environments are outside the scope of this Part of BS 7179. However it is likely that the basic principles given in this standard would still apply.

NOTE 1 General guiding principles are given in appendix A.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 7179, the definitions given in BS 7179-1 apply together with the following.

2.1

keyboard

an arrangement of typing and function keys laid out in a specified manner

2.2

numeric keyboard or numeric pad

an array of three rows of three keys (for the numerals 1 to 9), a zero/decimal area and any additional optional keys

2.3

alphanumeric keyboard

a matrix of keys representing the following set of characters:

- 26 upper case letters of the Latin alphabet (A to Z);
- 26 lower case letters of the Latin alphabet (a to z);
- 10 digits (1 to 0);
- non-printing graphic space;
- punctuation signs and other graphics as required.

2.4

QWERTY layout

a reference to the layout of alphanumeric keys in accordance with BS 5959, which takes its name from the top row of alphabetic characters

2.5

cursor keys

keys which control the movement of the cursor about the display

2.6

home row of keys

the row of keys containing the letters ASDFGHJKL (row C as defined in BS 5959)

2.7

reference keyboard

a keyboard that is known to comply with this standard and its performance can be used as a baseline against which the performance of a new keyboard can be assessed

3 Conformance

3.1 General

A keyboard shall comply with this Part of BS 7179 if:

- a) the design requirements of clause 4 are met; or
- b) when the keyboard is assessed in accordance with appendix B the test results comply with 3.2.

NOTE The test method described in appendix B is intended to be used when the design requirements are not applicable, for example where new and different technologies are being used.

3.2 User performance assessment

When tested in accordance with appendix B the keyboard shall comply with the following.

- a) The number of keystrokes per minute aggregated over the 3rd, 4th and 5th test sessions shall not be significantly lower (as assessed by a one-tailed t-test at a significance level α of 1.05) than that achieved on the reference keyboard.

NOTE 1 Other levels of α are acceptable provided the rationale of appendix C is followed.

If performance on the keyboard under test is not statistically significantly lower than that on the reference keyboard but this performance is only achieved after a specified training period then conformance with this standard will be qualified only.

If the required performance is achieved only in respect of a specific application then conformance with this standard will be qualified only.

- b) Comparative subjective assessment of comfort in use of the keyboard under test shall not be statistically significantly worse than that of the reference keyboard.

NOTE 2 Each subject is tested on both keyboards. Therefore, these are "related" samples, i.e. each subject acts as his/her own control

4 Design

4.1 Keyboard layout

4.1.1 Alphanumeric

A QWERTY layout shall be used (see BS 4822).

NOTE 1 It is recommended that the guidelines given in ISO 3243 for the preferred positions for commonly used keys such as space bar, return and shift are followed.

NOTE 2 The test method given in appendix B will enable “non-QWERTY” keyboards to be assessed.

4.1.2 Numeric pad

A “1 2 3” layout or a “7 8 9” layout for the numeric keys shall be used, i.e.

1 2 3	7 8 9
4 5 6	4 5 6
7 8 9	1 2 3
0	0

NOTE For tasks which make heavy use of the numeric keys, such as data entry, special keys like double zero, comma and decimal point may need to be added to the numeric keyboard.

4.2 Cursor control

Dedicated cursor control keys shall be provided for text processing applications. One of the arrangements shown in Figure 1 shall be used.

4.3 Keyboard slope and height

The keyboard slope shall be between 0° and 25° to the horizontal.

NOTE 1 It is recommended that the slope should be adjustable between 0° and 25°.

NOTE 2 Keyboard height and slope are connected, increasing slope increases the height of the home row of keys. Generally, keyboard slope is a matter of personal preference, habit and adaptation to previously used keyboards. Keyboard height should be measured from the work surface to the centre of a key top at the C-row. Where the slope of the keyboard is adjustable the keyboard height should be measured with the slope at its lowest level setting. Research indicates preferences for slopes of 10° to 20°.

NOTE 3 Keyboards with a home row height of less than 50 mm are recommended. However, keyboards with a home row height greater than 50 mm may be judged acceptable if the workplace arrangement can support them so that the operator’s posture is satisfactory, i.e. upper arm approximately vertical, lower arm approximately horizontal, legs supported by the chair with no restriction to blood circulation and feet well supported.

4.4 Keyboard placement

It shall be possible to position the keyboard on the work surface independently of the display. The keyboard shall be stable on the work surface during normal keying operations, e.g. it should not slip, creep or rock.

NOTE The weight or bulk of the keyboard should not make it awkward to reposition on the work surface.

4.5 Surfaces of keyboard housing and keytops

The keyboard housing and keytops shall have a matt finish and the diffuse reflection factor shall be between 0.15 and 0.75 when assessed against a diffuse reflection chart¹⁾. Specular reflectance of surfaces shall be not greater than 45 gloss units (silky matt) when measured by the method described in BS 3900-D5.

NOTE The colour of keys should be neutral. Dark colours should be avoided. The keyboard surround should be the same colour as the display housing.

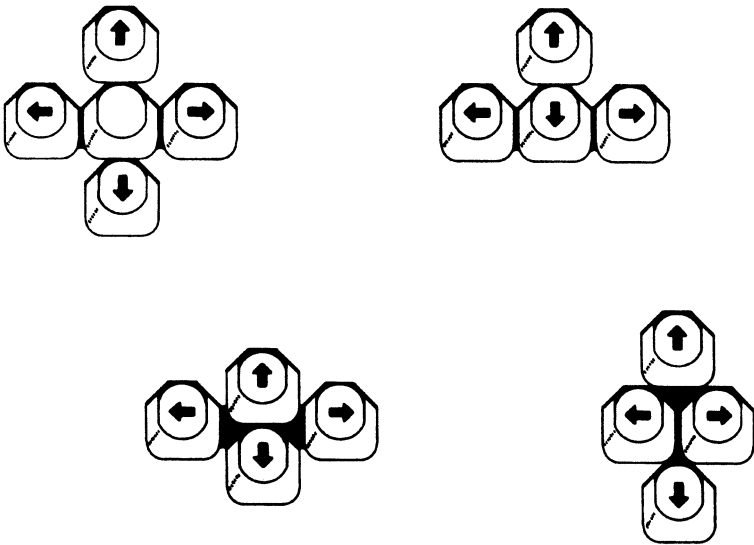


Figure 1 — Possible arrangements for cursor control

¹⁾ For information on suppliers of charts apply to Enquiry Section, BSI, Linford Wood, Milton Keynes MK14 6LE enclosing a stamped addressed envelope for reply.