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Information technology — Virtual keyboards user interfaces —

Part 2: On-screen keyboards with direct touch interface

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Partie 2: Claviers sur écran dotés d'interface tactile

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see https://patents.iec.ch).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 35, *User interfaces*.

A list of all parts in the ISO/IEC 22121 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

Virtual keyboards can be difficult for users as different types of keyboards and functionalities exist, and they are spreading exponentially; with the rise of tactile mobile phones and devices, most users in the world will have to use such interfaces for communication, work or leisure.

The most widespread type of virtual keyboard is found on devices that use both a screen to display the virtual keyboard (on-screen keyboard) and a built-in, direct touch interface to operate it.

Devices that use an on-screen keyboard with a direct touch interface include at least one touchpad screen that allows both the display of the keyboard interface and the interaction with the user. These features are mostly found in handheld devices such as mobile phones, tablets and connected watches, but can also be seen in other devices such as laptop computers, kiosks, automated teller machine (ATM) whiteboards, or other touchpad devices used for presentation and demonstration purposes.

The main purpose of this document is to provide a reliable, harmonized and easy-to-use interface for all on-screen keyboards with a direct touch interface across the various devices that might be using it, especially mobile and connected devices. It considers a wide range of user needs such as changing keyboard layouts for multilingual users, customization, responding to accessibility, or adapting the available keys depending on the context of use, to allow faster typing.

The ISO/IEC 22121 series specifies the requirements and recommendations for all types of virtual keyboards. This document specifies the requirements and provides further recommendations for on-screen keyboards with direct touch interface. This document is harmonized with ISO/IEC 24757, which describes any type of keyboard.

Information technology — Virtual keyboards user interfaces —

Part 2: On-screen keyboards with direct touch interface

1 Scope

This document specifies the design and specification of on-screen keyboards (keyboards that are displayed on a screen) with direct touch interface, including those with some audio feedback.

This document specifies keyboard layouts designed for on-screen keyboards with direct touch interface and ways for interaction with them.

It is not applicable to virtual keyboards that are not displayed on a screen, and on-screen keyboards that do not provide a direct touchscreen interface such as on-screen keyboards relying on an accessory unit like a trackpad or a remote control for interactions with the user.

It is not applicable to physical keyboards that use real or adaptable keys, which can be customized to user needs, for example, with LCD display.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 9995-1, *Information technology — Keyboard layouts for text and office systems — Part 1: General principles governing keyboard layouts*

ISO/IEC 9995-7:2009, *Information technology — Keyboard layouts for text and office systems — Part 7: Symbols used to represent functions*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
on-screen keyboard
virtual keyboard (3.3) displayed on any type of screen

Note 1 to entry: On-screen keyboards are one specific type of virtual keyboards, probably the most common, that use a screen to display a visual keyboard.

Note 2 to entry: This type of virtual keyboard can be used on personal computer's screens, on feature phones and tablets, mobile phones and tablets, TVs, kiosks, whiteboards.

3.2
physical keyboard
mechanical or electronic input device using an arrangement of buttons or keys

Note 1 to entry: Some physical keyboards are adaptable (for example, using LCD screens instead of keys with printed symbols and characters).

3.3
virtual keyboard
software alternative to a *physical keyboard* (3.2)

3.4
associated character
alphabetic character derived from another alphabetic character

Note 1 to entry: Characters can be associated because a diacritic sign is added to it (for example, Ê is associated to letter E) or because of its close relation to it.

Note 2 to entry: For most languages, using associated characters is essential to write properly.

3.7
qwerty-like on-screen keyboard
virtual keyboard layout used for typing in Latin-based languages, with a layout of alphabetical characters similar to the physical keyboard layout from which it is derived (qwerty, qwertz, azerty…)

3.8
prediction
software-generated set of characters, i.e. word, phrase or text, based on user typing that can be selected as next input for faster typing

3.9
group
logical state of a keyboard providing access to a collection of *graphic characters* (3.13) or elements of graphic characters

Note 1 to entry: A group gives access to one collection of characters. Typically, when more than one language is used, multiple groups are required.

Note 2 to entry: Usually these graphic characters or elements of graphic characters logically belong together and can be arranged on several levels within a group.

Note 3 to entry: The input of certain graphic characters, such as accented letters, may require access to more than one group.

Note 4 to entry: Subsets of a group are called levels.

[SOURCE: ISO/IEC 9995-1:2009, 4.9]

3.10
level
logical state of a keyboard providing access to a subset of a collection of *graphic characters* (3.13) or elements of graphic characters in a *group* (3.9)

Note 1 to entry: In certain cases, the level selected may also affect function keys.

Note 2 to entry: With on-screen keyboards, it is usual that only one level be shown per panel at a time.

[SOURCE: ISO/IEC 9995-1:2009, 4.11]

3.11
space key
key associated with character U+0020 SPACE

[SOURCE: ISO/IEC 9995-9:2016, 3.18]

3.12
enter key
key associated with an enter or return function

[SOURCE: ISO/IEC 9995-9:2016, 3.9]

3.13
graphic character
character, other than a control function, that has a visual representation normally handwritten, printed or displayed

Note 1 to entry: Graphic characters with no visual representation can still be used, as per ISO/IEC 9995-7.

[SOURCE: ISO/IEC 9995-1:2009, 4.1, Note 1 to entry added.]

3.14
graphic symbol
visual representation of a *graphic character* (3.13), a control function, or a combination of one or more graphic characters and/or control functions

[SOURCE: ISO/IEC 9995-1:2009, 4.14]

3.15
symbol
any *graphic symbol* (3.14) which is none of a letter, a digit or a punctuation mark

[SOURCE: ISO/IEC 9995-9:2016, 3.24]

3.16
level 2 select
function that, if activated, will change the keyboard state to produce characters from level 2

Note 1 to entry: Level 2 is particularly associated to case in bicameral scripts (for example, scripts which use upper and lower case). Other characters are often displayed at the same time in level 2 when space allows it in the same panel.

Note 2 to entry: By default, level 2 select is activated only for the next keystroke.

Note 3 to entry: Level 2 select may be locked similarly to the capital state lock function.

[SOURCE: ISO/IEC 9995-1:2009, 4.15, modified — Notes 2 and 3 to entry added.]

3.17
group select
function that, if activated, will change the keyboard state to produce characters from a different group

[SOURCE: ISO/IEC 9995-1:2009, 4.13]

3.18
capitals lock state
state that, if activated, will result in the generation of the capital form of all *graphic characters* (3.13) on the keyboard for which such a form exists

[SOURCE: ISO/IEC 9995-1:2009, 4.7]

3.19
toggle key
on-screen keyboard key that provides a choice of two states

Note 1 to entry: Toggle keys can be used to access a collection of graphic characters.

Note 2 to entry: Toggle keys can provide access to menus for item selection.

Note 3 to entry: Different symbols can be used to display the toggle key status.

3.20
toggle key status
state of the *toggle key* (3.19) activated by the user

3.21
tap
single consecutive touch and release actions on a touchscreen device, typically it finishes shorter than 500 ms

Note 1 to entry: The touch action can be performed by any part of the human body (usually, the fingers), a pen, stylus, or any other stylus shaped object.

3.22
long tap
single consecutive touch, hold and release actions on a touchscreen device, typically it lasts longer than 500 ms

3.23
layout selection key
on-screen keyboard key used for switching among various on-screen *keyboard layouts* (3.24)

3.24
keyboard layout
physical, visual or functional arrangement of the keys on a keyboard

Note 1 to entry: Contrary to physical keyboards, on-screen keyboards do not rely on mechanical keys and printed/engraved labels, therefore, their layout can be changed conveniently by the user with the device's user interface.

Note 2 to entry: Some physical keyboards provide ways to change the visual arrangement of keys (for example, physical keyboards with LCD/LED displayed keys).

Note 3 to entry: An on-screen keyboard layout may give access to one or multiple groups of characters.

Note 4 to entry: Subsets of an on-screen keyboard layout are called groups.

Note 5 to entry: Keyboard layouts could be defined by national, regional or local standards.

4 Conformance

4.1 Conformance with this document

An on-screen keyboard with direct touch interface reaches conformance with this document if it meets the applicable requirements of Clauses 5 to 13.

NOTE Depending on the rendering of the on-screen keyboard, some requirements might not apply.

4.2 Claims of conformance

The on-screen keyboards used in this system conform to ISO/IEC 22121-2.

If the on-screen keyboard includes layout mappings derived from physical keyboard standardized layouts as defined in Clause 6, a reference to the original physical keyboard layout standard can be included in the declaration of conformance.

EXAMPLE The on-screen keyboards used in this system conform to ISO/IEC 22121-2 and provides an on-screen keyboard layout derived from NF Z 71-300 physical keyboard layout.

5 General requirements for on-screen keyboards with direct touch interface

5.1 Character availability

a) If the national or local standards exists for each available language in the system, the on-screen keyboard with direct touch interface shall provide the user the capacity to create all characters (as described in ISO/IEC 10646) required in those standards.

b) When no national or local keyboard standard exists, the on-screen keyboard shall provide the set of characters most commonly used in the country's software and devices, without limiting the set, for using this language.

c) Specific on-screen keyboards made for augmentive and assistive communication (AAC) can use different sets of characters and symbols to answer specific accessibility needs, as shown in Figure 1.

EXAMPLE Figure 1 illustrates an on-screen keyboard made for symbol communication. On this on-screen keyboard, there are 20 keys; each of them is composed of a graphical symbol and captioned text. The "describing" key, composed of a speech balloon with eyes symbol is activated. There are other keys around such as "food" (plate symbol), "clothes" (shirts symbol), "colours" (rainbow symbol) or "transport" (truck symbol).

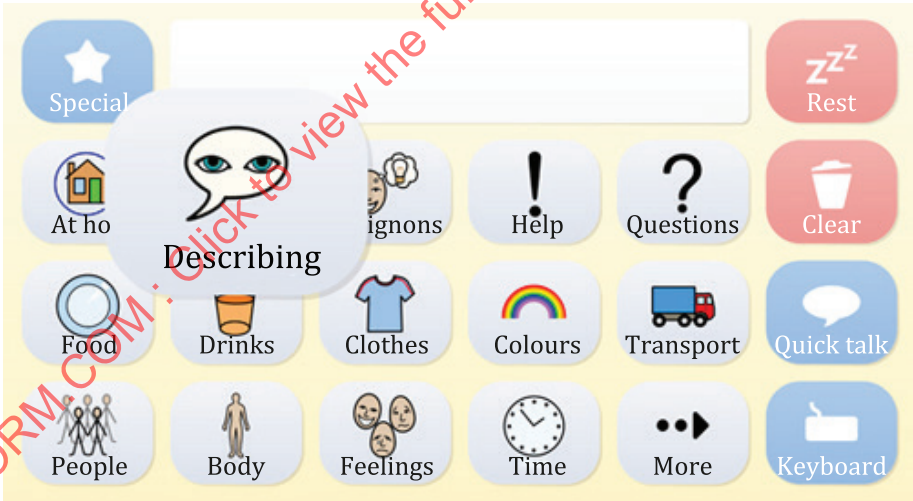


Figure 1 — Example of an AAC on-screen keyboard used for symbol communication

5.2 Single finger/stylus and multiple finger text input

There are four functionalities currently detectable by touch panels:

— tap and double tap;

Additionally, there are several possibilities for the number of detection points at the same time on the touchpad:

— single point;

— two points;

— over three points.

a) For accessibility reasons, it shall be possible to operate all text input and related functionalities of an on-screen keyboard with a single point of interaction and using only tap or double taps.

EXAMPLE 1 When only one finger can be used.

EXAMPLE 2 When a stylus is used.

NOTE ISO/IEC 24786 defines a number of keyboard accessibility operations to operate with a single point of interaction.

b) On-screen keyboards may provide additional long tap, press, press and move, or multiple point interaction text input functionality for increased ergonomics.

EXAMPLE 3 When using on-screen keyboard layouts on a touchscreen device, it is possible to access associated characters using either a single tap or a long tap, as described in 8.2.2, if available.

EXAMPLE 4 When using bi-cameral language scripts on-screen keyboard layouts on an touchscreen device, it is possible to lock the capitals (similarly to the “caps lock” key and capitals lock state on physical keyboards) while still touching and holding the level 2 selection toggle key, using multipoint input detection, and type as many capital letters as required, as described in 7.2.1 d).

c) For accessibility reasons, when the touchpad device can detect advanced features such as long tap, press, press and move, or multiple point interaction, the user should be able to activate or deactivate a specific accessible input mode from the device’s settings that fully complies with 5.2 a).

5.3 Adjustment

5.3.1 Long tap duration

For accessibility reasons, the long tap duration should be customizable from the device’s on-screen keyboard settings, in order to meet the user’s needs.

5.3.2 Double tap duration

For accessibility reasons, the double tap duration should be customizable from the device’s on-screen keyboard settings, in order to meet the user’s needs.

5.3.3 Touchpad pressure

a) For accessibility reasons, the device should provide ways to adjust the pressure used for single tap on the on-screen keyboard.

b) The device may provide additional ways to adjust the pressure used for some specific advanced features such as long tap, press, press and move, or multiple point interaction.

6 Mapping of keyboard layout standards

6.1 General

Due to their non-physical nature, on-screen keyboards cannot behave like physical keyboards and cannot have the exact same set of functionalities. One of the major issues is the limitation of available character keys, which can be due, for example, to display space constraints on smaller devices like watches.

In some cases, mapping an existing keyboard layout standard will be a prowess due to the very small size of the handheld device for which it is designed. More than one toggle key is then necessary to achieve this in different panels or layers.

When display space constraints make the mapping of an existing keyboard layout standard difficult, alternative on-screen keyboards more adapted to the device should be provided to the user.

Consequently, conventional fall-backs might be necessary for an on-screen keyboard to be fully mapped to materials conformant to the ISO/IEC 9995 series and other national or local keyboard layout standards.

Subclauses 6.2 to 6.4 specifies the requirements and recommendations for the mapping of physical keyboards or national layout standards.

6.2 Alphabetic characters

6.2.1 Key and row position numbering system

For describing the mapping of physical keyboard layouts to on-screen keyboard layouts, this document uses the numbering system described in ISO/IEC 9995-1.

According to ISO/IEC 9995-1, rows on a keyboard are numbered starting from the bottom line of keys with letter "A", the second line of keys starting from the bottom is row B, the third line of keys starting from the bottom is row C, the fourth line of keys starting from the bottom is row D and the fifth and top line of keys is row E, as illustrated in Figure 2.

NOTE 1 Figure 2 is taken from ISO/IEC 9995-1:2009. It shows a complete key numbering system for physical keyboards with an angled grid. We can see 17 columns with column numbers starting at "99", then "00" till "15", from left to right, and 5 rows with row numbers, starting from "E" to "A", from top to bottom. A square grid illustration is also given in ISO/IEC 9995-1 but not included in this document.

For describing the on-screen keyboard layout, this document uses the same key and row position numbering system. Rows on an on-screen keyboard are numbered starting from the bottom line of keys with letter "A". The second line of keys starting from the bottom is row B. The third line of keys starting from the bottom is row C. The fourth line of keys starting from the bottom is row D. The fifth line of keys is row E, as illustrated in Figure 3.

NOTE 2 Figure 3 shows a representation of a handheld device with an on-screen display. On the display, we can see at the top a free area used to display content on the device (screen). Under the screen, there is an area dedicated to the prediction software interface (predictions tab). Under the predictions tab, we can see the virtual keyboard itself with 4 rows of keys numbered "D" to "A" starting from top to bottom.

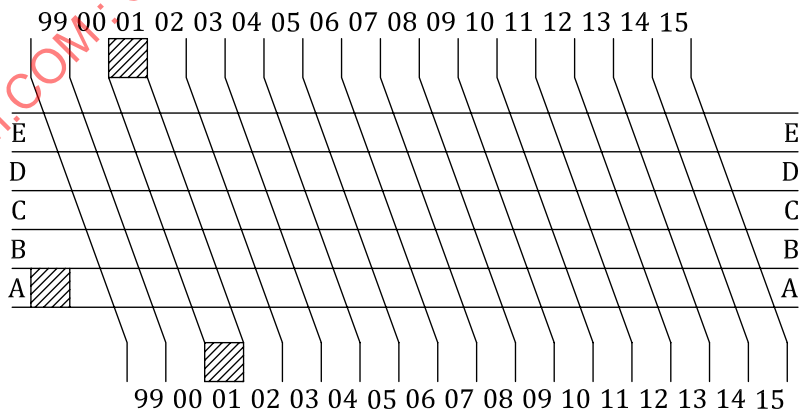
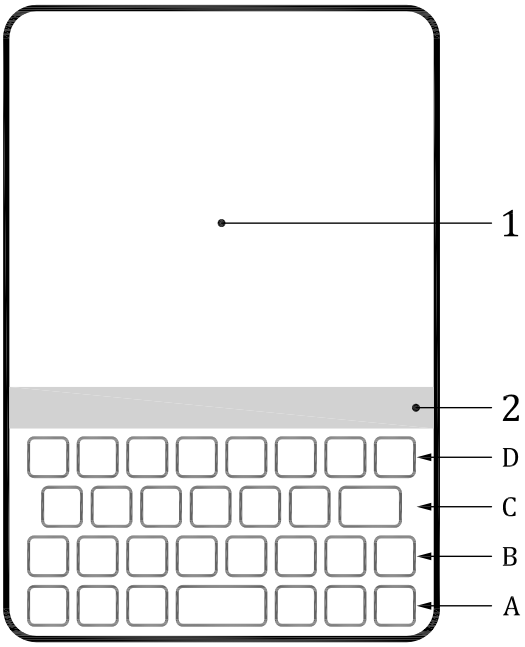


Figure 2 — Key position numbering system on physical keyboards (angled grid)



Key

1 screen
2 predictions tab
A row A
B row B
C row C
D row D

Figure 3 — Row position numbering system with on-screen keyboards

6.2.2 Set of characters to be mapped to on-screen keyboards layouts

All alphabetic characters of group 1 level 1 located on rows B, C, D of the keyboard layout, as defined in ISO/IEC 9995-1, should be available to the on-screen keyboard user in the same layout, if display space constraints allow it.

EXAMPLE 1 In the United States "QWERTY" national keyboard layout, as illustrated in the desktop keyboard layout shown in Figure 4, the following keys can be mapped to the on-screen keyboard within the same layout: QWERTYUIOP (row D), ASDFGHJKL (Row C), ZXCVBNM (Row B).

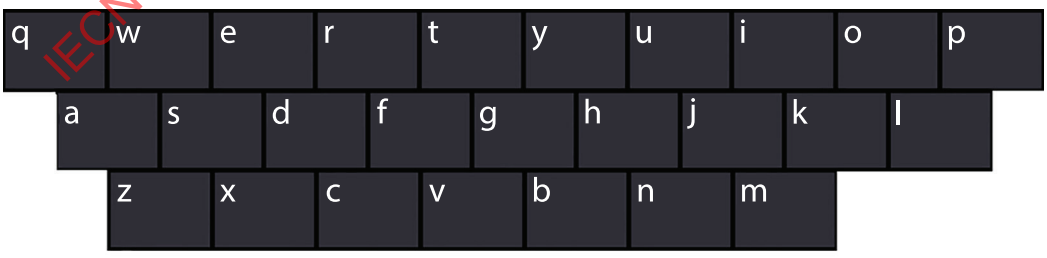


Figure 4 — Example of the required set of characters for the QWERTY keyboard layout

EXAMPLE 2 On the French "AZERTY" commonly used keyboard layout, the following keys can be mapped to the on-screen keyboard within the same layout: AZERTYUIOP (Row D), QSDFGHJKLM (Row C), WXCVBN (Row B) as illustrated in the on-screen keyboard layout shown in Figure 5.

Figure 5 — Example of a mapping of an AZERTY keyboard layout on a French on-screen keyboard

6.2.3 Mapping of physical keyboard layout

a) The on-screen keyboard layout should conform to the alphabetic group 1 level 1 (rows B, C, D) layout of national or local standards, if display space constraints allow it.

b) When no national or local keyboard layout standards exist, it should conform to the alphabetic group 1 level 1 (rows B, C, D) layout(s) most commonly used in the country's software and devices, without limiting the set, if display space constraints allow it.

c) When multiple national or local keyboard layout standards exist, one on-screen keyboard layout should be made available to the user for each national or local standard; the user shall be able to select and use one of these layouts at any time.

d) When a national or local keyboard layout standard provides the choice among several keyboard layouts (for example, in France, both "azerty" and "bépo" layouts conform to the standard), one on-screen keyboard layout should be made available to the user for each of the standardized layouts; the user should be able to select and use one of these layouts at any time.

Additional on-screen keyboard layouts matching no currently existing standard keyboard layout may be provided to the user to offer multiple ways to type in text, such as, for example, Latin-based or katakana/hiragana-based on-screen keyboards for writing Japanese language, half-qwerty or ABC based on-screen keyboards for typing on very small handheld devices.

NOTE Research and development for alternative on-screen keyboard layouts aimed at better accessibility, efficiency and ergonomics for the user is important.

6.3 Numeric characters

a) Qwerty-like on-screen keyboards should provide an additional top row (row E) specifically for the input of numeric characters, if display space constraints allow it, as shown in figure 6.

EXAMPLE On larger on-screen devices with direct touch interface, a row E is added as the top row in order to allow for easier use and input of numeric characters, as well as other specific characters and symbols, as illustrated in Figure 6. This figure shows on an on-screen keyboard used on a handheld device such as a tablet for the input of English language. We can see that the on-screen virtual keyboard layout is using 5 rows. The row E shown used on this example provides 14 additional keys of half the height of those on rows A, B, C, D, for direct access to characters `, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, -, =. The bottom rows provide the other keys required for the QWERTY layout.

Figure 6 — Example of an on-screen keyboard using an additional row to provide access to numeric characters

b) Numeric character keys for generic text input fields shall be available either directly in the on-screen keyboard or by using a specific toggle key.

c) On more advanced devices, it may also be possible to input numeric characters using a long tap on the keys located on row D.

d) Numeric character keys for generic text input fields shall be presented to the user in the same order and layout as in national or local keyboard layout standards or as in the layout(s) most commonly used in the country's software and devices, if there is no such standard in the country.

6.4 Space key and other non-graphic keys

6.4.1 Space bar/key

a) A space bar or key, as defined in ISO/IEC 9995-7:2009, Table 1, number 9 (ISO 7000-0251), shall be provided for all on-screen keyboard layouts used for typing in languages that require some spacing between words, such as in Latin or Cyrillic alphabet languages or for the mapping of national or local physical keyboard layouts used to type them.

b) The space key shall be located at or near the centre of row A of the on-screen keyboard.

c) The space key width should be at least 25 % of the device's screen total width for ergonomic and accessibility reasons.

d) The space key should not be provided or displayed at all on the on-screen keyboard when it is not needed by the language selected by the user, as in, for example, most Asian languages, or by the national or local physical keyboard layouts mapped and adapted for on-screen keyboard use.

6.4.2 Backspace/backward erase key

a) A backspace/backward erase (delete) key, as defined in ISO/IEC 9995-7:2009, Table 1, number 17 (ISO 7000-2023), shall be provided for all on-screen keyboard layouts.

b) The backspace/backward erase (delete) key shall conform with ISO/IEC 9995-7 for the symbol or label describing it.

6.4.3 Return/enter key

a) The return key, as defined in ISO/IEC 9995-7:2009, Table 1, number 23 (ISO 7000-0651), shall always be provided on the on-screen keyboard interface when the context of use allows or requires the input of line or paragraph breaks.

b) The enter key, as defined in ISO/IEC 9995-7:2009, Table 1, number 24 (ISO 7000-1025), shall be provided on the on-screen keyboard only when screen display size constraints allow it and when the context of use may require an enter action.

c) Both return and enter keys, as defined in ISO/IEC 9995-7, shall be located at the far-right position on row A of the keyboard.

d) The on-screen keyboard may provide and display only one key for both return and enter functionalities.

e) The return/enter key width should be at least that of two alphabetic keys, including the separating space between them.

f) When there is only one return/enter key, the label describing the key on the on-screen keyboard should be named accordingly, based on the context of use.

g) If typing the key results in a line or paragraph break, the key should be labelled as a return key and shall conform to ISO/IEC 9995-7 for the symbol or label describing it.

h) If typing the key results in a validation action, the key should be labelled as an enter key and shall conform with ISO/IEC 9995-7 for the symbol or label describing it.

i) If typing the key results in a line, paragraph break or a validation action, the key should be labelled as a return key and shall conform to ISO/IEC 9995-7 for the symbol or label describing it.

6.4.4 Tabulation key

a) On-screen keyboards should provide a tabulation key, as defined in ISO/IEC 9995-7:2009, Table 1, number 44 (ISO 7000-0001), if display space constraints allow it.

b) If a tabulation key is provided on the on-screen keyboard, it shall conform to ISO/IEC 9995-7 for the symbol or label describing it.

7 Specific toggle keys and commands

7.1 Toggle key layout and operations

7.1.1 General

a) Specific toggle keys are required with on-screen keyboards to reach various functionalities. It is also one of the means to provide a fall-back for level 3 characters of different standards (in particular, the ISO/ IEC 9995 series) or de facto physical keyboards widely in use.

b) When used, the toggle key activates specific functionality, gives access to a new set of graphic characters, or deactivates these specific functionalities.

EXAMPLE 1 The level 2 select toggle key gives the user access to a related set of graphic characters as illustrated in Figure 7. This figure shows an example of a level 2 select toggle key located at the left side of row B of an on-screen keyboard. On the left image, the toggle key is not activated. It is displayed as a black shaped, translucent arrow sign, and we can see that the alphabetical characters are shown as lower-case characters. When activated, the symbol used to describe this toggle key has changed, indicating its different state to the user. On the right image, the toggle key is activated and is now displayed as a bold, black arrow sign. The alphabetical characters available are now shown as capital characters, instead of lower-case characters.

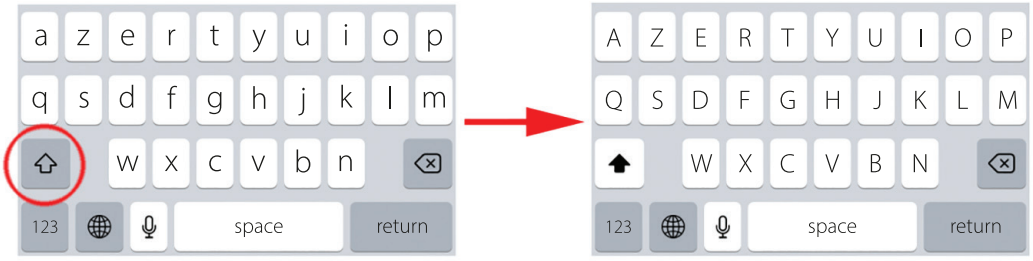


Figure 7 — Example of a level 2 select toggle key with an on-screen keyboard

EXAMPLE 2 The language select toggle key (analogous to group select key on physical keyboards) gives the user access to additional on-screen keyboard layouts, as illustrated in Figure 8. In this figure, there is a language selection toggle key (image on the left), located on the bottom (A) row of the on-screen keyboard. When activated, a selection menu (image on the right) allows the user to customize on-screen keyboard settings and to choose from various types of on-screen keyboards layouts (French, English, Emoji, Russian, Japanese-Kana, Japanese-Romaji, Swype, Arabic, Greek, Tamil). Each keyboard layout in the selection menu is shown using the name and characters of the language for which it is designed.

Figure 8 — Example of a language selection toggle key menu with an on-screen keyboard

EXAMPLE 3 In this example, as shown in Figure 9, a language selection toggle key (image on the left) is located on the bottom (A) row of the on-screen keyboard. This image shows an on-screen keyboard set up with a Japanese-kana keyboard layout providing access to Kana characters. When activated, the on-screen keyboard automatically switches to the next on-screen keyboard (image on the right) registered in the users' on-screen keyboard preferences. On this image, we can see that the keyboard layout has changed to a Japanese-Romaji keyboard layout, which provides access to roman characters.

Figure 9 — Example of a language selection toggle key with an on-screen keyboard

c) Toggle keys shall be operated with a single tap and shall not need to be pressed for a longer time (long tap) to be activated.

d) The different subsets of characters accessed with toggle keys shall completely cover the set of level 1, level 2 and level 3 characters offered on standard or de facto physical keyboards used in the marketplace.

e) Additional functionality may be provided with toggle keys for specific on-screen keyboards.

EXAMPLE 4 A long tap can either lock/unlock the toggle key state or display a menu for selecting among various items.

These non-graphic toggle keys shall follow the requirements in 7.1.2 and 7.1.3.

7.1.2 Location on the on-screen keyboard

All toggle keys shall be located at the bottom of the on-screen keyboard (row A of the on-screen keyboard) except the level 2 selection toggle key, as defined in ISO/IEC 9995-7:2009, Table 1, number 1 (ISO 7000-0251), which shall be located on row B, if display space constraints allow it.

7.1.3 Locking/unlocking toggle keys

a) A double tap shall activate and lock the toggle key for further text input or menu selection.

b) On more advanced devices, it should also be possible to activate and lock the toggle key with a long tap.

c) Double tap as well as long tap duration for locking toggle keys should be an adjustable setting to help people with various physical difficulties and help prevent unintentional activations by some specific users.

d) It shall be possible to unlock and deactivate the toggle key with a single tap on this toggle key.

7.2 Toggle key functionality

7.2.1 Level 2 selection toggle key

The level 2 selection toggle key, as defined in ISO/IEC 9995-7:2009, Table 1, number 1 (ISO 7000-0251), and shown in Figure 7, allows users to at least access level 2 characters of group 1 (default) available on the on-screen keyboard. It is optional with on-screen keyboards, depending on the languages and alphabets available in the on-screen keyboard.

a) When using Latin, Cyrillic or Greek alphabet-based on-screen keyboards, they shall provide access to the level 2 selection key in order to type capital letters.

b) When using Latin, Cyrillic or Greek alphabet-based on-screen keyboards, the location of the alphabetic keys on the on-screen keyboard shall not be changed when switching from level 1 to level 2 characters with the level 2 selection toggle key.

c) While using level 1 characters, a tap on the level 2 selection toggle key shall give access to level 2 set of characters only for the next keystroke, after which the on-screen keyboard automatically switches back to level 1 characters.

d) On more advanced devices that allow multipoint gesture detection, while using level 1 characters, it may be possible to activate and hold the level 2 selection toggle key while at the same time typing level 2 characters from the on-screen keyboard, using multiple point text entry. When the pressure on the level 2 selection toggle key is released, the on-screen keyboard automatically reverts to level 1 characters.

e) When using Latin, Cyrillic or Greek alphabet-based on-screen keyboards, the keyboard should automatically switch from level 1 characters to level 2 characters when the context of use requires the use a capital letter, and automatically switch back to level 1 characters after the input of the capital character.

EXAMPLE 1 When starting a new text message, the on-screen keyboard is automatically set to level 2 characters for the input of a starting capital letter. The on-screen keyboard automatically switches back to level 1 characters for the next keystrokes.

EXAMPLE 2 When the user inputs a "." (dot), the on-screen keyboard is automatically set to level 2 characters for the input of a capital letter beginning a new sentence. The on-screen keyboard automatically switches back to level 1 characters for the next keystrokes.

EXAMPLE 3 When the user inputs a "?" (question mark), the on-screen keyboard is automatically set to level 2 characters for the input of a capital letter beginning a new sentence. The on-screen keyboard automatically switches back to level 1 characters for the next keystrokes.

f) The user shall have the possibility to activate or deactivate automatic switching between level 1 and 2 of on-screen keyboard layouts in the device's user settings or by other means when such functionality is provided.

7.2.2 Group selection toggle key

The group selection toggle key, as defined in ISO/IEC 9995-7:2009, Table 1, number 7 (ISO 7000-0251), allows users to select additional sets of characters not necessarily needed for the typical user of a given human language.

a) The group selection toggle key, as defined in ISO/IEC 9995-7:2009, Table 1, number 7 (ISO 7000-0251), can be assimilated to the language select toggle key. A group selection toggle key or a language selection toggle key shall be provided. It may be used for other purposes than language selection, but not typically.

b) A single tap on the group selection toggle key shall activate and lock the next group of characters.

c) Another tap on the group selection toggle key shall activate and lock either the next available group of characters, or switch back to group 1 characters, if there are no more groups provided in the on-screen keyboard.

d) The level 2 selection toggle key should be used to provide an additional set of characters (level 2 additional characters of the selected active group of characters).

e) Characters available through the level 2 of additional groups of characters should not be required or commonly used in the chosen language because of the poor accessibility of this functionality.

7.2.3 Layout selection key

The layout selection key allows user to choose among various on-screen keyboard layouts, either selected or installed as their preferred or favourite layouts using the device's user settings or by other means.

a) Emoji keyboard layout should always be made available as an on-screen keyboard layout choice for the users, where appropriate.

b) The symbol used for representing the layout selection key shall always be the same amongst the different keyboard layouts.

c) The symbol used to represent the layout selection key should be culturally neutral and accessible, understandable and distinguishable from other keys by the user.

d) A single tap on the layout selection key shall activate the next keyboard layout as selected by the user using the device's user settings or by other means.

e) Successive taps on the layout selection key alternates between all the on-screen keyboard layouts selected by the user using the device's user settings or by other means.

f) When locked, the layout selection key shall activate an interface allowing the quick selection of the keyboard layout with the complete list of keyboard layouts selected by the user using the device's user settings or by other means.

g) Keyboard layouts shall be described and labelled using the language and alphabet for which they are intended.

h) Country flags should not be used to represent or describe a keyboard layout, which can be misleading.

7.2.4 Speech dictation toggle key

a) An on-screen keyboard should provide direct access to voice recognition and dictation functionalities as a specific toggle key on the on-screen keyboard, if such functionalities are available on the device.

b) The symbol used to represent the voice recognition and dictation functionalities toggle key should be culturally neutral and accessible, understandable and distinguishable from other keys by the user.

7.2.5 Keyboard deactivation toggle key

a) On-screen keyboards shall provide a deactivation toggle key that allows users to temporarily hide the keyboard to enlarge the display and have a better view of the on-screen content.

b) The keyboard shall be displayed again when the user taps or selects an area on the screen where text input is possible.

c) On-screen keyboards shall always display the keyboard deactivation toggle key whether the device is used in landscape or portrait orientation.

7.3 Toggle key status indication

a) Toggle keys shall always provide accurate indication of their current selection status to the user.

b) Level 2 selection toggle key symbol shape shall be modified, or its shade highlighted or reversed when activated by the user.

c) The group selection toggle key label shall indicate to the user, either by a short string of characters or by a symbol, what type of additional characters can be used by changing the current group to the next available one.

EXAMPLE 1 Label “123” can be used if the next group of characters provides access to numerical characters.

EXAMPLE 2 Label “ABC” can be used if the next group of characters provides access to Latin-alphabet characters.

EXAMPLE 3 Label “+=” can be used if the next group of characters provides access to symbols other than characters or digits.

8 Associated characters

8.1 General

a) The on-screen keyboard shall provide easy access to all of the associated characters required for typing in the language available in the system and selected by the user.

b) All of the associated characters listed in local or national keyboard standards or, if there are no such standards, commonly used in the country’s software and devices shall be provided by the on-screen keyboard to the user.

8.2 Access to associated characters

8.2.1 Access to associated characters with a selection box

When the user has enabled accessible input mode, or when the device is not able to detect long tap, a single tap on a character key with associated characters should display a new character selection box with the main character and all the available associated characters for this character shown on the screen for input.

8.2.2 Access to associated characters with a long tap

a) When the device is able to detect long taps, a long tap on a character key with available associated characters shall display an associated character selection box showing all possible associated characters, for selection by the user.

b) The long tap required to display the available associated characters should have a duration not less than 250 ms and not more than 750 ms should last longer than 500 ms.

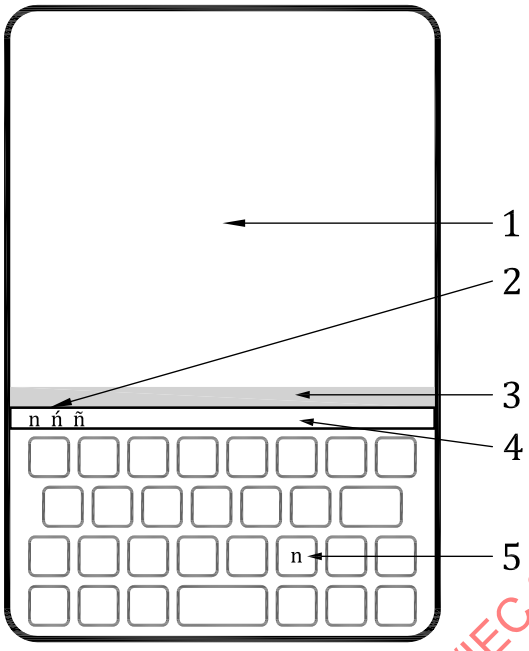
c) The duration of the long tap required to access associated characters should be adjustable by the user in the settings of the device.

8.3 Selection of associated characters

8.3.1 Selection of associated characters with accessible input mode enabled

a) The associated characters shall be displayed on a specific box within the display space of the on-screen keyboard (as shown in Figure 10).

NOTE Figure 10 shows a representation of a handheld device with an on-screen keyboard at the bottom of the device’s screen. The key ‘n’ has been activated by the user. At the top of the onscreen keyboard, there is a selection box where letter ‘n’ and its associated characters ‘ń‘ and ‘ñ’ are displayed, and ready to be selected by the user for text input. Right above this associated character selection box and below the screen, there is a predictions tab.



Key

1 screen
2 characters associated with character 'n'
3 predictions tab
4 selection box for associated characters
5 'n' key, pressed by the user

Figure 10 — Associated characters selection box

b) The user shall select the target associated character using a single tap on any of the associated characters displayed on the box.

c) The main character shall also be selectable in the associated characters box or window.

d) The associated character selection box should not hide on-screen keyboard keys, to avoid confusion or typing errors.

e) The associated character selection box should not hide text input point.

f) The associated character selection box should be located at the top of the on-screen keyboard.

g) If there is a predictions tab, the associated character selection box should be located just below it.

h) On more advanced devices, word predictions using associated characters may be shown to the user in the predictions tab, for easier typing.

8.3.2 Selection of associated characters with accessible input mode disabled

a) When the user presses the character key, the associated characters shall be displayed on a specific box or floating window (as shown in Figure 11) within the display space of the on-screen keyboard, as long as the user maintains the pressure on the character key.

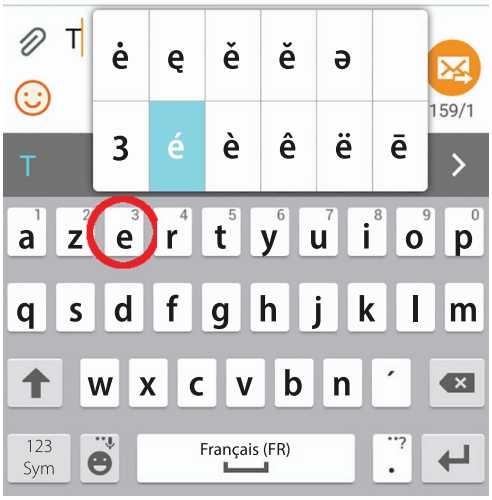


Figure 11 — Example of an associated character selection box

EXAMPLE The associated character selection box can be displayed as a floating window. Figure 10 shows a Latin-based on-screen keyboard with character key 'e' (located on row D) pressed. An associated character selection box appears as a floating window at the top of on-screen keyboard. The associated characters available for selection are all diacritic characters made with 'e' such as 'é', ê or 'ë', with the exception of character '3' used in the Cyrillic alphabet.

b) Alternately, when the user touches the character and immediately moves to any direction, then the associated characters shall be displayed in the same way as described in a).

c) The selection of the associated character shall be done by moving the point to the target associated character while maintaining the pressure on the touchpad, then on releasing the pressure on the target associated character.

d) When the key with associated characters is no longer selected (pressure released), the associated character box shall be closed.

e) The main character shall also be selectable in the associated characters box or window.

f) All the associated characters for a specific character (including the character itself) shall be displayed at once on the screen.

NOTE This makes it unnecessary for the user to scroll or use any more menus or other interface components to reach other associated characters.

8.4 Insertion of associated characters

a) When the user has selected one of the possible associated characters, that character shall be directly inserted into the text input field.

b) If no selection has been made, the character initially selected shall be inserted into the text input field.

9 Keyboard mode context dependency

9.1 General

a) On-screen keyboard software should be able to auto-detect the type of input required by a text field.

EXAMPLE 1 A ZIP code input box can only accept numbers.

EXAMPLE 2 A mail address input box does not accept spaces.

b) If the on-screen keyboard can auto-detect the type of input required by the selected input field, then it should limit the available characters proposed to the user to those required by this input field for accessibility reasons.

c) Different types of keyboard layouts optimized for speed of typing and accessibility should be provided to the user, depending on the type of input field.

9.2 Numeric input fields

a) When typing on a numeric input field such as a phone number or zip code input field, the on-screen keyboard should only provide access to the 0 to 9 numeric characters and to the -, +, *, (,) and # operator symbols.

b) When typing on a numeric input field, the layout used to display the numeric keyboard should conform to the "1-2-3" numeric keyboard layout as shown in Figure 12, which represents a standardized 1-2-3 numeric keyboard. On the top row (row D), there are 3 keys, from left to right: '1', '2', and '3'. On the second row (row C), the keys are '4', '5', '6'. On the third row (row B), the keys are '7', '8', '9'. On the bottom row (row A), the key is '0' and is located in the middle position.

NOTE The "1-2-3" numeric keyboard layout is documented in ISO/IEC 9995-4:2009, 8.1, ISO/IEC 9995-2 and ISO/IEC 9995-8.

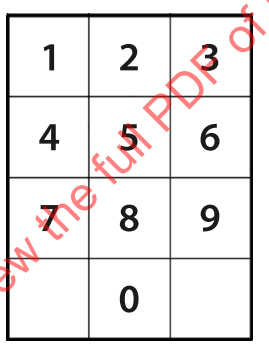


Figure 12 — 1-2-3 numeric keyboard layout as standardized in ISO/IEC 9995-4

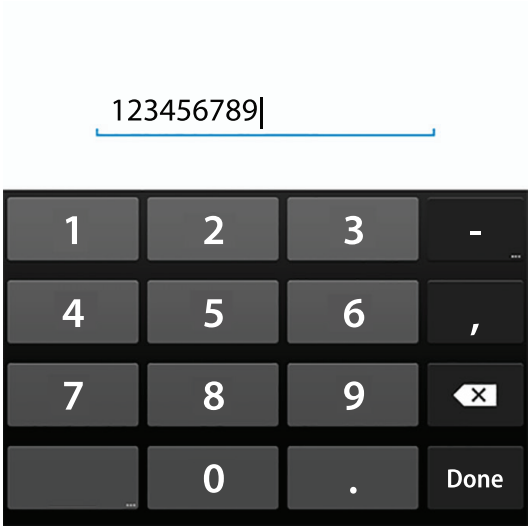


Figure 13 — Numeric input with a numeric on-screen keyboard layout on a handheld device

EXAMPLE 2 Figure 13 illustrates numeric input using a 1-2-3 type on-screen keyboard layout on a handheld device. On the top of the screenshot, a numeric input field is shown with numbers inserted. Under the input field, there is a 1-2-3 type on-screen numeric keyboard composed of the following keys: top row (D) keys are 1, 2, 3; row C keys are 4, 5, 6; row B keys are 7, 8, 9; bottom row (A) keys are space, 0, dot. Additional keys are added in a separate column, at the right of the numeric keyboard, and are displayed with a different colour, and provide the following keys: minus "-", comma, Backspace, Validation key.

c) Additional numeric keyboard layouts or sets of keys designed for numeric input may be provided to the user.

EXAMPLE 3 A "calculator" layout can be chosen by the user instead of the standard numeric keyboard.

9.3 Email address input fields

When typing on an email address input field, the on-screen keyboard should provide direct access to '@' and '.' symbols, besides alphanumeric characters.

9.4 URL/URI input fields

When typing on a uniform resource locator (URL) input field or on a uniform resource identifier (URI) input field, the on-screen keyboard should provide direct access to '/' and '.' symbols, besides alphanumeric characters.

9.5 Input fields with preselected values

a) Custom selection interfaces may be provided for completing fields with preselected values such as country, region, age, year, date, time, time zone.

b) Operation of custom selection interfaces for input fields with preselected values shall be accessible to all users including users with disabilities.

c) If operating time to select a custom value from a list of values is longer with the custom input field interface than it is with the standard text input interface, the standard interface should be used instead.

EXAMPLE 1 Having to scroll or navigate through a long list of years starting at 1900 up to 2017 can be longer and less accessible than to type in the selected year directly with a numeric on-screen keyboard.

EXAMPLE 2 Having to scroll or navigate through a list of 200+ countries can be longer and less accessible than to type in the selected country directly with an alphanumeric on-screen keyboard.

10 User customization and creation of new keyboards

10.1 Customization of the keyboard

a) The system shall enable the user to change from one on-screen keyboard layout to another.

b) The system should enable the user to customize on-screen keyboard layouts.

EXAMPLE Adding or removing keys, changing key placement, input methods to enter characters, combining keys together.

c) The system should enable the user to download and use their own images for personalization of the on-screen keyboard keys.

10.2 Switching between keyboards

The toggle key for switching from one layout to another shall always be visible, directly accessible and located at the same place on the on-screen keyboard user interface.

NOTE Non-written languages can be typed using specific phonetic keyboard layouts.

10.3 Loading, saving and sharing the keyboard layout

10.3.1 Modifying a keyboard layout

The user should have the possibility to edit and save the on-screen keyboard layouts and then choose them for later use.

10.3.2 Loading a stored keyboard layout

It should be possible to load an on-screen keyboard layout stored locally and select it as the active on-screen keyboard layout using one of the toggle keys provided by the on-screen keyboard.

10.3.3 Adding a new keyboard layout

It should be possible to add new on-screen keyboard layouts from remote locations and servers, either by downloading it directly or by using mobile applications or any other software (remote storage, email, etc.).

11 Activation/deactivation of on-screen keyboard

11.1 Manual activation/deactivation of on-screen keyboard

The on-screen keyboard should provide the possibility to activate (display) or deactivate (hide) the on-screen keyboard by means of the specific toggle key (11.3) or other system functions.

11.2 Automatic activation/deactivation of on-screen keyboard

11.2.1 Automatic activation

a) Automatic activation of the on-screen keyboard shall be activated by default.

b) The on-screen keyboard shall automatically be activated when the user clicks or selects a text input field unless a physical keyboard is connected or automatic activation of the on-screen keyboard is disabled.

c) The user interface shall provide a way to disable automatic activation of the on-screen keyboard. In this case, the on-screen keyboard does not activate when the user clicks or selects a text input field.

11.2.2 Automatic deactivation

a) The on-screen keyboard shall automatically be disabled when the user clicks or selects an element that does not allow any text input unless automatic deactivation of the on-screen keyboard is disabled.

b) The user interface of the on-screen keyboard shall provide a way to disable the automatic deactivation of the on-screen keyboard. In this case, the on-screen keyboard does not deactivate when the user clicks or selects an element that does not allow any text input.

11.2.3 Input fields with pre-selected values

Input fields containing pre-selected values that do not allow any text input, but only a choice between various options, should let the users activate the on-screen keyboard for accessibility reason.

NOTE Additional guidance on dealing with input fields accessibility can be found on ISO 9241-171 Ergonomics of human-system interaction — Part 171: Guidance on software accessibility.

EXAMPLE Country, region/state, age, year, date, time, time zone, etc.

11.3 Location of toggle key

a) The toggle key for activating/deactivating the on-screen keyboard should always be visible if display space constraints allow it.

b) The toggle key for activating/deactivating the on-screen keyboard shall always be located at the same location on the user interface.

12 Positioning and sizing

12.1 Positioning

a) On-screen keyboards should be displayed at the bottom of the active screen if the user cannot move them (fixed location).

b) On-screen keyboards should be movable across the screen when they are displayed in a floating window, in order to avoid hiding content or text input fields.

12.2 Sizing

12.2.1 Relative size of on-screen keyboards

On-screen keyboard height should not exceed 40 % of the screen area and not be under 20 % of the screen area when displayed on the working screen as shown in Figure 14.

EXAMPLE 1 Figure 14 shows an on-screen keyboard on a handheld device with a screen display size of about 60 %(A). On the bottom part of the screen, we can see a predictions tab (B) followed by an on-screen virtual keyboard with 4 rows of keys (C to F). This figure also indicates other display requirements from Clauses 6, 7 and 12.