# Rules for writing and using Braille
# in the Slovak Republic

*Writing signs and symbols in Braille in Slovak Basic texts*
*in six-dots uncontracted notation*

*On the basis of the decision taken by the Government of the Slovak Republic on the proposal of the Ministry of Culture of the Slovak Republic, the Braille Authority of Slovakia (SABP) was established in December 2020 in Matej Hrebenda's Slovak Library for the Blind in Levoča, in accordance with Recommendation No. 64 of the Concluding Recommendations of the UN Committee on the Rights of Persons with Disabilities.*

*This manual was created thanks to the support of the Ministry of Culture of the Slovak Republic, which proposed and supported the establishment of SABP as an institute creating standards for writing, printing and use of Braille and relief graphics in Slovakia.*

# 1 Foreword

***This edition of an electronic English guidelines of Slovak braille alphabet has been translated using automatic translating tools. May the reader have any doubt about correct usage of braille in Slovakia, do not hesitate to contact the Braille Authority of Slovakia at [sabp@skn.sk](mailto:sabp@skn.sk).***

Uniform Braille, or dot writing, is an essential means of communicating with each other in writing and clearly understanding text. In Slovakia, we have so far based the writing and printing of dots on the 1996 Rules of Slovak Braille, which were developed at the Union of the Blind and Partially Sighted of

Slovakia on the basis of the conclusions of a meeting of representatives of institutions dedicated to people with visual impairments. Over the following years, the need to redefine some of the characters, to implement them in braille on braille displays in computers, and also to improve the rules of Braille usage rules in general, especially in the areas of professional texts and the use of braille in the digital environment, became more and more frequent.

Also in the field of relief graphics and graphic design of texts it is necessary to adopt nationally binding rules, since in Slovakia we have so far published only one material on graphic design of texts in Braille font. This document, entitled Rules for the writing and graphic editing of texts in dot type, is an internal material of the Slovak Library for the Blind in Levoča, which was drawn up in 2001. Also in this area it is necessary to be inspired by manuals and materials that have been and are still being developed abroad on the basis of research on tactile orientation in text and pictorial materials.

**This manual is based primarily on the rules currently in force in Slovakia and also on internationally approved and used codifications, in particular:**

- Rules of Slovak Braille from 1996;

- Manual for transcribing Print Texts into Braille (Teiresiás - Masaryk University Centre for Assistance to Students with Special Needs);

- Unified English Braille (UEB);

- Nemeth Braille Code.

**This part of the codification contains the rules for writing Braille in Slovak non-technical texts and basic professional writings in the following fields:**

- Slovak alphabet with all letters with diacritics;

- foreign language letters from the alphabets of other nations in Europe using the Latin alphabet;

- Greek alphabet;

- punctuation marks;

- symbols of currency;

- numbers, basic mathematical symbols and operations.

## 2 The Braille Authority of Slovakia

On the basis of the decision of the Government of the Slovak Republic on the proposal of the Ministry of Culture of the Slovak Republic, the Braille Authority of Slovakia (SABP) was established in December 2020 at Matej Hrebenda's Slovak Library for the Blind in Levoča, in accordance with Recommendation No. 64 of the Concluding Recommendations of the UN Committee on the Rights of Persons with Disabilities. The aim of the SABP was and is the creation of comprehensive standards for the creation and use of Braille and relief graphics in Slovakia, as well as the enhancement of the use of Braille and its promotion. SABP's advisory body is the SABP Council, whose members are representatives of partner organisations involved in providing support, teaching or rehabilitation for people with visual impairments. Further information about SABP and its activities can be found on the SABP and Slovak Library for the Blind websites.

## 3 History of writing for the blind

As the first record of an educated blind man, the name of St. Didymus, who lived in the 4th century, appears in literature. In world literature we subsequently encounter blind educated men in Roman literature. Cicero, in his collection Disputationum Tusculanarum, gave the names of several blind scholars: Democritus, Appius Claudius, Aufidius, Diodotus. The blind scholars of the time, like many other scholars, certainly used the help of tutors and scribes in transmitting their knowledge.

The first documented attempts to develop a reading script for the blind date from the fourteenth century. At that time, a blind professor at the University of Iraq, Zayn al-Din 'Ali ibn Ahmad al-Amidi, used a special kind of raised letters written with scraps. This system helped him to recognize the titles and ranges of his rich collection of books, and he was able to write dates and short notes with it. Blind lecturers also worked and worked in European universities, and their activities certainly stimulated the search for a means of recording and transmitting information in writing.

The need for the accessibility of writing for the blind was accentuated with the advent of the printing of books, which, after the invention of letterpress printing, were easily disseminated within the sighted population. Francesco Lucas of Zaragoza (1517) introduced the idea of engraving the letters of the alphabet on wooden tablets in various variations. Erasmus of Rotterdam (1528) introduced a different concept of engraving letters on hard material such as ivory or metal plates. In 1651, the German Harsdorffer developed wax tablets for engraving letters, based on Quintilian's Tabella. In this way, the letters of the Latin alphabet could be written down and subsequently read. However, this system did not meet the needs of writing and reading for the blind; in particular, it was not efficient or fast enough. Engraving the shape of the letters or extruding them is technically difficult, and writing them out is cumbersome, slow and complicated.

An interesting proposal was that of relief writing by the Italian Jesuit monk Francesco Lana de Terzi, who in 1670 proposed a way of writing using dots and lines intersecting at right angles. It was a combination of relief dots and two to four lines geometrically separating the dots to form the letters of the Latin alphabet. It was a system that can already be considered as the beginnings of an elaborate systematic notation of tactile writing. The use of pegs with headers was moved from dots and lines to the use of pegs with heads. Nicholas Saunderson, a mathematician and physicist, professor at Cambridge University, was able to solve complex mathematical problems on such tables, could write down expressions and correct any errors that were noted. Blind people have mastered the techniques of recording information. Most of them, however, used sign symbols. Only a few had mastered the Latin alphabet and used it. The teaching of the blind was by no means organized in a specialized institution.

Significant changes in this area occurred in the eighteenth century. Emerging new trends and theories about education became the cause of the search for methods of educating the blind. The pioneer was the Frenchman Valentin Haüy (1745-1822), a man of great social sensitivity. After

successful attempts to teach the blind beggar Francois Leseur, he founded the first school for the blind in 1784. Haüy had many followers. More schools educating blind students were created - facilities in England, in many European capitals, and also across the Atlantic. However, all the schools faced the same problem - the writing system used until then had not been translated into an effective and quickly usable system adapted for tactile use. During this period, artillery captain Charles Barbier developed a military cipher that could be read by touch even in the dark. Like Francesco Lana of Terzi in the previous century, Barbier introduced the convex point to encode letters. The basis of this Barbier script is a vertical rectangle consisting of two hexagonal points. The letters and sounds of the French language are phonetically encoded in this system as single letters or phonetic groups. After devising a suitable way of writing the dots on paper, Barbier introduced this script to the Haüy school. After learning his script, students could easily write, do schoolwork, take notes, and read them quickly. However, the phonetic way of writing made it impossible to use spelling, and punctuation marks and numbers were absent.

Louis Braille (1809 - 1852) entered the school founded by Valentin Haüy, later called the National Institute for Young Blinds, in 1819 at the age of ten to learn how to read and write from patterns made by Haüy and Barbier respectively. In 1824, Braille presented Captain Barbier with his plan to reform his system of dot writing, but it was not received with understanding. The young Louis, only 15 years old, altered Barbier's original typeface, modifying a single character into six dots arranged vertically in two rows of three dots each, thus creating a six-dot system that provides the possibility of 64 combinations of dots arranged in relation to each other.

Using the young Louis Braille's new invention was not as straightforward as it might seem. Although it quickly gained popularity among the students at the school, his writing was not received with understanding within the teaching staff and especially by the director of the institute. Many of Louis's bloodily transcribed materials were lost and destroyed during the holidays. However, through his unwavering advocacy of the dot writing and the system he devised, as well as his demonstration of reading and writing in Braille, he eventually convinced influential people until he eventually became a teacher at the institute where he himself had graduated.

The new script did not find immediate application in Europe. The first draft of Braille was published in 1829 as a 32-page booklet entitled "A Method of Writing Words, Notes, and Temple Hymns by Means of Points for the Use of the Blind", for which it was created by Louis Braille, the accompanist of the

Institut royale des jeunes aveugles (Institut royale des jeunes aveugles, still the Institut national des jeunes aveugles) in Paris. In the booklet, Braille presents an alphabet consisting of 9 groups of 10 characters and 6 additional characters. In 1835, Braille publishes a booklet in which he adds today's punctuation and the basics of modern notation. Thanks to Dr. Pignier, Braille began to be used in the National Institute in 1830. In 1837, a three-volume History of France was published, printed in this typeface. The director of the Institute, Gaudet, was fully responsible for the application of the typeface not only in France but also abroad.

From France, Braille began to spread only after 1850. In Denmark and Sweden, it was introduced in 1860, and in England, the credit for its spread goes to Dr. Armitage, a blinded physician, in 1870. In 1873 the script was introduced in the Hradec Králové Institute in Prague by the Germans. The Czech adaptation of the Braille alphabet still in use today was created by Malý, a teacher from the Klár Institute in Prague. In Hungary, the script was not introduced until 1893, and the first Slovak textbooks printed in Braille were not published until after 1923, during the First Czechoslovak Republic. From the point of view of the whole of Europe and the world, the year 1878 is significant for Braille, when the Congress for the Advancement of the Blind and Deaf-Blind met in Paris, rejecting all other proposals for blindness and advocating the introduction of Braille throughout the world. Braille has long since spread beyond Europe, having been known in China and India more than 100 years ago. Dot alphabets have been created not only in all the world's languages, but also in the languages of smaller nations, nationalities and ethnic groups, such as Welsh, Amharic, Malay, Thai, Hindi and others.

Today, Braille is the most widely used tool for writing and reading text. It is a carrier of literacy for blind people, contributing significantly to accessibility to information and thus to social integration. Even nowadays, when much information can be accessed through computers with voice output, Braille remains an integral part of blind people's lives.

**Further information about the history of tactile writing can be found in publications and on websites:**

- Josef Smýkal: A look into the history of blind writing. Brno, 1994.
  https://smykal.ecn.cz/publikace/kniha08t.htm

- Union of the Blind and Partially Sighted of Slovakia. History of Braille. https://unss.sk/historia-

braillovho-pisma/

- Duxbury Systems. <u>History of Braille and the Early Education of</u> the Blind. https://www.duxburysystems.com/braille_history.asp

# 4 Basic information about Braille and its Slovak codification

Braille, which is used to print and write text for people with visual impairments, is made up of characters, cells, which can be made up of six or eight dots. This part of the codification deals with the six-point braille notation. The basis of six-point Braille is a six-point cell consisting of a matrix with six positions of dots arranged in three rows and two columns. The positions in the left-hand column are numbered from top to bottom with the numbers 1, 2 and 3. The positions in the right-hand column are numbered from top to bottom 4, 5 and 6. Each position can contain a maximum of one embossing point, thus creating 64 six-point braille cells, characters (including spaces). The points in a braille cell are identified by the position numbers in which they are located. Individual symbols are formed by one or more braille cells in six-point braille. For multi-cell symbols, the meaning of the symbol is determined by reading the cells sequentially from left to right.

Throughout the codification of Braille in Slovak notation, we rely on Unicode characters, which are also represented by a numeric Unicode position in hexadecimal form. In addition to the Unicode symbol itself, we will include the verbal name of the symbol in the manual and symbol tables to ensure unambiguous identification of the symbol.

Tables with symbols and their braille notations will also always contain a sequence of braille dots in a cell or a sequence of dots in multiple cells. The designation of such a sequence will always begin with a lowercase letter b followed by a numeric sequence indicating the positions of the points in the cell. Thus, the sequence b1 represents a cell with an embossing point in the first position ( ⠁ ), and the sequence b1245 represents a cell with embossing points in positions 1, 2, 4, and 5 (⠛). An empty braille cell ( b0) represents a space. For characters consisting of multiple cells, the cells in the sequence will be separated by a comma, for example, the number 3 as b3456,14 (⠼⠉).

As graphical representations of braille cells in the manual we use Unicode characters, which are representations of sixty-four or two hundred and fifty-six braille cells and are found in the Unicode character table at positions U+2800 to U+28FF. These are Unicode characters that may not display correctly in text editors using encodings other than Unicode. In text editors that do display Unicode characters, these symbols, single braille cells, can also be typed from the computer keyboard using a combination of the alt key and a number combination on the numeric keypad. All numeric combinations for writing braille cells from the keyboard can be found on the website of the Braille Authority of Slovakia. To make it easier to identify which embossing point is actually graphically displayed for a given symbol, we use the b123456 (⠿) cell immediately before its braille cell, but this is for orientation only and is no longer used before individual letters or symbols in normal text unless it is in another function described in the codification.

In the text of this manual, i.e. in the textual descriptions of the symbols, we will refer to the symbol in parentheses, first its graphical representation and then its numerical description of the dots in the braille cell(s), e.g. the character for the capital letter ( ⠠ b6).

## 4.1 Technical parameters of points and their dimensions in Braille notation

In setting standards for the production, i.e. writing and printing, of Braille, we have based our work on the standards used in English Unified Braille (EUB), which are based on the standard (ISO17049). At the same time, these standards meet pharmaceutical standards for printing Braille on pharmacological products (The Marburg Medium Braille Specification).

**We recommend the use of Braille with dimensions:**

- distance between vertices of points in one braille cell (both vertically and horizontally, e.g. between points b1 and b2 or points b1 and b4) = 2,50 mm;

- distance between the vertices of two equal points of two consecutive cells (for example, between point b1 of the first cell and point b1 of the second cell) = 6.00 mm;

- distance between the vertices of the same points of two cells in a row with a space between them = 12.00 mm;

- the distance between the vertices of the same points of the two cells exactly below each other (for example, between the point b1 of the cell in the first row and the point b1 of the cell in the second row directly below the first one), i.e., line = 10.00 mm;

- point height = 0,5 ± 0,1 mm;

- dimension of the base of the point (point thickness) = 1,5 ± 0,25 mm.

These dimensions are always measured from the centre of the point, i.e. its vertex.

The height of the dot and the size of the base of the dot are given in these standards with a possible tolerance, as these parameters depend on the thickness and quality of the paper on which the dots are to be embossed.

Printing on cardboard packaging for products such as pharmaceuticals and pharmacological products usually has a smaller dot height for technical reasons, but in the case of printing on cardboard packaging a dot height of less than 0,5 mm or 0,4 mm, but not less than 0,2 mm, is permissible.

These dimensions are the recommended standards primarily for printing and writing braille on paper; other dimensions may be used for computer writing or braille displays.

Micro-Braille, a dot font with smaller dot sizes and smaller spacing, is used primarily in Japan, but even there it is slowly being replaced by standard Braille with globally accepted standards. Micro-Braille has not been evaluated as well readable for the blind and its use is not recommended in Slovakia.

For the purpose of teaching point writing or for printing text for people with sight loss at a later age, Braille notation can resort to double line printing or an enlarged version of Braille, the so-called Jumbo Braille.

Double line printing is a form of printing in which one line is omitted after each line typed. In

standard printed texts, such as books, magazines or calendars, lines are not omitted, i.e. it is normal dense printing. However, a person with a poorly trained sense of touch may not be able to distinguish the individual braille cells and the spaces between them well enough, and may not be able to trace the line well enough. In order to make line movement more straightforward, blank lines between the described lines ensure that the line being read is alone, thus avoiding confusion with other lines.

Jumbo Braille, or enlarged Braille, is for people with reduced sensitivity in the bellies of their fingers. It is printed using the same combinations as braille, the same size of individual dots, only the distances between dots in a cell are enlarged, and also the distances between individual braille cells, usually by 25%. Writing aids, whiteboards and mechanical typewriters and printers are also adapted for writing Jumbo Braille. In the absence of such devices in Slovakia, the printing of Braille for teaching purposes is mainly based on double line printing.

# 5 Basic Slovak alphabet

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| **a** | lower a | b1 | ⠁ | U+0061 |
| **á** | lower a with acute | b16 | ⠡ | U+00E1 |
| **ä** | lower a with diaeresis | b4 | ⠈ | U+00E4 |
| **b** | lower b | b12 | ⠃ | U+0062 |
| **c** | lower c | b14 | ⠉ | U+0063 |
| **č** | lower c with caron | b146 | ⠩ | U+010D |
| **d** | lower d | b145 | ⠙ | U+0064 |
| **ď** | lower d with caron | b1456 | ⠹ | U+010F |
| **dz** | lower dz | b145,1356 | ⠙⠵ | double sign |
| **dž** | lower d z with caron | b145,2346 | ⠙⠮ | double sign |
| **e** | lower e | b15 | ⠑ | U+0065 |
| **é** | lower e with acute | b345 | ⠬ | U+00E9 |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| f | lower f | b124 | | U+0066 |
| g | lower g | b1245 | | U+0067 |
| h | lower h | b125 | | U+0068 |
| ch | lower ch | b14,125 | | double sign |
| i | lower i | b24 | | U+0069 |
| í | lower i with acute | b34 | | U+00ED |
| j | lower j | b245 | | U+006A |
| k | lower k | b13 | | U+006B |
| l | lower l | b123 | | U+006C |
| ĺ | lower l with acute | b46 | | U+013A |
| ľ | lower l with caron | b456 | | U+013E |
| m | lower m | b134 | | U+006D |
| n | lower n | b1345 | | U+006E |
| ň | lower n with caron | b1246 | | U+0148 |
| o | lower o | b135 | | U+006F |
| ó | lower o with acute | b246 | | U+00F3 |
| ô | lower o with circumflex | b23456 | | U+00F4 |
| p | lower p | b1234 | | U+0070 |
| q | lower q | b12345 | | U+0071 |
| r | lower r | b1235 | | U+0072 |
| ŕ | lower r with acute | b12356 | | U+0155 |
| s | lower s | b234 | | U+0073 |
| š | lower s with caron | b156 | | U+0161 |
| t | lower t | b2345 | | U+0074 |
| ť | lower t with caron | b1256 | | U+0165 |
| u | lower u | b136 | | U+0075 |
| ú | lower u with acute | b346 | | U+00FA |
| v | lower v | b1236 | | U+0076 |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| **w** | lower w | b2456 | ⠺ | U+0077 |
| **x** | lower x | b1346 | ⠭ | U+0078 |
| **y** | lower y | b13456 | ⠽ | U+0079 |
| **ý** | lower y with acute | b12346 | ⠾ | U+00FD |
| **z** | lower z | b1356 | ⠵ | U+007A |
| **ž** | lower z with caron | b2346 | ⠮ | U+017E |

# 6 Punctuation marks and other symbols

Punctuation marks are generally written as instandard print, as they appear before or after a word, with or without spaces. In this respect, the rules and codification of the Slovak language must be observed. However, with regard to some signs, it is necessary to draw attention to some specific features resulting from the adaptation to Braille.

Quotation marks are written with the same symbol (⠶ b2356) for both lower and upper quotation marks. Similarly, the lower and upper single quotation marks have the same symbol (⠄ b3).

The hyphen, dash and long dash are written with the same symbol (⠤ b36) and must be spaced depending on whether the hyphen or dash is hyphenated.

For some punctuation marks, their combination of dots in a cell is the same as that of other symbols used in professional notation. In this case, they are distinguished in meaning. In the case of a literary text, the use of a cell (⠲ b235) is more related in meaning than an exclamation mark. However, in such a text, if we want to write the plus sign (+) explicitly, and it is not entirely clear that the reader can safely distinguish that it is a plus sign in meaning, its other meaning is indicated by the symbol (⠰ b56) immediately preceding it.

**Characters with possible contextually different meanings:**

- exclamation mark (!) and plus (+) (⠖ b235);

- quotes ("" or ") and equals (=) (⠶ b2356);

- single quotation marks (''), apostrophe (') and mathematical times (×) (⠄ b3);

- colon (:) and divided (÷) (⠒ b25);

- hyphen, hyphen, long dash (- - -) and minus (-) (⠤ b36);

- lower e with acute (é) and greater than (>) (⠦ b345).

## 6.1 Punctuation marks

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| , | comma | b2 | ⠀⠄ | U+002C |
| ; | semicolon | b23 | ⠀⠆ | U+003B |
| : | colon | b25 | ⠀⠒ | U+003A |
| . | period | b256 | ⠀⠲ | U+002E |
| ... | three dots (ellipsis) | b256,256,256 | ⠀⠲⠲⠲ | U+2026 |
| ? | question mark | b26 | ⠀⠢ | U+003F |
| ! | exclamation mark | b235 | ⠀⠖ | U+0021 |
| " | Quotation marks | b2356 | ⠀⠶ | U+0022 |
| „" | lower and upper quotation marks | b2356 | ⠀⠶ | U+201E U+201C |
| ' ' | lower and upper single quotation marks | b3 | ⠀⠄ | U+201A U+2018 |
| - | hyphen | b36 | ⠀⠤ | U+002D |
| – | dash (always written with spaces) | b36 | ⠀⠤ | U+2013 |
| — | long dash | b36 | ⠀⠤ | U+2014 |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| ' | apostrophe | b3 | ⠄ | U+0027 |
| ( | left parenthesis | b236 | ⠰ | U+0028 |
| ) | right parenthesis | b356 | ⠪ | U+0029 |
| [ | left square bracket | b6,236 | ⠠⠲ | U+005B |
| ] | right square bracket | b6,356 | ⠠⠪ | U+005D |
| { | left brace | b5,236 | ⠐⠲ | U+007B |
| } | right brace | b5,356 | ⠐⠪ | U+007D |
| 〈 | left angle bracket | b5,126 | ⠐⠳ | U+3008 |
| 〉 | right angle bracket | b5,345 | ⠐⠊ | U+3009 |
| / | slash | b12456 | ⠻ | U+002F |

## 6.2 Mathematical symbols often used in literary texts

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| * | asterisk | b35 | ⠔ | U+002A |
| + | plus | b235 | ⠖ | U+002B |
| - | minus | b36 | ⠤ | U+2212 |
| ± | plus-minus | b235,36 | ⠖⠤ | U+00B1 |
| < | less than | b126 | ⠣ | U+003C |
| > | greater than | b345 | ⠜ | U+003E |
| = | equals | b2356 | ⠶ | U+003D |

## 6.3 Other symbols

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| % | Percent | b3456,1234 | ⠼⠏ | U+0025 |
| ‰ | promile | b3456,1235 | ⠼⠗ | U+2030 |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| ∅ | average or empty set | b3456,13456 | ⠿⠨⠿ | U+2205 |
| ° | degrees | b3456,234 | ⠿⠨⠩ | U+00B0 |
| ℃ | degree Celsius | b3456,234,6,14 | ⠿⠨⠩ ⠠⠉ | U+2103 |
| ℉ | degree Fahrenheit | b3456,234,6,124 | ⠿⠨⠩ ⠠⠋ | U+2109 |
| ′ | prime, angular minute | b34,2 | ⠿⠈⠄ | U+2032 |
| ″ | double prime, angular second | b34,2,2 | ⠿⠈⠄⠄ | U+2033 |
| & | ampersand | b3456,12346 | ⠿⠨⠯ | U+0026 |
| @ | at | b3456,12456 | ⠿⠨⠽ | U+0040 |
| \ | backslash | b3456,1256 | ⠿⠨⠳ | U+005C |

The symbols for percent % (⠨⠴⠯ b3456,1234), per mille ‰ (⠨⠴⠽ b3456,1235), and average ∅ (⠨⠴⠿ b3456,13456) are used only in conjunction with the number from which they are separated by a space. This is because these symbols replace full-meaning words that are written with spaces. If numerals are not used in the context of a sentence, they are replaced by a word.

The symbols ℃ - degrees Celsius (⠨⠩ ⠠⠉ b3456,234,6,14) and ℉ - degrees Fahrenheit (⠨⠩ ⠠⠋ b3456,234,6,124) are always written with a space in front of the symbol. They are not written together with a number.

The degree symbols ° (⠨⠩ b3456,234), angular minute ′ (⠈⠄ b34,2) and angular second ″ (⠈⠄⠄ b34,2,2) are written without a space in front of the symbol, i.e. together with the number to which they belong.

# 7 Prefixes

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| ⠠ | prefix for one capital letter | b6 | ⠿ ⠠ | U+2820 |
| ⠠ ⠠ | prefix for a string of capital letters | b6,6 | ⠿ ⠠ ⠠ | U+2820 U+2820 |
| ⠰ | termination of the current prefix | b56 | ⠿ ⠰ | U+2830 |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| ⠐ | continuation indicator on new line | b5 | ⠿ ⠐ | U+2810 |
| ⠘ | prefix for one lower case Greek letter | b45 | ⠿ ⠘ | U+2818 |
| ⠠ ⠘ | prefix for one capital Greek letter | b6,45 | ⠿ ⠠ ⠘ | U+2820 U+2818 |
| ⠠ ⠠ ⠘ | prefix for a string of capital Greek letters | b6,6,45 | ⠿ ⠠ ⠠ ⠘ | U+2820 U+2820 U+2818 |
| ⠼ | prefix for a number/string of numbers | b3456 | ⠿ ⠼ | U+283C |
| ⠿ | six-dots Braille cell | b123456 | ⠿ ⠿ | U+283F |

In the case of these prefixes, they are graphical representations of braille cells that are followed by another character in the written text and together form a symbol or prefix an unbroken string of symbols - capital letters or numbers. In this guide, we have represented these braille cells as Unicode characters, which may not display correctly in text editors using a different character set.

In text editors that display Unicode characters, it is also possible to type these symbols, single braille cells, from the computer keyboard by combining the alt key and a number combination on the numeric keypad. All numeric combinations for writing braille cells from the keyboard are listed in the table on the SABP website. Below are the options for writing these special prefixes.

| symbol | configuration of points | Unicode position | shortcut for Windows | shortcut for Mac |
|---|---|---|---|---|
| ⠠ | b6 | U+2820 | Alt+10272 | Option+2820 |
| ⠰ | b56 | U+2830 | Alt+10288 | Option+2830 |
| ⠐ | b5 | U+2810 | Alt+10256 | Option+2810 |
| ⠘ | b45 | U+2818 | Alt+10264 | Option+2818 |
| ⠼ | b3456 | U+283C | Alt+10300 | Option+283C |
| ⠿ | b123456 | U+283F | Alt+10303 | Option+283F |

## 7.1 Prefix for one capital letter

The capital letter character ( ⠠ b6) is used to indicate a single capital letter and is followed by that letter. The capital letter D (U+0044) is made up of the uppercase letter sign ( ⠠ b6) and the lowercase letter d (⠙ b145) in Braille. The prefix always applies to only one immediately following letter.

## 7.2 Prefix for uppercase string

This is a two-cell prefix that enables uppercase mode, similar to Capslock. This prefix indicates that it is an unbroken string of consecutive uppercase letters. Capitalization mode allows letters of the Slovak alphabet, foreign-language letters with a prefix (⠿⠿⠄ b5), and a continuation indicator on a new line (⠿⠿⠄ b5 at the end of the line).

**The prefix is canceled by putting anything that doesn't fall within the allowed characters in uppercase mode, especially:**

- by ending the prefix ( ⠰ b56),

- punctuation,

- by another prefix,

- by the space.

The OSN (Slovak for UN) abbreviation, composed of the symbols of capital letters in Latin (U+004F, U+0053, U+004E), will thus be written as ( ⠠ ⠠⠭⠎⠝ b6,6,135,234,1345). For more concrete examples, see the subsection on Notation of strings formed by upper- and lower-case letters and alphanumeric strings.

## 7.3 Terminating the current prefix

The symbol ( ⠰ b56) terminates the prefix that was at the beginning of the current string to be continued without interruption, but without the given prefix (for more detailed examples, see the subsection Writing uppercase and lowercase strings and alphanumeric strings).

## 7.4 Prefix for a number or string of numbers

This prefix enables numeric mode. It is used to write numbers that are written as letters preceded by a number prefix or numeric character in the six-point Slovak Braille notation. The number prefix applies to a string of consecutive numbers until the string is broken.

**In numeric mode, the following characters are allowed:**

- lowercase letters a, b, c, d, e, f, g, h, i, j (with the number sign being the numbers 1 to 0);

- continuation indicator on new line (⠐ b5);

- punctuation marks: comma (, ⠠ b2), period (. ⠲ b256), hyphen (- ⠤ b36), apostrophe (' ⠄ b3), colon (: ⠒ b25), slash (/ ⠌ b12456), round brackets for periodic decimal numbers ( ( () ⠦ ⠴ b236 b356);

**The numeric string is broken by the inclusion of anything that is not listed in the allowed characters, in particular:**

- by the space,

- prefix for capital letters,

- any capital letter,

- lower case letters (except lower case a to j),

- by ending the current prefix ( ： b56).

In a professional scientific text, for example in mathematics, situations may arise where the rule of a particular expression notation may override the rule of a numeric character prefix notation, but such a situation must be specified in the Braille notation manual for technical texts.

## 7.5 String continuation indicator on new line

This indicator is used if the string we want to write as a single unit is longer than one line. If the string continues on a new line, the last character ( ⠄ b5) is placed at the end of the first line. It is not preceded or followed (at the beginning of the new line) by a space. Point 5 does not cancel the current prefix, so if it is a string of e.g. capital letters or numbers, the new line does not start with the prefix.

## 7.6 Prefixes for Greek letters

The prefix for a Greek letter (⠨ b45) is used as a prefix to indicate that the next character will be a letter of the Greek alphabet. The individual characters of the Greek alphabet are listed in the Greek Letters subsection of this manual. The character for a capital Greek letter (⠸⠨ b6,45) applies to the one immediately following letter. The prefix for all capital Greek letters (⠸⠸⠨ b6,6,45) prefixes a string of consecutive capital Greek letters. The same rules apply to this prefix as to the prefix for capital letters.

## 7.7 Six-dots braille cell and space

The six-dots braille character (⠿ b123456) is used more for graphical display in normal text. It can be used as an auxiliary basic braille character when we are introducing stand-alone characters where it is difficult to determine the position of a point (for example, ⠠ b5). When typing, it is also used as a way of crossing out an error. If a different contextual meaning is assigned to a full character, this must be stated in the Braille notation manual.

# 8 Writing numbers and strings with numbers and letters

The numbers 0 to 9 (symbols U+0030 to U+0039) are written as a numeric character (⠼ b3456) followed by a lowercase letter a to j, with 1 corresponding to a, 2 to b, 9 to i and 0 to j, as follows:

| | | |
|---|---|---|
| 1 ⠼⠁ | 2 ⠼⠃ | 3 ⠼⠉ |
| 4 ⠼⠙ | 5 ⠼⠑ | 6 ⠼⠋ |
| 7 ⠼⠛ | 8 ⠼⠓ | 9 ⠼⠊ |
| | 0 ⠼⠚ | |

## 8.1 Notation of numbers

*Integers*

Integers are written as an unbroken string, with a minus sign immediately preceding the numeric

character in the case of a negative integer. For more than three digits, the triplets may be separated by an apostrophe (⠄ b3).

**Examples:**

- number four hundred and twenty-five - 425 - (⠼⠙⠃⠑ b3456,145,12,15);

- Number twenty-four thousand one hundred and sixty-nine - 24169 or 24,169 - (⠼⠃⠙⠁⠋⠊ b3456,12,145,1,124,24 or ⠼⠃⠙⠄⠁⠋⠊ b3456,12,145,3,1,124,24);

- Number minus two hundred and sixty-nine - -269 - (⠠⠤⠼⠃⠋⠊ b36,3456,12,124,24).

## *Decimal numbers*

The symbol , (U+002C) is used as a decimal point when writing decimal numbers, which in Braille is written as (⠂ b2). It is written immediately after the integer and immediately before its decimal part. The prefix for the number is not canceled by this symbol; the number continues on without the prefix.

**For example:**

- Number three whole fourteen hundredths - 3,14 - (⠼⠉⠂⠁⠙ b3456,14,2,1,145);

- Number two thousand three hundred and fourteen whole fourteen hundredths - 2314.14 or 2,314.14 - (⠼⠃⠉⠁⠙⠂⠁⠙ b3456,12,14,1,145,2,1,145 or ⠼⠃⠄⠉⠁⠙⠂⠁⠙ b3456,12,3,14,1,145,2,1,145);

- Number ten whole fifty - 10.50 - (⠼⠁⠚⠂⠑⠚ b3456,1,245,2,15,245).

## *Periodical numbers*

The period in decimal numbers, which in blackletter is indicated by a long line above the digits that repeat indefinitely, is indicated in Braille by enclosing the period in round brackets.

**For example:**

- The number fifteen whole two hundred and sixteen thousandths with a period of two hundred and sixteen - 15,‾216‾ - (⠿ b3456,1,15,2,236,12,1,124,356).

## 8.2 Roman numerals

They are written in the same way as in ink-print, i.e. in capital letters:

- I – capital I - 1 - ( ⠠⠊ b6.24);

- V – capital V - 5 - ( ⠠⠧ b6,1236);

- X – capital X - 10 - ( ⠠⠭ b6,1346);

- L – capital L - 50 - ( ⠠⠇ b6,123);

- C – capital C - 100 - ( ⠠⠉ b6,14);

- D – capital D - 500 - ( ⠠⠙ b6,145);

- M – capiital M - 1000 - ( ⠠⠍ b6,134).

In the case of multiple letters immediately following each other, a prefix is used for all capital letters ( ⠠⠠ b6,6), for example:

- IX - 9 - ( ⠠⠠⠊⠭ b6,6,24,1346);

- CMXCIX - 999 - ( ⠠⠠⠉⠍⠭⠉⠊⠭ b6,6,14,134,1346,14,24,1346).

## 8.3 Time and date

The time and date may be entered in Braille as it appears in the black-print template, or all commonly used notation options may be used. The date can be written in numbers (1.1.2021, 01.01.2021, 1.1.2021), but also the month can be written in words (1 january 2021). Time can be written in numbers and also in physical quantities of time for hour, minute or second (8 h 15 min). The symbols dot . (U+002E) and colon : (U+003A) do not break the numeric string, and if written without spaces, we do not reenter the prefix for the number (⠼ b3456) immediately after them. In braille notation, however, it is preferable to use the date with spaces for clarity.

**Examples:**

- Date 21 1. 2021 (⠼⠃⠁ ⠲ ⠼⠁ ⠲ ⠼⠃⠚⠃⠁ b3456,12,1,256,0,3456,1,256,0,3456,12,245,12,1);

- date 21.1.2021 (⠼⠃⠁⠲⠁⠲⠃⠚⠃⠁ b3456,12,1,256,1,256,12,245,12,1);

- Time 8:00 (⠼⠓⠒⠚⠚ b3456,125,25,245,245);

- Time 8:00.50 (⠼⠓⠒⠚⠚⠲⠑⠚ b3456,125,25,245,256,15,245).

## 8.4 Recording scores

In ordinary texts where scores occur, such as sports scores, they are written as numerical data separated by spaces and a colon, where each number is preceded by a prefix for the number. It is also possible to write the score without spaces, with the prefix for the number then appearing only at the beginning of the string:

**Examples:**

- Score 2 : 3 (⠼⠃ ⠒ ⠼⠉ b3456,12,0,25,0,3456,14);

- score 2:3 (⠐⠩⠆ ⠉⠒ b3456,12,25,14).

## 8.5  Notation of numbering and marking

Chapter numbering or heading designations are written in the same way as normal numbers, using a prefix for numbers and the letters a to j. The period does not break the numeric string. In the case of nested numbering, the numbers are written immediately after the dot. Example: chapter 1.2.3 (⠰⠂ ⠒⠆ ⠒⠒ b3456,1,256,12,256,14).

## 8.6  Ordinal numbers

Ordinal numbers are written in the same way as in blackprint, i.e. a number with an immediately following dot and space.

**For example:**

- First 1. (⠰⠂ ⠲ b3456,1,256);

- Fifteenth: 15. (⠰⠂ ⠢⠲ b3456,1,15,256).

## 8.7  ZIP-code entry (postcode)

The postcode shall generally be entered in the same way as the black-print entry allows. The numbers in the ZIP code are either given together as 94901 (⠰⠔⠭⠔⠁ b3456,24,145,24,245,1) or with a space after the third digit as 949 01 (⠰⠔⠭⠀⠰⠁ b3456,24,145,24,0,3456,245,1). For official documents and economic correspondence, it is recommended to use the postal code with a space after the third digit and two spaces between the last digit and the delivery post (name of the municipality).

**Enrollment examples:**

- 94901 Nitra (⠼⠊⠙⠊⠚⠁ ⠠⠝⠊⠞⠗⠁);

- 054 01 Levoča (⠼⠚⠑⠙ ⠼⠚⠁ ⠠⠇⠑⠧⠕⠩⠁);

- SK-054 01 Levoča (⠠⠎⠠⠅⠤⠼⠚⠑⠙ ⠼⠚⠁ ⠠⠇⠑⠧⠕⠩⠁);

- DE-76227 Karlsruhe (⠠⠙⠠⠑⠤⠼⠛⠋⠃⠃⠛ ⠠⠅⠁⠗⠇⠎⠗⠥⠓⠑).

## 8.8  Entry of telephone numbers

Telephone numbers shall be written in all forms that are permitted in black-print. If the telephone number is written with spaces, each group of digits is preceded by a prefix for the numbers. In the case of notation with dots, dashes or when all numbers are written together, the prefix for the numbers is given only at the beginning of the number. The plus sign before the number in the international code is written with a space before and without a space after the sign.

**Examples:**

- 0532451001 (⠼⠚⠑⠉⠃⠙⠑⠁⠚⠚⠁);

- 053 2451 001 (⠼⠚⠑⠉ ⠼⠃⠙⠑⠁ ⠼⠚⠚⠁);

- 053.2451.001 (⠼⠚⠑⠉⠲⠃⠙⠑⠁⠲⠚⠚⠁);

- +421532451001 (⠲ ⠼⠙⠃⠁⠑⠉⠃⠙⠑⠁⠚⠚⠁);

- 053-2451-001 (⠼⠚⠑⠉⠤⠃⠙⠑⠁⠤⠚⠚⠁).

## 8.9    Splitting digits in a long number

When writing longer numbers, the three digits can be separated by a dot as in blackletter, but in this case the dot is written as an apostrophe (⠄ b3). The prefix for numbers is not cancelled by this symbol; the number continues without the prefix.

**For example:**

- 1,400 - one thousand four hundred - (⠼⠁⠄⠉⠼⠙⠼⠼ b3456,1,3,145,245);

- 320,400 - three hundred and twenty-four thousand four hundred (⠼⠉⠃⠙⠄⠉⠙⠚⠚ b3456,14,12,245,3,145,245).

## 8.10  Numerical series

It shall be written down as in blackletter. Individual numbers are written with a prefix for the number, separated by commas and spaces.

**For example:**

- 3, 6, 9, 12, … (⠼⠉⠄ ⠼⠋⠄ ⠼⠊⠄ ⠼⠁⠃⠄ ⠄⠄⠄ b3456,14,2 b3456,124,2 b3456,24,2 b3456,1,12,2 b256,256,256).

# 9  Notation of strings made up of lower and upper case letters and alphanumeric strings

If we want to write a string of consecutive symbols, alternating upper and lower case letters, or numbers and letters, we need to follow all the rules of writing with prefixes. Each prefix valid for a string

of consecutive symbols must be followed consistently and, if necessary, terminated with the prefix termination symbol ( : b56) before continuing with the other symbols. The prefixes valid for the following symbol string are the all-caps prefix and the numbers prefix.

A prefix for capital letters ( ⠠ b6,6) is terminated by a space, another prefix or prefix termination ( : b56), and also by a punctuation mark.

A number prefix (⠼ b3456) terminates a space, another prefix, a terminating prefix ( : b56), and any lowercase letter without a prefix, except a through j. A number prefix does not terminate every punctuation mark; marks such as comma, period, colon, and slash do not terminate numeric mode. See the chapter Prefixes for more detailed rules for writing a prefix for numbers, and thus for writing in numeric mode.

When writing symbols that are normally written with spaces, such as % ( ⠼⠬ b3456,1234) or euro € ( ⠈⠑ b4,15), spaces do not need to be included in a numeric string or alphanumeric string.

**Examples:**

*Academic titles:*

- Mgr. ( ⠠⠍⠛⠗⠲ b6,134,1245,1235,256);

- PhDr. ( ⠠⠏⠓⠠⠙⠗⠲ b6,1234,125,6,145,1235,256);

- JUDr. ( ⠠⠠⠚⠥⠠⠙⠗⠲ b6,6,245,136,145,56,1235,256);

*Address details (e.g. house number, entrance):*

- Seventy-five slash five - 75/5 - (⠼⠛⠑⠌⠑ b3456,1245,15,12456,15);

- Seventy-five slash capital e - 75/E - (⠼⠛⠑⠌ ⠠⠑ b3456,1245,15,12456,6,15);

- Seventy-five slash lower e - 75/e - (⠼⠛⠑⠌ ⠰⠑ b3456,1245,15,12456,56,15);

***A number with a corresponding quantity or mathematical character symbol:***

- Twenty-four point five percent - 24.5% - (⠿ b3456,12,145,2,15,0,3456,1234);

- Thirty-six point five degrees Celsius - 36.5℃ - (⠿ b3456,14,124,2,15,0,3456,234,6,14);

***Arbitrary strings of letters, numbers, and punctuation marks (for example, promo codes, SMS codes, passwords, and so on):***

- ADAM.EVA ( ⠿ b6,6,1,145,134,256,6,15,1236,1);

- ADAM.eva ( ⠿ b6,6,1,145,1,134,256,15,1236,1);

- 23x12 (⠿ b3456,12,14,1346,3456,1,12);

- 23xa2 (⠿ b3456,12,14,1346,1,3456,12);

- 23a2 (⠿ b3456,12,14,56,1,3456,12);

- 23ab (⠿ b3456,12,14,56,1,12);

- 23axb2b23 (⠿ b3456,12,14,56,1,1346,12,3456,12,56,12,3456,12,14);

- 23aXb2b23 (⠿ b3456,12,14,56,1,6,1346,12,3456,12,56,12,3456,12,14);

- 2b%ab12.1 (⠿ b3456,12,56,12,3456,1234,1,12,3456,1,12,256,1).

## 10 Symbols for text completion

In some types of texts, such as texts to be filled / corrected, a blank space within the text must be provided and marked in which letters, numbers or words must be entered. It is appropriate to indicate

these spaces in a dotted font in a way other than by a space. For this purpose, a visible space character (⠿ ⠄⠄⠄ b5,5,5), a question mark (⠿⠂ b26), an underscore (⠿⠠⠄ b46,36), or a simple hyphen without spaces (⠿⠠⠄ b36) can be used.

**Examples:**

- Fill in the correct letter: Banská B?strica ( ⠨⠃ ⠈ ⠏⠎⠅⠁ ⠄⠄ ⠨⠃ ⠶⠦⠎⠞⠗⠊⠉⠁ );

- Spinning aid: k---vr--ok (⠅ ⠄⠄⠄⠈⠅⠒ ⠄⠄⠄⠕⠅ );

- Without   there are no cakes: Bez    nie sú koláče (� ⠴⠒ ⠄⠄⠄⠄ ⠏⠊⠑ ⠎⠬ ⠅ ⠕⠇ ⠷�⠉⠑).

# 11 Currency symbols and other special symbols used in texts

These are special symbols that may appear in non-technical and literary texts. They are written with an appropriate prefix that applies only to the immediately following braille cell and together, as a two-cell character, they represent the symbol. This symbol is written with a space before and after the symbol, unless it is a punctuation mark such as the inverted question mark ¿ ( ⠠⠢⠄ b46,35). If the nature of the text so requires, the symbol may be written without spaces if it cannot be confused with letters of the Slovak alphabet. If it is necessary to write without spaces but it is not clear that it is one of the special symbols, it is written with a prefix ( ⠸ b56). If the symbol is used in a number or an alphanumeric string, no spaces shall be written.

## 11.1 Selected special symbols

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|--------|--------------------|-------------------------|----------------------------|------------------|
| # | cross (hash) | b46,3456 | ⠿ ⠭⠭ | U+0023 |
| ^ | caret (circumflex) | b46,45 | ⠿ ⠐⠂ | U+005E |
| _ | The Underline | b46,36 | ⠿ ⠠⠄ | U+005F |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| ` | accent | b46,6 | ⠿ ⠒ ⠄ | U+0060 |
| ¡ | inverted exclamation mark | b46,235 | ⠿ ⠒⠢ | U+00A1 |
| ¿ | inverted question mark | b46,35 | ⠿ ⠒⠄ | U+00BF |
| \| | vertical bar | b46,456 | ⠿ ⠒ ⠸ | U+007C |
| ¦ | broken vertical bar | b46,46 | ⠿ ⠒ ⠐ | U+00A6 |
| § | paragraph | b46,346 | ⠿ ⠒⠬ | U+00A7 |
| © | copyright | b46,14 | ⠿ ⠒⠉ | U+00A9 |
| « | left double broken bracket | b46,236 | ⠿ ⠒⠦ | U+00AB |
| » | right double broken bracket | b46,356 | ⠿ ⠒⠴ | U+00BB |
| ® | Registered | b46,1235 | ⠿ ⠒⠗ | U+00AE |
| ¶ | paragraph designation (pilcrow) | b46,345 | ⠿ ⠒⠜ | U+00B6 |
| ™ | trademark | b46,2345 | ⠿ ⠒⠞ | U+2122 |
| ~ | tilde | b46,26 | ⠿ ⠒⠢ | U+007E |
| · | dot in the middle | b46,256 | ⠿ ⠒⠲ | U+00B7 |
| ♀ | female symbol (Venus) | b46,1346 | ⠿ ⠒⠭ | U+2640 |
| ♂ | male symbol (Mars) | b46,13456 | ⠿ ⠒⠽ | U+2642 |
| • | indent | b46,2356 | ⠿ ⠒⠶ | U+2022 |
| ½ | one half | b3456,1,23 | ⠼⠁ ⠒ | U+00BD |
| ⅓ | one third | b3456,1,25 | ⠼⠁ ⠢ | U+2153 |
| ¼ | one quarter | b3456,1,256 | ⠼⠁ ⠲ | U+00BC |
| ⅕ | one fifth | b3456,1,26 | ⠼⠁ ⠢ | U+2155 |
| ⅙ | one sixth | b3456,1,235 | ⠼⠁ ⠖ | U+2159 |
| ⅐ | one-seventh | b3456,1,2356 | ⠼⠁ ⠶ | U+2150 |
| ⅛ | one-eighth | b3456,1,236 | ⠼⠁ ⠦ | U+215B |
| ⅑ | one ninth | b3456,1,35 | ⠼⠁ ⠄ | U+2151 |
| ⅒ | one tenth | b3456,1,2,356 | ⠼⠁ ⠂⠴ | U+2152 |
| ⅔ | two thirds | b3456,12,25 | ⠼⠃ ⠢ | U+2154 |
| ¾ | three quarters | b3456,14,256 | ⠼⠉ ⠲ | U+00BE |

## 11.2  Currency symbols

When entering currencies, it is possible, as in black-print text, to use the letter abbreviation of the currency, for example EUR, USD, CZK, GBP, as well as their lowercase versions when indicating the price of the goods. Some selected, most commonly used currencies in Slovakia can also be written with the symbol specified in the Unicode character set for that currency.

When writing currency, we use the prefix ( ˙ b4). When writing currency in text, we write a space before and after the symbol.

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|--------|--------------------|-----------------------|--------------------------|------------------|
| € | euro | b4,15 | ⠀ ⠀ | U+20AC |
| ¢ | cent | b4,14 | ⠀ ⠀ | U+00A2 |
| ₣ | French franc | b4,124 | ⠀ ⠀ | U+20A3 |
| ₴ | Ukrainian Hryvnia | b4,125 | ⠀ ⠀ | U+20B4 |
| £ | British pound | b4,123 | ⠀ ⠀ | U+00A3 |
| ₤ | lira | b4,123,1235 | ⠀ ⠀ ⠀ | U+20A4 |
| ₽ | Ruble | b4,1235 | ⠀ ⠀ | U+20BD |
| $ | Dollar | b4,234 | ⠀ ⠀ | U+0024 |
| ¥ | Yen | b4,13456 | ⠀ ⠀ | U+00A5 |
| ¤ | currency symbol | b4,136 | ⠀ ⠀ | U+00A4 |
| ₿ | bitcoin | b4,12 | ⠀ ⠀ | U+20BF |

## 11.3  Phases of the month

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|--------|--------------------|-----------------------|--------------------------|------------------|
| ● | new moon | b2456,1235 | ⠀ ⠀ ⠀ | U+1F311 |
| ◐ | first quarter | b135,135 | ⠀ ⠀ ⠀ | U+1F313 |
| ○ | full moon | b246,135 | ⠀ ⠀ ⠀ | U+1F315 |
| ◑ | last quarter | b246,246 | ⠀ ⠀ ⠀ | U+1F317 |

# 12 Foreign language alphabets and their special letters in Slovak texts

For the purpose of writing foreign language words or short passages in Slovak texts, the standard Slovak Braille notation is used and in the case of an isolated foreign language letter, the notation of that

letter as adopted and implemented in the Slovak dot notation rules is used. The prefix for the foreign-language letter ( ⠐ b5) shall appear immediately before the foreign-language letter. In the case of writing a word or a fragment of a foreign-language text with several special letters, the text as a whole may be prefixed ( ⠐⠐ b5,5) immediately before the fragment of such text. However, even in this text, an excerpt, the standards of Slovak letter notation and punctuation are used; special letters are given without the prefix ( ⠐ b5). If it is necessary to indicate what language is intended in a text fragment, it can be indicated on a separate line before this longer fragment, with the indication inserted between the two fifth points ( ⠐⠉⠱⠐⠐ b5,124,1235,5). A foreign-language passage that has been introduced with two fifth points ( ⠐⠐ b5,5) immediately before the passage is ended by reintroducing ( ⠐⠐ b5,5) immediately after the passage.

In the case of writing or printing a foreign language book or a foreign language textbook containing both Slovak and foreign language text, the rules of the point font of both languages are followed, while the language of the text will be obvious from the nature of the publication, or it may be explicitly indicated, in case of ambiguity, by the abbreviation of the language (Sk, Fr, De, Hu, Es...).

When introducing foreign words in a Slovak text, the cataloguing rules may also be followed and atypical diacritical marks above the letters may be omitted if the nature of the text allows it and these marks are not essential.


## 12.1 Latin letters with diacritics


These selected Latin letters with diacritics have been implemented from foreign languages, mainly from the languages of our neighbouring countries in Central Europe, the Czech Republic, Poland and Hungary, and further from the most widely spoken languages in Europe, German, French and Spanish. These implemented features cover most European languages and their specificities. In the implementation, it was not always possible to adopt the notation of the letters in the dot script in its original notation immediately after our prefix ( ⠐ b5), because the notation for one letter often differs from language to language, or the combination used (braille cell) in a foreign language clashes with another, already implemented braille cell combination for a different symbol. Therefore, for the

purpose of writing foreign language words or short passages in Slovak texts, we use these implemented

letters, although in the original language the special character may be written in respective Braille script

with a different combination. We have tried to preserve the authenticity of the symbols wherever the

implementation allowed it. The transcriptions of the symbols in each language in their original form can

be found in the World Braille Usage publication on the Perkins School for the Blind website.

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| à | lower a with grave accent | b5,12356 | ⠐ ⠻ | U+00E0 |
| â | lower a with a roof (circumflex) | b5,16 | ⠐ ⠡ | U+00E2 |
| ą | lower a with a tail (tail) | b5,156 | ⠐ ⠱ | U+0105 |
| å | lower a with ring | b5,1 | ⠐ ⠁ | U+00E5 |
| ā | lower a with macron | b5,2 | ⠐ ⠂ | U+0101 |
| ć | lower c with acute | b5,146 | ⠐ ⠙ | U+0107 |
| ç | lower c with cedilla | b5,12346 | ⠐ ⠿ | U+00E7 |
| đ | lower d with stroke | b5,1456 | ⠐ ⠹ | U+0111 |
| æ | lower open e | b5,345 | ⠐ ⠜ | U+00E6 |
| è | lower e with grave accent | b5,1246 | ⠐ ⠫ | U+00E8 |
| ě | lower e with a caron | b5,126 | ⠐ ⠣ | U+011B |
| ę | lower e with a tail | b5,1256 | ⠐ ⠳ | U+0119 |
| ë | lowercase e with diaeresis | b5,15 | ⠐ ⠑ | U+00EB |
| ê | lower e with circumflex | b5,26 | ⠐ ⠢ | U+00EA |
| ē | lower e with macron | b5,256 | ⠐ ⠲ | U+0113 |
| ģ | lower g with cedilla | b5,1245 | ⠐ ⠛ | U+0123 |
| ġ | lower g with dot | b5,2356 | ⠐ ⠶ | U+0121 |
| ï | lower i with diaeresis | b5,24 | ⠐ ⠉ | U+00EF |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| ī | lower i with macron | b5,35 | ⠐ ⠊ | U+012B |
| î | lower i with circumflex | b5,34 | ⠐ ⠌ | U+00EE |
| ķ | lower k with cedilla | b5,13 | ⠐ ⠅ | U+0137 |
| ł | lower l with stroke | b5,123 | ⠐ ⠇ | U+0142 |
| ļ | lower l with cedilla | b5,1236 | ⠐ ⠧ | U+013C |
| ń | lower n with acute | b5,1345 | ⠐ ⠝ | U+0144 |
| ñ | lower n with tilde | b5,12456 | ⠐ ⠻ | U+00F1 |
| ņ | lower n with cedilla | b5,23 | ⠐ ⠒ | U+0146 |
| ö | lower o with a diaeresis | b5,135 | ⠐ ⠕ | U+00F6 |
| ø | lower o with stroke | b5,246 | ⠐ ⠪ | U+00F8 |
| œ | ligatured oe | b5,135,15 | ⠐ ⠕ ⠡ | U+0153 |
| ò | lower o with grave accent | b5,356 | ⠐ ⠶ | U+00F2 |
| ō | lower o with macron | b5,236 | ⠐ ⠶ | U+014D |
| ő | lower o with double acute | b5,12345 | ⠐ ⠟ | U+0151 |
| ř | lower r with caron | b5,2456 | ⠐ ⠺ | U+0159 |
| ś | lower s with acute | b5,234 | ⠐ ⠎ | U+015B |
| ß | sharp s | b5,2346 | ⠐ ⠶ | U+00DF |
| ů | lower u with ring | b5,23456 | ⠐ ⠾ | U+016F |
| ü | lower u with a diaeresis | b5,136 | ⠐ ⠭ | U+00FC |
| ù | lower u with grave accent | b5,346 | ⠐ ⠬ | U+00F9 |
| û | lower u with circumflex | b5,3456 | ⠐ ⠼ | U+00FB |
| ű | lower u with double acute | b5,123456 | ⠐ ⠿ | U+0171 |
| ū | lower u with macron | b5,36 | ⠐ ⠤ | U+016B |
| ż | lower z with dot | b5,13456 | ⠐ ⠽ | U+017C |
| ź | lower z with | b5,1356 | ⠐ ⠵ | U+017A |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
|  | acute |  |  |  |

**Examples of writing words with foreign letters:**

- Jo Nesbø ( ⠐⠚⠕ ⠐⠝⠑⠎⠃⠳ );

- Novak Đoković ( ⠐⠝⠕⠧⠁⠅ ⠀⠐�⠕⠅⠕⠧⠊� );

- The domestic horse is a domesticated animal belonging to the odd-toed ungulates (in czech) -
  ( ⠨⠙ ⠲⠕⠍⠁�⠌ ⠅⠕ ⠅⠕⠝⠱⠎⠞⠑⠒ ⠚⠑ ⠙⠕⠍�⠞⠊⠅⠕⠧⠁⠝⠜ ⠵⠧⠌⠮⠑ ⠏⠞⠎ ⠅⠌⠴⠙⠌⠕⠒⠒⠒⠒⠒⠒⠒⠒⠒
  ⠑⠕⠞⠺⠕⠒ ⠎⠋�⠙⠝⠌⠌ ⠼ ).

## 12.2  Greek alphabet

Greek letters are written with a prefix ( ⠒ b45), which prefixes one lower case Greek letter. When writing a string of lowercase Greek letters, the prefix should be given twice in a row ( ⠒⠒ b45,45). Such a string is terminated by a space or prefix termination ( ⠰ b56).

A capital Greek letter is written as a lower case Greek letter, but with a prefix ( ⠠ b6) and applies to the one immediately following letter. For example: α - lower case alpha ( ⠒⠁ b45,1) and A - upper case alpha ( ⠠⠒⠁ b6,45,1). In the case of a string of uppercase Greek letters, the prefix for all uppercase letters must be observed, but also the prefix for all Greek letters. For example: ΕΛΛΗΝΙΚΌ αλφάβητο - ELLENIKO alfabeto ( ⠠⠠⠒⠒�������� ⠒⠒�������� ) b6,6,45,45,15,123,123,156,1345,24,13,246 b45,45,1,123,124,345,12,156,2345,135).

*Lowercase Greek letters*

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
| --- | --- | --- | --- | --- |
| α | alpha | b45,1 | ⠿ ⠁ | U+03B1 |
| β | beta | b45,12 | ⠿ ⠃ | U+03B2 |
| γ | gamma | b45,1245 | ⠿ ⠛ | U+03B3 |
| δ | delta | b45,145 | ⠿ ⠙ | U+03B4 |
| ε | epsilon | b45,15 | ⠿ ⠑ | U+03B5 |
| ζ | zeta | b45,1356 | ⠿ ⠵ | U+03B6 |
| η | éta | b45,156 | ⠿ ⠱ | U+03B7 |
| θ | théta | b45,1456 | ⠿ ⠹ | U+03B8 |
| ι | iota | b45,24 | ⠿ ⠊ | U+03B9 |
| κ | hood | b45,13 | ⠿ ⠅ | U+03BA |
| λ | lambda | b45,123 | ⠿ ⠇ | U+03BB |
| μ | me | b45,134 | ⠿ ⠍ | U+03BC |
| ν | her | b45,1345 | ⠿ ⠝ | U+03BD |
| ξ | xi | b45,1346 | ⠿ ⠭ | U+03BE |
| ο | omicron | b45,135 | ⠿ ⠕ | U+03BF |
| π | Pi | b45,1234 | ⠿ ⠏ | U+03C0 |
| ρ | ró | b45,1235 | ⠿ ⠗ | U+03C1 |
| σ | sigma | b45,234 | ⠿ ⠎ | U+03C3 |
| ς | the letter sigma at the end of the word | b45,234 | ⠿ ⠎ | U+03C2 |
| τ | you | b45,2345 | ⠿ ⠞ | U+03C4 |
| υ | upsilon | b45,136 | ⠿ ⠥ | U+03C5 |
| φ | Fi | b45,124 | ⠿ ⠋ | U+03C6 |
| χ | Hi | b45,12346 | ⠿ ⠯ | U+03C7 |
| ψ | Dog | b45,13456 | ⠿ ⠽ | U+03C8 |
| ω | omega | b45,2456 | ⠿ ⠺ | U+03C9 |

*Lowercase Greek letters with accents*

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
| --- | --- | --- | --- | --- |
| ά | alpha tonos | b45,345 | ⠿ ⠜ | U+03AC |
| ᾶ | alpha perishables | b45,16 | ⠿ ⠡ | U+1FB6 |
| ὰ | alpha varia | b45,12356 | ⠿ ⠧ | U+1F70 |
| έ | epsilon tonos | b45,1246 | ⠿ ⠫ | U+03AD |
| ὲ | epsilon varia | b45,14 | ⠿ ⠉ | U+1F72 |
| ή | éta tonos | b45,123456 | ⠿ ⠿ | U+03AE |
| ῆ | éta perispomeni | b45,126 | ⠿ ⠣ | U+1FC6 |
| ὴ | éta varia | b45,2346 | ⠿ ⠮ | U+1F74 |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| ί | iota tonos | b45,12456 | ⠙ ⠐⠿ | U+03AF |
| ῖ | iota perispomeni | b45,146 | ⠙ ⠐⠣ | U+1FD6 |
| ὶ | iota varia | b45,34 | ⠙ ⠐⠌ | U+1F76 |
| ό | omicron tonos | b45,246 | ⠙ ⠐⠪ | U+03CC |
| ὸ | omicron varia | b45,346 | ⠙ ⠐⠬ | U+1F78 |
| ύ | upsilon tonos | b45,1256 | ⠙ ⠐⠳ | U+03CD |
| ῦ | upsilon perisymbionts | b45,1236 | ⠙ ⠐⠧ | U+1FE6 |
| ὺ | upsilon varia | b45,23456 | ⠙ ⠐⠾ | U+1F7A |
| ώ | omega tonos | b45,245 | ⠙ ⠐⠩ | U+03CE |
| ῶ | omega perispomeni | b45,3456 | ⠙ ⠐⠼ | U+1FF6 |
| ὼ | omega varia | b45,12345 | ⠙ ⠐⠟ | U+1F7C |
| Ϝ | digamma | b45,1236 | ⠙ ⠐⠧ | U+03DD |
| ϟ | koppa | b45,12345 | ⠙ ⠐⠟ | U+03DF |
| ϡ | sampi | b45,2346 | ⠙ ⠐⠮ | U+03E1 |

# 13 Fundamentals of mathematical and other professional notation

This part of the manual contains rules for writing non-scientific literary texts in Braille. However, simple notation of texts using quantities or simple mathematical notation may also occur in common literature or other non-vocational or basic vocational materials. Therefore, this section of the manual already provides the basics of notation of some quantities and signs used in non-scientific texts and materials.

## 13.1 Units of measurement

Units of measurement are generally written as in print. For units of measure with an index, the number in the index is written between the beginning and end of the index-the beginning of the superscript (⠒⠘ b34), the beginning of the subscript (⠰⠢ b16), and the end of each index (⠒⠆ b156). Units can also be written by specifying the numeric value in the index without the beginning and end of the index, if the unambiguity of the unit of measure notation allows it.

Within the text or mathematical notation, we then indicate units with a space before the unit, unless the unit is followed in the text by a punctuation mark such as a comma, period or question mark. In that case, a space is not placed after the unit, as in standard printing.

**For example:**

- 10 m - ten meters - (⠿ b3456,1,245,0,134);

- 60 km² - sixty square kilometers (⠿ b3456,124,245,0,13,134,34,3456,12,156);

- 60 km² - sixty square kilometers (⠿ b3456,124,245,0,13,134,3456,12).

*SI base units*

| symbol | verbal description | configuration of points | graphical display of cells |
|--------|--------------------|-----------------------|--------------------------|
| t | Time | b2345 | ⠞ |
| s | second | b234 | ⠎ |
| l | Length | b123 | ⠇ |
| m | meter | b134 | ⠍ |
| m | weight | b134 | ⠍ |
| kg | kilogram | b13,1245 | ⠅ ⠛ |
| I | electric current | b6,24 | ⠠ ⠊ |
| A | ampere | b6,1 | ⠠ ⠁ |

| symbol | verbal description | configuration of points | graphical display of cells |
|--------|-------------------|------------------------|---------------------------|
| T | thermodynamic temperature | b2345 | |
| K | kelvin | b6,13 | |
| n | substance quantity | b1345 | |
| mole | moth | b134,135,123 | |
| l | luminosity | b6,24 | |
| cd | candela | b14,145 | |

*Units of length*

| symbol | verbal description | configuration of points | graphical display of cells |
|--------|-------------------|------------------------|---------------------------|
| l | Length | b123 | |
| d | Length | b145 | |
| m | meter | b134 | |
| dm | decimeter | b145,134 | |
| cm | centimeter | b14,134 | |
| km | kilometer | b13,134 | |

| symbol | verbal description | configuration of points | graphical display of cells |
|--------|--------------------|-------------------------|----------------------------|
| mm | millimetre | b134,134 | ⠿⠒⠒ |
| µm | micrometer | b45,134,134 | ⠿ ⠒⠒⠒ |
| Nm | nanometer | b1345,134 | ⠿⠒⠒ |
| Pm | picometer | b1234,134 | ⠿⠒⠒ |

## Units of content

The units of area denoted by S ( ⠨⠎ b6,234) are written in the same way as they are written in blackletter, i.e., a for acre, ha for hectare, and so on. In the case of writing using units of length squared, the unit of content may be written with or without characters for the beginning and end of the index, e.g:

- square meter (meter squared) - m² - (⠍⠂⠲⠦⠒ ⠱ b134,34,3456,12,156);

- square meter (meter squared) - m² - (⠍⠲⠒ b134,3456,12);

- square centimeter (centimeter squared) - cm² - (⠉⠍⠲⠒ b14,134,3456,12).

## Units of volume

The units of the hollow volume denoted by the letter V ( ⠨⠧ b6,1236) are written in the same way as they are written in blackletter, i.e., l for litre, cl for centilitre, ml for millilitre, hl for hectolitre, and so on. In the case of writing a full volume using units of length to the third, the unit of volume may be written with or without characters for the beginning and ending of the index, e.g:

- cubic meter (meter per third) - m³ - (⠍⠂⠲⠉⠱ b134,34,3456,14,156);

- cubic meter (meter per third) - m³ - (⠐⠩⠲⠰⠔ b134.3456.14);

- cubic kilometer (kilometer per third) - km³ - (⠅ ⠐⠩⠲⠰⠔ b13,134,3456,14).

## Units of mass

| symbol | verbal description | configuration of points | graphical display of cells |
|--------|--------------------|-------------------------|----------------------------|
| m | weight | b134 | ⠩⠃ |
| kg | kilogram | b13,1245 | ⠅ ⠛ |
| g | gram | b1245 | ⠛ |
| mg | milligram | b134,1245 | ⠩⠛ |
| dag | decagram | b145,1,1245 | ⠙⠁ ⠛ |
| Q | metric cent | b12345 | ⠟ |
| T | ton | b2345 | ⠞ |

The microgram unit is written as μg ( ⠨⠩⠛ b45,134,1245), but for example, we can also see mcg or mkg marks on medicine boxes from abroad.

## Units of time

| symbol | verbal description | configuration of points | graphical display of cells |
|---|---|---|---|
| t | Time | b2345 | ⠵⠶ |
| s | second | b234 | ⠎ |
| min | Minute | b134,24,1345 | ⠍⠊⠝ |
| h | Hour | b125 | ⠓ |
| ms | millisecond | b134,234 | ⠍⠎ |
| tP | Planck time | b2345,6,1234 | ⠵⠠⠏ |
| $h$ | Planck's constant | b4,6,125 | ⠈⠠⠓ |
| $\hbar$ | reduced Planck's constant (Dirac constant) | b4,125 | ⠈⠓ |

## Circle and hollow circle

| symbol | verbal description | configuration of points | graphical display of cells |
|---|---|---|---|
| d | diameter of the circle | b145 | ⠙ |
| r | radius (radius) | b1235 | ⠗ |
| O | circuit | b6,135 | ⠠⠕ |
| S | Content | b6,234 | ⠠⠎ |

| symbol | verbal description | configuration of points | graphical display of cells |
|---|---|---|---|
| 2πr | calculate the perimeter (two times pi times r) | b3456,12,45,1234,1235 | ⠼⠃⠏⠗ |
| πr² | content calculation (pi times r squared) | b45,1234,1235,34,3456,12,156 | ⠈⠏⠗⠌⠼⠃ |

## 13.2 Basic mathematical signs and symbols

Mathematical operators, or operation signs, are usually written in dotted notation with a space before the sign. The sign is not followed by a space; the sign is immediately followed by a number or part of an expression, such as a parenthesis. If we want to use a mathematical operator as part of a non-mathematical text, we distinguish its function with a prefix ( ⠒ b56). In particular, signs with the same combination of dots have a different meaning in the non-mathematical text than in the mathematical text, e.g., the exclamation point (! ) and the plus sign (+) both have the same combination of dots (⠖ b235), so the plus sign in the non-mathematical text is marked with the prefix ( ⠒⠖ b56,235).

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| + | plus | b235 | ⠖ | U+002B |
| - | minus | b36 | ⠤ | U+2212 |
| ± | plus minus | b235,36 | ⠖⠤ | U+00B1 |
| ∓ | minus or plus | b36,235 | ⠤⠖ | U+2213 |
| ∗ | star operator | b35 | ⠔ | U+2217 |
| ∙ | times and | b3 | ⠄ | U+2219 |

| symbol | verbal description | configuration of points | graphical display of cells | Unicode position |
|---|---|---|---|---|
| | scalar product | | | |
| × | times, vector and Cartesian product | b346 | ⠆⠒ | U+00D7 |
| ÷ | divide | b25 | ⠒⠈ | U+00F7 |
| ǀ | divides | b456 | ⠒ ⠅ | U+2223 |
| ∕ | fractional line | b12456 | ⠒⠒ | U+2215 |
| / | slash | b12456 | ⠒⠒ | U+002F |
| ∤ | does not divide | b4,456 | ⠒ ⠄ ⠅ | U+2224 |
| , | decimal point | b2 | ⠒⠄ | U+002C |
| ≠ | does not equal | b4,2356 | ⠒ ⠄ ⠒ | U+2260 |
| < | less than | b126 | ⠒⠪ | U+003C |
| ≤ | less than or equal to | b126,2356 | ⠒⠪ ⠒ | U+2264 |
| = | equals | b2356 | ⠒ ⠒ | U+003D |
| > | greater than | b345 | ⠒⠱ | U+003E |
| ≥ | greater than or equal to | b345,2356 | ⠒⠱ ⠒ | U+2265 |
| ⋚ | less than or greater than | b126,345 | ⠒⠪ ⠱ | U+2276 |
| ⋛ | greater than or less than | b345,126 | ⠒⠱ ⠪ | U+2277 |
| ≈ | is approximately equal to | b5,2356 | ⠒ ⠈ ⠒ | U+2248 |
| Σ | sum | b46,234 | ⠒ ⠒⠂ | U+2211 |
| ∏ | product | b46,1234 | ⠒ ⠒⠃ | U+220F |

**Examples of notations with operators:**

- 3 + 4 (� � b3456,14,0,235,3456,145);

- 3.5 (� � b3456,14,0,3,3456,15);

- 3.(10 - 5) =(30-15) (� �

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b3456,14,0,3,236,3456,1,245,0,36,3456,15,356 ,0,2356,236,3456,14,245,0,36,3456,1,15,356);

- 14 ÷ 7 (⠨⠹ ⠛⠒ ⠲⠨⠯ b3456,1,145,0,25,3456,1245);

- n ≠ 7 (⠝ ⠈⠡⠲⠨⠯ b1345,0,4,2356,3456,1245).

More detailed ways of writing science and other technical texts will be given in later sections of the handbook.

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# Rules for writing and using Braille in the Slovak Republic
## Writing signs and symbols in Braille in Slovak texts and basic professional notations in six-point notation