Disability Discrimination Act (DDA) - Implications on Keypad Design -

Since October 1999, service providers have to take reasonable steps to:

- Change practices and procedure, which make it impossible or unreasonably difficult to use a service.
- Provide auxiliary aides or services which would make it easier for or enable disabled people to use a service.
- Overcome physical features, which make it impossible or unreasonably difficult for disabled people to use a service, by providing the service by a reasonable alternative method.

From 2004 there is a requirement for service providers to take reasonable steps to remove, alter or provide reasonable means of avoiding physical features that make it impossible or unreasonably difficult for disabled people to use a service.
Guidelines for Keypad Design:

A standard layout for keypads is essential for blind people. There are currently two common layouts for numeric keys; the telephone layout and the calculator layout. It is recommended that the telephone layout be used exclusively on public access terminals.

Enlarged keys enable persons with poor dexterity to press the correct key; a concave shape to the keys will also help fingers to stay in place. The spacing between the keys is as important as the size of the keys.

Persons who are blind or have low vision find it useful to be able to feel the keys of a telephone. It is particularly important to have a single raised dot on the number 5 key.

Large clear typefaces should be used to improve legibility for persons with low vision. When choosing typefaces it is important to use characters that have clear ‘open’ shapes. Many people with low vision can easily misread such characters as 3, 5, 6, 8 and 9 if the tails curl over; this tends to blur or merge the shapes.

**Numeric and command keys:**

People with low vision find some numeric characters difficult to read. It is important that a typeface is used that has numerals with open shapes. To help blind people, there should be a single raised dot on the number 5 key; this should be positioned so as not to reduce legibility. Visual markings on the keys should be characters at least 4 mm high and should have good contrast with the colour of the key (eg. white characters on matt black keys).

Colour coded keys should be:

- Red: Cancel
- Yellow: Clear or Correct
- Green: Enter or Proceed

All keys or buttons should be tactually discernible. Controls and keys should be tactually discernible without activating the control or keys. The status of all locking or toggle controls or keys should be visually discernible, and discernible either through touch or sound.

**The arrangement of keys:**

Function keys should be clearly separated from the numeric keys. When command keys are vertically arranged, 'cancel' should be the uppermost key and 'enter' the lowest. When the command keys are horizontally arranged, 'cancel' should be located the furthest left, 'enter' the furthest right. It is better to position the command keys to the right of the numeric keys. They are then less likely to be inadvertently touched when entering numerals. Where command keys are positioned beneath the numerical keys they may be a problem to visually disabled persons because they are likely to be pressed accidentally when entering numbers. Command keys should be as large as possible so that the words on them can be larger and thus easier to read.
**Shaped keys:**

Colour should not be the only distinguishing feature between keys, since red/green colour blindness is not uncommon; if possible, the keys should have different shapes and be marked with symbols.

Illumination

Ideally keys should be internally illuminated when the terminal is waiting for input from that keypad.

**Sound:**

Sound feedback in the form of sounds such as a 'beep' or 'click' when a key is pressed is helpful to many people.

**Tactile feedback:**

Tactile indication can be provided by a gradual increase in the force, followed by a sharp decrease in the force required to actuate the key, and a subsequent increase in force beyond this point for cushioning.

**Checklist for Keys:**

Designers should follow the ETSI standard ES 201 381 for tactile identifiers on keypads.

The user should have the option of pressing keys sequentially instead of simultaneously (eg having to press a control key at the same time as a numeric key).

Keytops should be concave.

Legends should be high contrast to the colour of the keys.

Provide feedback for each key's actuation.

The spacing between the keys should be at least 50% of the width of the key.

The following are drawn from other guidelines but the scientific data on which they are based are not quoted:

Keys should be at least 15mm wide by 15mm high.

There should be at least 3.2mm spacing between keys.

There should be at least 9.6mm between function keys and a numerical keypad.

The force required to operate a key or slider control should not be greater than 22.2 Newtons (irrespective of the orientation of the control).

**Relevant standards:**

- EN 1332 Machine readable cards, related device interfaces and operations. Part 3 Keypads.
- EN 29241 Part 4 Keyboard requirements.
- ETSI TCR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
- ETSI ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.
- IEC 73 Colours of pushbuttons and their meanings.
- ISO/IEC 9995 Information technology: Keyboard layouts for text and office systems.
- ITU E161 Arrangements of figures, letters and symbols on telephones.

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Information from: [www.disability.gov.uk](http://www.disability.gov.uk)
[www.ofTEL.gov.uk](http://www.ofTEL.gov.uk)
[www.tiresias.org](http://www.tiresias.org)
[www.bankers.asn.au](http://www.bankers.asn.au)
Summary:

1. There should be a single raised dot on the number 5 key.

2. It is recommended that the telephone layout be used exclusively on public access terminals.

3. Visual markings on the keys should be characters at least 4 mm high and should have good contrast with the colour of the key (e.g. white characters on matt black keys). Numbers and letters should be “open” for clarity. See Tiresias font.

4. Colour coded keys should be:
   a. Red: Cancel
   b. Yellow: Clear or Correct
   c. Green: Enter or Proceed

5. Function keys should be clearly separated from the numeric keys. When command keys are vertically arranged, 'cancel' should be the uppermost key and 'enter' the lowest. When the command keys are horizontally arranged, 'cancel' should be located the furthest left, 'enter' the furthest right. It is better to position the command keys to the right of the numeric keys.

6. Key top shape should be concaved to “hold the finger” in position.

7. The top key should be in alignment with the top row of the numeric keypad. If there is a fourth function key, it shall be blank. The function keys shall have raised tactile markings, as follows:
   - Cancel - cross (X)
   - Correction/Clear - vertical line (I)
   - OK/Enter - raised circle (O)

8. The spacing between the keys should be at least 50% of the width of the key.

9. Keys should be at least 15mm wide by 15mm high.

10. Keys should be raised or recessed by a minimum of 2mm.

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Overview prepared by Steve Greenaway
Information from: www.disability.gov.uk
              www.oftel.gov.uk
              www.tiresias.org
              www.bankers.asn.au
11. There should be at least 3.2mm spacing between keys.

12. There should be at least 9.6mm between function keys and a numerical keypad.

13. The force required to operate a key or slider control should not be greater than 22.2 Newtons (irrespective of the orientation of the control).

14. Clarity of key top marking is essential. A font such as Tiresias font should be used. This is an example of Tiresias font:

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INFORMATION LABELS
improving legibility for all
INFOFONT
abcdefghijklmnopqrstuvwxyz
CLARITY
1234567890£$&¢@!?!%
good design for people with disabilities is
FREQUENTLY GOOD DESIGN FOR EVERYONE
public telephones
ABCDEFGHIJKLMNOPQRSTUVWXYZ
LMNOPQRSTUVWXYZ

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