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ISO/IEC JTC1/SC2/WG2
Universal Multiple-Octet Coded Character Set (UCS)

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STATUS: Working paper of JTC1/SC2/WG2

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DISTRIBUTION: Members of JTC1/SC2/WG2

1. Scope

This paper provides a second draft of the text sections of the Second Edition of ISO/IEC 10646-1. It replaces the previous paper WG2 N 1796 (1998-06-01).

This draft text includes:
- Clauses 1 to 27 (replacing the previous clauses 1 to 26),
- Annexes A to R (replacing the previous Annexes A to T),

and is attached here as “Draft 2 for ISO/IEC 10646-1 : 1999” (pages ii & 1 to 77).

Published and Draft Amendments up to Amd.31 (Tibetan extended), Technical Corrigenda nos. 1, 2, and 3, and editorial corrigenda approved by WG2 up to 1999-03-15, have been applied to the text.

The draft does not include:
- character glyph tables and name tables (these will be provided in a separate WG2 document from AFII),
- the alphabetically sorted list of character names in Annex E (now Annex G),
- markings to show the differences from the previous draft.

A separate WG2 paper will give the editorial corrigenda applied to this text since N 1796. The editorial corrigenda are as agreed at WG2 meetings #34 to #36.

Editorial corrigenda applicable to the character glyph tables and name tables, as listed in N1796 pages 2 to 5, have already been applied to the draft character tables prepared by AFII. in March 1999.

2. Electronic version of this text

The electronic version of this text is supplied as three separate files for convenience:

- WG2 cover sheet and Clauses 1 to 27 (pages i, ii, & 1 - 21),
- Annexes A to Q (pages 22 - 69),
- Annex R (Informative annex on CJK unification, pages 70 - 77, file size 1.075 MB).

Contents

Information technology — Universal Multiple-Octet Coded Character Set (UCS) —

Part 1:

Architecture and Basic Multilingual Plane

1 Scope

ISO/IEC 10646 specifies the Universal Multiple-Octet Coded Character Set (UCS). It is applicable to the representation, transmission, interchange, processing, storage, input, and presentation of the written form of the languages of the world as well as additional symbols.

This part of ISO/IEC 10646 specifies the overall architecture, and

- defines terms used in ISO/IEC 10646;

- describes the general structure of the coded character set;

- specifies the Basic Multilingual Plane (BMP) of the UCS, and defines a set of graphic characters used in scripts and the written form of languages on a world-wide scale;

- specifies the names for the graphic characters of the BMP, and the coded representations;

- specifies the four-octet (32-bit) canonical form of the UCS: UCS-4;

- specifies a two-octet (16-bit) BMP form of the UCS: UCS-2;

- specifies the coded representations for control functions;

- specifies the management of future additions to this coded character set.

The UCS is a coding system different from that specified in ISO 2022. The method to designate UCS from ISO 2022 is specified in 16.2.

NOTE - It is intended that character code positions for additional scripts and symbols will be allocated in this Part 1 of this International Standard when sufficient input and review is provided by national standards organizations or other qualified experts.

2 Conformance

2.1 General

Whenever private use characters are used as specified in ISO/IEC 10646, the characters themselves shall not be covered by these conformance requirements.

2.2 Conformance of information interchange

A coded-character-data-element (CC-data-element) within coded information for interchange is in conformance with ISO/IEC 10646 if

a) all the coded representations of graphic characters within that CC-data-element conform to clauses 6 and 7, to an identified form chosen from clause 13 or Annex C or Annex D, and to an identified implementation level chosen from clause 14;

b) all the graphic characters represented within that CC-data-element are taken from those within an identified subset (clause 12);

c) all the coded representations of control functions within that CC-data-element conform to clause 15.

A claim of conformance shall identify the adopted form, the adopted implementation level and the adopted subset by means of a list of collections and/or characters.

2.3 Conformance of devices

A device is in conformance with ISO/IEC 10646 if it conforms to the requirements of item a) below, and either or both of items b) and c).

NOTE - The term device is defined (in 4.18) as a component of information processing equipment which can transmit and/or receive coded information within CC-data-elements. A device may be a conventional input/output device, or a process such as an application program or gateway function.

A claim of conformance shall identify the document that contains the description specified in a) below, and shall identify the adopted form(s), the adopted implementation level, the adopted subset (by means

of a list of collections and/or characters), and the selection of control functions adopted in accordance with clause 15.

a) Device description: A device that conforms to ISO/IEC 10646 shall be the subject of a description that identifies the means by which the user may supply characters to the device and/or may recognize them when they are made available to the user, as specified respectively, in subclauses b), and c) below.

b) Originating device: An originating device shall allow its user to supply any characters from an adopted subset, and be capable of transmitting their coded representations within a CC-data-element in accordance with the adopted form and implementation level.

c) Receiving device: A receiving device shall be capable of receiving and interpreting any coded representation of characters that are within a CC-data-element in accordance with the adopted form and implementation level, and shall make any corresponding characters from the adopted subset available to the user in such a way that the user can identify them.

Any corresponding characters that are not within the adopted subset shall be indicated to the user. The way used for indicating them need not distinguish them from each other.

NOTES

1 An indication to the user may consist of making available the same character to represent all characters not in the adopted subset, or providing a distinctive audible or visible signal when appropriate to the type of user.

2 See also annex J for receiving devices with re-transmission capability.

3 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 10646. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 10646 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 2022:1994 *Information technology — Character code structure and extension techniques*.

ISO/IEC 6429:1992 *Information technology — Control functions for coded character sets.*

4 Definitions

For the purposes of ISO/IEC 10646, the following definitions apply :

4.1 Basic Multilingual Plane (BMP): Plane 00 of Group 00.

4.2 block: A contiguous range of code positions to which a set of characters that share common characteristics, such as script, are allocated. A block cannot overlap another block. One or more of the code positions within a block may have no character allocated to it.

4.3 canonical form: The form with which characters of this coded character set are specified using four octets to represent each character.

4.4 CC-data-element (coded-character-data-element): An element of interchanged information that is specified to consist of a sequence of coded representations of characters, in accordance with one or more identified standards for coded character sets.

4.5 cell: The place within a row at which an individual character may be allocated.

4.6 character: A member of a set of elements used for the organisation, control, or representation of data.

4.7 character boundary: Within a stream of octets the demarcation between the last octet of the coded representation of a character and the first octet of that of the next coded character.

4.8 coded character: A character together with its coded representation.

4.9 coded character set: A set of unambiguous rules that establishes a character set and the relationship between the characters of the set and their coded representation.

4.10 code table: A table showing the characters allocated to the octets in a code.

4.11 collection: A set of coded characters which is numbered and named and which consists of those coded characters whose code positions lie within one or more identified ranges.

NOTE - If any of the identified ranges include code positions to which no character is allocated, the repertoire of the collection will change if an additional character is assigned to any of those positions at a future amendment of this International Standard. However it is intended that the collection number and name will remain unchanged in future editions of this International Standard.

4.12 combining character: A member of an identified subset of the coded character set of ISO/IEC 10646 intended for combination with the preceding non-combining graphic character, or with

a sequence of combining characters preceded by a non-combining character (see also 4.14).

NOTE - This part of ISO/IEC 10646 specifies several subset collections which include combining characters.

4.13 compatibility character: A graphic character included as a coded character of ISO/IEC 10646 primarily for compatibility with existing coded character sets.

4.14 composite sequence: A sequence of graphic characters consisting of a non-combining character followed by one or more combining characters (see also 4.12).

NOTES

1 A graphic symbol for a composite sequence generally consists of the combination of the graphic symbols of each character in the sequence.

2 A composite sequence is not a character and therefore is not a member of the repertoire of ISO/IEC 10646.

4.15 control function: An action that affects the recording, processing, transmission or interpretation of data, and that has a coded representation consisting of one or more octets.

4.16 default state: The state that is assumed when no state has been explicitly specified.

4.17 detailed code table: A code table showing the individual characters, and normally showing a partial row.

4.18 device: A component of information processing equipment which can transmit and/or receive coded information within CC-data-elements. (It may be an input/output device in the conventional sense, or a process such as an application program or gateway function.)

4.19 fixed collection: A collection in which every code position within the identified range(s) has a character allocated to it, and which is intended to remain unchanged in future editions of this International Standard.

4.20 graphic character: A character, other than a control function, that has a visual representation normally handwritten, printed, or displayed.

4.21 graphic symbol: The visual representation of a graphic character or of a composite sequence.

4.22 group: A subdivision of the coding space of this coded character set; of 256 x 256 x 256 cells.

4.23 high-half zone: a set of cells reserved for use in UTF-16 (see Annex C); an RC-element corresponding to any of these cells may be used as the first of a pair of RC-elements which represents a character from a plane other than the BMP.

4.24 interchange: The transfer of character coded data from one user to another, using telecommunication means or interchangeable media.

4.25 interworking: The process of permitting two or more systems, each employing different coded character sets, meaningfully to interchange character coded data; conversion between the two codes may be involved.

4.26 low-half zone: a set of cells reserved for use in UTF-16 (see Annex C); an RC-element corresponding to any of these cells may be used as the second of a pair of RC-elements which represents a character from a plane other than the BMP.

4.27 octet: An ordered sequence of eight bits considered as a unit.

4.28 plane: A subdivision of a group; of 256 x 256 cells

4.29 presentation; to present: The process of writing, printing, or displaying a graphic symbol.

4.30 presentation form: In the presentation of some scripts, a form of a graphic symbol representing a character that depends on the position of the character relative to other characters.

4.31 private use plane: A plane within this coded character set the contents of which is not specified in ISO/IEC 10646 (see clause 10)

4.33 RC-element: a two-octet sequence comprising the R-octet and the C-octet (see 6.2) from the four octet sequence that corresponds to a cell in the coding space of this coded character set.

4.33 repertoire: A specified set of characters that are represented in a coded character set.

4.34 row: A subdivision of a plane; of 256 cells.

4.35 script: A set of graphic characters used for the written form of one or more languages.

4.36 supplementary plane: A plane that accommodates characters which have not been allocated to the Basic Multilingual Plane.

4.37 unpaired RC-element: An RC-element in a CC-data element that is either:

- an RC-element from the high-half zone that is not immediately followed by an RC-element from the low-half zone, or
- an RC-element from the low-half zone that is not immediately preceded by a high-half RC-element from the high-half zone.

4.38 user: A person or other entity that invokes the service provided by a device. (This entity may be a process such as an application program if the

"device" is a code converter or a gateway function, for example.)

4.39 zone: A sequence of cells of a code table, comprising one or more rows, either in whole or in part, containing characters of a particular class (see clause 8).

5 General structure of the UCS

The general structure of the Universal Multiple-Octet Coded Character Set (referred to hereafter as "this coded character set") is described in this explanatory clause, and is illustrated in figures 1 and 2. The normative specification of the structure is given in the following clauses.

The value of any octet is expressed in hexadecimal notation from 00 to FF in ISO/IEC 10646 (see annex K).

The canonical form of this coded character set — the way in which it is to be conceived — uses a four-dimensional coding space, regarded as a single entity, consisting of 128 three-dimensional groups.

NOTE - Thus, bit 8 of the most significant octet in the canonical form of a coded character can be used for internal processing purposes within a device as long as it is set to zero within a conforming CC-data-element.

Each group consists of 256 two-dimensional planes. Each plane consists of 256 one-dimensional rows, each row containing 256 cells. A character is located and coded at a cell within this coding space or the cell is declared unused.

In the canonical form, four octets are used to represent each character, and they specify the group, plane, row and cell, respectively. The canonical form consists of four octets since two octets are not sufficient to cover all the characters in the world, and a 32-bit representation follows modern processor architectures.

The four-octet canonical form can be used as a four-octet coded character set, in which case it is called UCS-4.

The first plane (Plane 00 of Group 00) is called the Basic Multilingual Plane. The Basic Multilingual Plane includes characters in general use in alphabetic, syllabic and ideographic scripts together with various symbols and digits.

The subsequent planes are regarded as supplementary or private use planes, which will accommodate additional graphic characters (see clause 9).

The planes that are reserved for private use are specified in clause 10. The contents of the cells in private use zones are not specified in ISO/IEC 10646.

Each character is located within the coded character set in terms of its Group-octet, Plane-octet, Row-octet, and Cell-octet.

In addition to the canonical form, a two-octet BMP form is specified. Thus, the Basic Multilingual Plane can be used as a two-octet coded character set identified as UCS-2.

Subsets of the coding space may be used in order to give a sub-repertoire of graphic characters.

A UCS Transformation Format (UTF-16) is specified in Annex C which can be used to represent characters from 16 planes of group 00, additional to the BMP, in a form that is compatible with the two-octet BMP form.

A UCS Transformation Format (UTF-8) is specified in Annex D which can be used to transmit text data through communication systems which are sensitive to octet values for control characters coded according to the 8-bit structure of ISO/IEC 2022, and to ISO/IEC 4873. UTF-8 also avoids the use of octet values according to ISO/IEC 4873 which have special significance during the parsing of file-name character strings in widely-used file-handling systems.

6 Basic structure and nomenclature

6.1 Structure

The Universal Multiple-Octet Coded Character Set as specified in ISO/IEC 10646 shall be regarded as a single entity.

This entire coded character set shall be conceived of as comprising 128 groups of 256 planes. Each plane shall be regarded as containing 256 rows of characters, each row containing 256 cells. In a code table representing the contents of a plane (such as in figure 2), the horizontal axis shall represent the least significant octet, with its smaller value to the left; and the vertical axis shall represent the more significant octet, with its smaller value at the top.

Each axis of the coding space shall be coded by one octet. Within each octet the most significant bit shall be bit 8 and the least significant bit shall be bit 1.

Accordingly, the weight allocated to each bit shall be

bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1
128	64	32	16	8	4	2	1

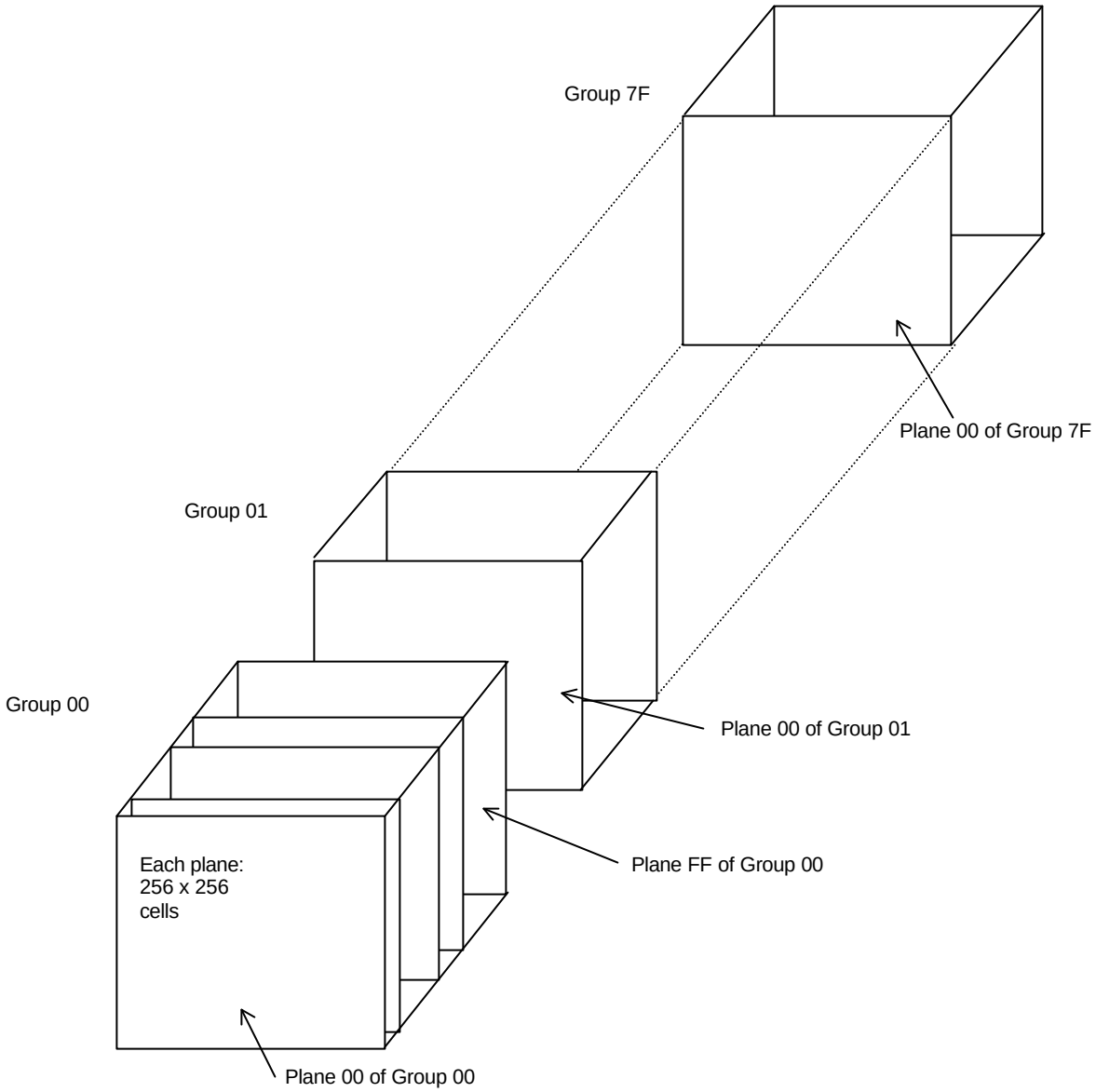
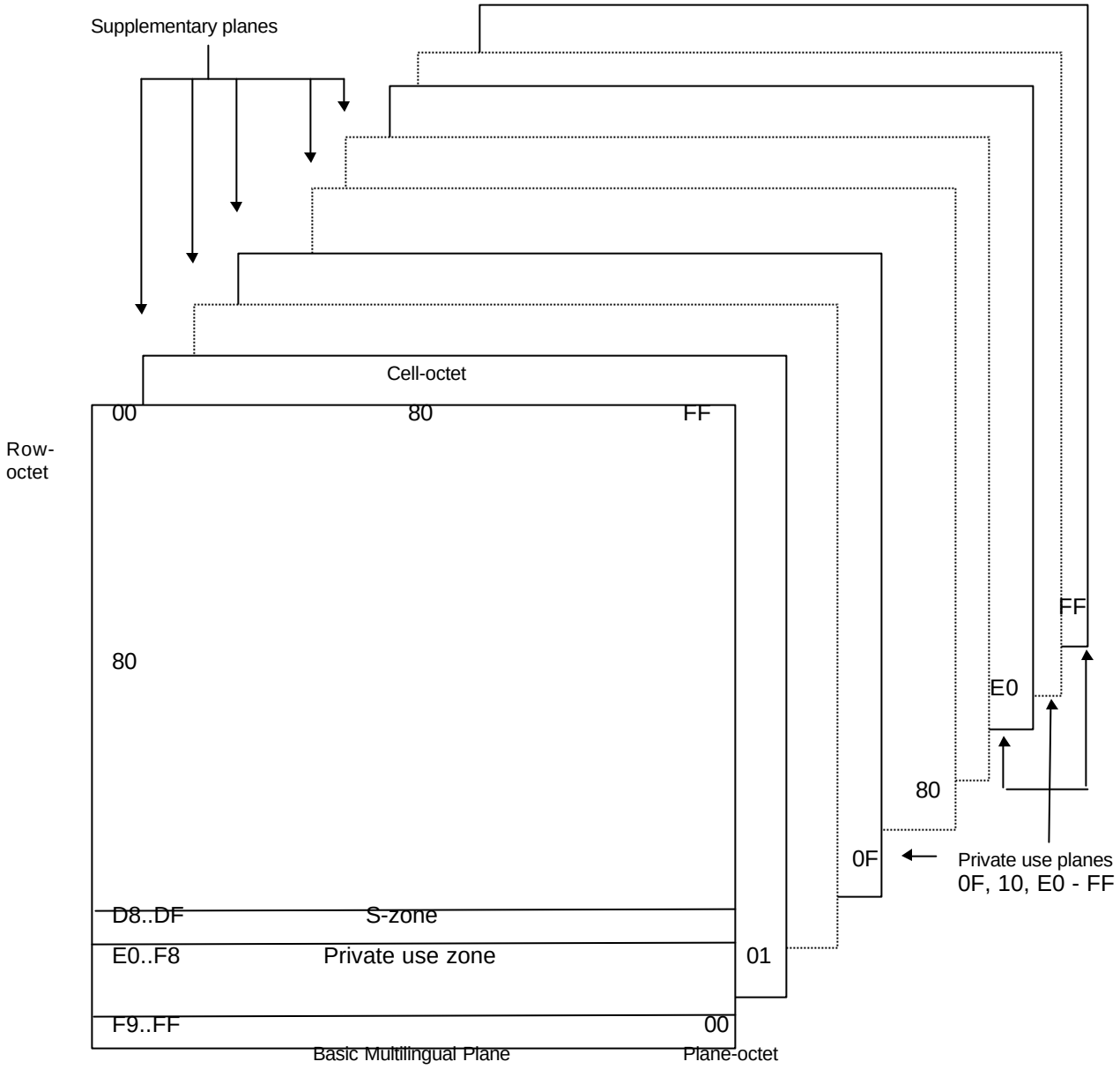


Figure 1 - Entire coding space of the Universal Multiple-Octet Coded Character Set



NOTE - Labels “S-zone” and “Private use zone” are specified in clause 8.

Figure 2 - Group 00 of the Universal Multiple-Octet Coded Character Set

6.2 Coding of characters

In the canonical form of the coded character set, each character within the entire coded character set shall be represented by a sequence of four octets. The most significant octet of this sequence shall be the group-octet. The least significant octet of this sequence shall be the cell-octet. Thus this sequence may be represented as

m.s. l.s.

Group-octet	Plane-octet	Row-octet	Cell-octet

where m.s. means the most significant octet, and l.s. means the least significant octet.

For brevity, the octets may be termed

m.s. l.s.

G-octet	P-octet	R-octet	C-octet

Where appropriate, these may be further abbreviated to G, P, R, and C.

The value of any octet shall be represented by two hexadecimal digits, for example: 31 or FE. When a single character is to be identified in terms of the values of its group, plane, row, and cell, this shall be represented such as:

0000 0030 for DIGIT ZERO

0000 0041 for LATIN CAPITAL LETTER A

When referring to characters within an identified plane, the leading four digits (for G-octet and P-octet) may be omitted. For example, within plane 00, 0030 may be used to refer to DIGIT ZERO.

6.3 Octet order

The sequence of the octets that represent a character, and the most significant and least significant ends of it, shall be maintained as shown above. When serialized as octets, a more significant octet shall precede less significant octets. When not serialized as octets, the order of octets may be specified by agreement between sender and recipient (see 16.1 and annex H).

6.4 Naming of characters

ISO/IEC 10646 assigns a unique name to each character. The name of a character either:

a. denotes the customary meaning of the character, or
b. describes the shape of the corresponding graphic symbol, or
c. follows the rule given in clause 27 for Chinese/Japanese/Korean (CJK) unified ideographs.

Guidelines to be used for constructing the names of characters in cases a. and b. are given in annex L.

6.5 Identifiers for characters

ISO/IEC 10646 defines a short identifier for each character. The short identifier for any character is distinct from the short identifier for any other character. These short identifiers are independent of the language in which this standard is written, and are thus retained in all translations of the text.

The following alternative forms of notation of a short identifier are defined here.

a. The eight-digit form of short identifier shall consist of the sequence of eight hexadecimal digits that represents the code position of the character (see 6.2).

b. The four-digit form of short identifier shall consist of the last four digits of the eight-digit form. It is not defined if the first four digits of the eight-digit form are not all zeroes; that is, for characters allocated outside the Basic Multilingual Plane.

c. The character "-" (HYPHEN-MINUS) may, as an option, precede the 8-digit form of short identifier.

d. The character "+" (PLUS SIGN) may, as an option, precede the 4-digit form of short identifier.

e. The prefix letter "U" (LATIN CAPITAL LETTER U) may, as an option, precede any of the four forms of short identifier defined in a. to d. above.

The CAPITAL letters A to F, and U that appear within identifiers may be replaced by the corresponding SMALL letters.

The full syntax of the notation of a short identifier, in Backus-Naur form, is:

{ U | u } [{+}xxxx | {-}xxxxxxxx]

where "x" represents one hexadecimal digit (0 to 9, A to F, or a to f), for example:

-hhhhhhhh +kkkk
Uhhhhhhhh U+kkkk

where hhhhhhhh indicates the eight-digit form and kkkk indicates the four-digit form.

NOTES

1 As an example the identifier for LATIN SMALL LETTER LONG S (see tables for Row 01 in clause 26) may be notated in any of the following forms:

0000017F -0000017F U0000017F U-0000017F
017F +017F U017F U+017F

Any of the capital letters may be replaced by the corresponding small letter.

2 Two special prefixed forms of notation have also been used, in which the letter T (LATIN CAPITAL LETTER T or LATIN SMALL LETTER T) replaces the letter U in the corresponding prefixed forms. The

forms of notation that included the prefix letter T indicated that the identifier refers to a character in ISO/IEC 10646-1 First Edition (before the application of any Amendments), whereas the forms of notation that include the prefix letter U always indicate that the identifier refers to a character in ISO/IEC 10646 at the most recent state of amendment. Corresponding identifiers of the form T-xxxxxxxx and U-xxxxxxxx refer to the same character except when xxxxxxxx lies in the range 00003400 to 00004DFF inclusive. Forms of notation that include no prefix letter always indicate a reference to the most recent state of amendment of ISO/IEC 10646, unless otherwise qualified.

7 General requirements for the UCS

The following requirements apply to the entire coded character set.

a) The values of P-, and R-, and C-octets used for representing graphic characters shall be in the range 00 to FF. The values of G-octets used for representation of graphic characters shall be in the range 00 to 7F. On any plane, code positions FFFE and FFFF shall not be used.

NOTE - Code position FFFE is reserved for "signature" (see annex H). Code position FFFF can be used for internal processing uses requiring a numeric value that is guaranteed not to be a coded character such as in terminating tables, or signaling end-of-text. Since it is the largest two-octet value, it may also be used as the final value in binary or sequential searching index.

b) Code positions to which a character is not allocated, except for the positions reserved for private use characters or for transformation formats, are reserved for future standardization and shall not be used for any other purpose. Future editions of ISO/IEC 10646 will not allocate any characters to code positions reserved for private use characters or for transformation formats.

c) The same graphic character shall not be allocated to more than one code position. There are graphic characters with similar shapes in the coded character set; they are used for different purposes and have different character names.

8 The Basic Multilingual Plane

Plane 00 of Group 00 shall be the Basic Multilingual Plane (BMP). The BMP can be used as a two-octet coded character set in which case it shall be called UCS-2 (see 13.1).

Code positions 0000 0000 to 0000 001F in the BMP are reserved for control characters, and code position 0000 007F is reserved for the character DELETE (see clause 15). Code positions 0000 0080 to 0000 009F are reserved for control characters.

Code positions 0000 D800 to 0000 DFFF are reserved for the use of UTF-16 (see Annex C). These positions are known as the S-zone.

Code positions 0000 E000 to 0000 F8FF are reserved for private use (see clause 10). These positions are known as the private use zone.

Code postions FFFE and FFFF are reserved.

9 Other planes

9.1 Planes reserved for future standardization

Planes 11 to DF in Group 00 and Planes 00 to FF in Groups 01 to 5F are reserved for future standardization, and thus those code positions shall not be used for any other purpose.

9.2 Planes accessible by UTF-16

Each code position in Planes 01 to 10 of Group 00 has a unique mapping to a four-octet sequence in accordance with the UTF-16 form of coded representation (see Annex C). This form is compatible with the two-octet BMP form of UCS-2 (see 13.1).

Code positions in Planes 11 to FF of Group 00, or in Planes 00 to FF of other groups, do not have a mapping to the UTF-16 form.

10 Private use groups, planes, and zones

10.1 Private use characters

Private use characters are not restrained in any way by ISO/IEC 10646. Private use characters can be used to provide user-defined characters. For example, this is a common requirement for users of ideographic scripts.

NOTE 1 - For meaningful interchange of private use characters, an agreement, independent of ISO/IEC 10646, is necessary between sender and recipient.

Private use characters can be used for dynamically-redefinable character applications.

NOTE 2 - For meaningful interchange of dynamically-redefinable characters, an agreement, independent of ISO/IEC 10646 is necessary between sender and recipient. ISO/IEC 10646 does not specify the techniques for defining or setting up dynamically-redefinable characters.

10.2 Code positions for private use characters

The code positions of the 32 groups from Group 60 to Group 7F shall be for private use.

The code positions of Plane 0F and Plane 10, and of the 32 planes from Plane E0 to Plane FF, of Group 00 shall be for private use.

The 6400 code positions E000 to F8FF of the Basic Multilingual Plane shall be for private use.

The contents of these code positions are not specified in ISO/IEC 10646 (see 10.1).

11 Revision and updating of the UCS

The revision and updating of this coded character set will be carried out by ISO/IEC JTC1/SC2.

NOTE - It is intended that in future editions of ISO/IEC 10646, the names and allocation of the characters in this edition will remain unchanged.

12 Subsets

ISO/IEC 10646 provides the specification of subsets of coded graphic characters for use in interchange, by originating devices, and by receiving devices.

There are two alternatives for the specification of subsets: limited subset and selected subset. An adopted subset may comprise either of them, or a combination of the two.

12.1 Limited subset

A limited subset consists of a list of graphic characters in the specified subset. This specification allows applications and devices that were developed using other codes to interwork with this coded character set.

A claim of conformance referring to a limited subset shall list the graphic characters in the subset by the names of graphic characters or code positions as defined in ISO/IEC 10646.

12.2 Selected subset

A selected subset consists of a list of collections of graphic characters as defined in ISO/IEC 10646. The collections from which the selection may be made are listed in annex A of each part of ISO/IEC 10646. A selected subset shall always automatically include the Cells 20 to 7E of Row 00 of Plane 00 of Group 00.

A claim of conformance referring to a selected subset shall list the collections chosen as defined in ISO/IEC 10646.

13 Coded representation forms of the UCS

ISO/IEC 10646 provides two alternative forms of coded representation of characters.

NOTE - The characters from the ISO/IEC 646 IRV repertoire are coded by simple zero extensions to their coded representations in ISO/IEC 646 IRV. Therefore, their coded representations have the same integer values when represented as 8-bit, 16-bit, or 32-bit integers. For implementations sensitive to a zero-valued octet (e.g. for use as a string terminator), use of 8-bit based array data type should be avoided as any zero-valued octet may be interpreted incorrectly. Use of data types at least 16-bits wide is more suitable for UCS-2, and use of data types at least 32-bits wide is more suitable for UCS-4.

13.1 Two-octet BMP form

This coded representation form permits the use of characters from the Basic Multilingual Plane with each character represented by two octets.

Within a CC-data-element conforming to the two-octet BMP form, a character from the Basic Multilingual Plane shall be represented by two octets comprising the R-octet and the C-octet as specified in 6.2 (i.e. its RC-element).

NOTE - A coded graphic character using the two-octet BMP form may be implemented by a 16-bit integer for processing.

13.2 Four-octet canonical form

The canonical form permits the use of all the characters of ISO/IEC 10646, with each character represented by four octets.

Within a CC-data-element conforming to the four-octet canonical form, every character shall be represented by four octets comprising the G-octet, the P-octet, the R-octet, and the C-octet as specified in 6.2.

NOTE - A coded graphic character using the four-octet canonical form may be implemented by a 32-bit integer for processing.

14 Implementation levels

ISO/IEC 10646 specifies three levels of implementation. Combining characters are described in 24 and listed in annex B.

14.1 Implementation level 1

When implementation level 1 is used, a CC-data-element shall not contain coded representations of combining characters (see clause B.1) nor of characters from HANGUL JAMO block (see clause 25). When implementation level 1 is used the unique-spelling rule shall apply (25.2).

14.2 Implementation level 2

When implementation level 2 is used, a CC-data-element shall not contain coded representations of characters listed in clause B.2. When implementation level 2 is used the unique-spelling rule shall apply (25.2).

14.3 Implementation level 3

When implementation level 3 is used, a CC-data-element may contain coded representations of any characters.

15 Use of control functions with the UCS

This coded character set provides for use of control functions encoded according to ISO/IEC 6429 or similarly structured standards for control functions, and standards derived from these. A set or subset of such coded control functions may be used in conjunction with this coded character set. These standards encode a control function as a sequence of one or more octets.

When a control character of ISO/IEC 6429 is used with this coded character set, its coded representation as specified in ISO/IEC 6429 shall be padded to correspond with the number of octets in the adopted form (see clause 13). Thus, the least significant octet shall be the bit combination specified in ISO/IEC 6429, and the more significant octet(s) shall be zeros.

For example, the control character FORM FEED is represented by "000C" in the two-octet form, and "0000 000C" in the four-octet form.

For escape sequences, control sequences, and control strings (see ISO/IEC 6429) consisting of a coded control character followed by additional bit combinations in the range 20 to 7F, each bit combination shall be padded by octet(s) with value 00.

For example, the escape sequence "ESC 02/00 04/00" is represented by "001B 0020 0040" in the two-octet form, and "0000 001B 0000 0020 0000 0040" in the four-octet form.

NOTE - The term “character” appears in the definition of many of the control functions specified in ISO/IEC 6429, to identify the elements on which the control functions will act. When such control functions are applied to coded characters according to ISO/IEC 10646 the action of those control functions will depend on the type of element from ISO/IEC 10646 that has been chosen, by the application, to be the element (or character) on which the control functions act. These elements may be chosen to be characters (non-combining characters and/or combining characters) or may be chosen in other ways (such as composite sequences) when applicable.

Code extension control functions for the ISO/IEC 2022 code extension techniques (such as designation escape sequence, single shift, and locking shift) shall not be used with this coded character set.

16 Declaration of identification of features

16.1 Purpose and context of identification

CC-data-elements conforming to ISO/IEC 10646 are intended to form all or part of a composite unit of coded information that is interchanged between an originator and a recipient. The identification of ISO/IEC 10646 (including the form), the implementation level, and any subset of the coding space that have been adopted by the originator must also be available to the recipient. The route by which such identification is communicated to the recipient is outside the scope of ISO/IEC 10646.

However, some standards for interchange of coded information may permit, or require, that the coded representation of the identification applicable to the CC-data-element forms a part of the interchanged information. This clause specifies a coded representation for the identification of UCS with an implementation level and a subset of ISO/IEC 10646, and also of a C0 and a C1 set of control functions from ISO/IEC 6429 for use in conjunction with ISO/IEC 10646. Such coded representations provide all or part of an identification data element, which may be included in information interchange in accordance with the relevant standard.

If two or more of the identifications are present, the order of those identifications shall follow the order as specified in this clause.

NOTE - An alternative method of identification is described in annex N.

16.2 Identification of UCS coded representation form with implementation level

When the escape sequences from ISO/IEC 2022 are used, the identification of a coded representation form of UCS (see clause 13) and an implementation level (see clause 14) specified by ISO/IEC 10646 shall be by a designation sequence chosen from the following list:

ESC 02/05 02/15 04/00
: UCS-2 with implementation level 1

ESC 02/05 02/15 04/01
: UCS-4 with implementation level 1

ESC 02/05 02/15 04/03
: UCS-2 with implementation level 2

ESC 02/05 02/15 04/04
: UCS-4 with implementation level 2

ESC 02/05 02/15 04/05
: UCS-2 with implementation level 3

ESC 02/05 02/15 04/06
: UCS-4 with implementation level 3

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 2022, it shall consist only of the sequences of bit combinations as shown above.

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 10646, it shall be padded in accordance with clause 15.

16.3 Identification of subsets of graphic characters

When the control sequences of ISO/IEC 6429 are used, the identification of subsets (see clause 12) specified by ISO/IEC 10646 shall be by a control sequence IDENTIFY UNIVERSAL CHARACTER SUBSET (IUCS) as shown below.

CSI Ps... 02/00 06/13

Ps... means that there can be any number of selective parameters. The parameters are to be taken from the subset collection numbers as shown in annex A of each part of ISO/IEC 10646. When there is more than one parameter, each parameter value is separated by an octet with value 03/11.

Parameter values are represented by digits where octet values 03/00 to 03/09 represent digits 0 to 9.

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 2022, it shall consist only of the sequences of bit combinations as shown above.

If such a control sequence appears within a CC-data-element conforming to ISO/IEC 10646, it shall be padded in accordance with clause 15.

16.4 Identification of control function set

When the escape sequences from ISO/IEC 2022 are used, the identification of each set of control functions (see clause 15) of ISO/IEC 6429 to be used in conjunction with ISO/IEC 10646 shall be an identifier sequence of the type shown below.

ESC 02/01 04/00	identifies the full C0 set of ISO/IEC 6429
ESC 02/02 04/03	identifies the full C1 set of ISO/IEC 6429

For a subset of C0 or C1 sets, the final octet F shall be obtained from the International Register of Coded Character Sets. The identifier sequences for these sets shall be:

ESC 02/01 F identifies a C0 set
ESC 02/02 F identifies a C1 set

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 2022, it shall consist only of the sequences of bit combinations as shown above.

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 10646, it shall be padded in accordance with clause 15.

16.5 Identification of the coding system of ISO/IEC 2022

When the escape sequences from ISO/IEC 2022 are used, the identification of a return, or transfer, from UCS to the coding system of ISO/IEC 2022 shall be by the escape sequence ESC 02/05 04/00. If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 10646, it shall be padded in accordance with clause 15.

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 2022, it shall consist only of the sequences of bit combinations as shown above.

NOTE - Escape sequence ESC 02/05 04/00 is normally used for return to the restored state of ISO/IEC 2022. The escape sequence ESC 02/05 04/00 specified here is sometimes not exactly as specified in ISO/IEC 2022 due to the presence of padding octets. For this reason the escape sequences in 16.2 for the identification of UCS include the octet 02/15 to indicate that the return does not always conform to that standard.

17 Structure of the code tables and lists

The clauses 26 and 27 set out the detailed code tables and the lists of character names for the graphic characters. Together, these specify graphic characters, their coded representation, and the character name for each character.

The graphic symbols are to be regarded as typical visual representations of the characters. ISO/IEC 10646 does not attempt to prescribe the exact shape of each character. The shape is affected by the design of the font employed, which is outside the scope of ISO/IEC 10646.

Graphic characters specified in ISO/IEC 10646 are uniquely identified by their names. This does not imply that the graphic symbols by which they are commonly imaged are always different. Examples of graphic characters with similar graphic symbols are LATIN CAPITAL LETTER A, GREEK CAPITAL LETTER ALPHA, and CYRILLIC CAPITAL LETTER A.

The meaning attributed to any character is not specified by ISO/IEC 10646; it may differ from country to country, or from one application to another.

For the alphabetic scripts, the general principle has been to arrange the characters within any row in approximate alphabetic sequence; where the script has capital and small letters, these are arranged in pairs. However, this general principle has been overridden in some cases. For example, for those scripts for which a relevant standard exists, the characters are allocated according to that standard. This arrangement within the code tables will aid conversion between the existing standards and this coded character set. In general, however, it is anticipated that conversion between this coded

character set and any other coded character set will use a table lookup technique.

It is not intended, nor will it often be the case, that the characters needed by any one user will be found all grouped together in one part of the code table.

Furthermore, the user of any script will find that needed characters may have been coded elsewhere in this coded character set. This especially applies to the digits, to the symbols, and to the use of Latin letters in dual-script applications. Therefore, in using this coded character set, the reader is advised to refer first to the block names list in annex A.2 or an overview of the BMP in figures 3 and 4, and then to turn to the specific code table rows for the relevant script and for symbols and digits. In addition, annex G contains an alphabetically sorted list of character names.

18 Block names

Named blocks of contiguous code positions are specified within a plane for the purpose of allocation of characters sharing some common characteristic, such as script. The blocks specified within the BMP are listed in A.2 of Annex A, and are illustrated in Figures 3 and 4.

19 Characters in bi-directional context

A class of left/right handed pairs of characters have special significance in the context of bi-directional text. In this context the terms LEFT or RIGHT in the character name are also intended to imply "opening" or "closing" forms of character shape, rather than a strict left-hand or right-hand form. These characters are listed below.

Code Position	Name
0028	LEFT PARENTHESIS
0029	RIGHT PARENTHESIS
005B	LEFT SQUARE BRACKET
005D	RIGHT SQUARE BRACKET
007B	LEFT CURLY BRACKET
007D	RIGHT CURLY BRACKET
2045	LEFT SQUARE BRACKET WITH QUILL
2046	RIGHT SQUARE BRACKET WITH QUILL
207D	SUPERSCRIPT LEFT PARENTHESIS
207E	SUPERSCRIPT RIGHT PARENTHESIS
208D	SUBSCRIPT LEFT PARENTHESIS
208E	SUBSCRIPT RIGHT PARENTHESIS
2329	LEFT-POINTING ANGLE BRACKET
232A	RIGHT-POINTING ANGLE BRACKET
3008	LEFT ANGLE BRACKET
3009	RIGHT ANGLE BRACKET
300A	LEFT DOUBLE ANGLE BRACKET
300B	RIGHT DOUBLE ANGLE BRACKET
300C	LEFT CORNER BRACKET
300D	RIGHT CORNER BRACKET
300E	LEFT WHITE CORNER BRACKET
300F	RIGHT WHITE CORNER BRACKET
3010	LEFT BLACK LENTICULAR BRACKET
3011	RIGHT BLACK LENTICULAR BRACKET
3014	LEFT TORTOISE SHELL BRACKET
3015	RIGHT TORTOISE SHELL BRACKET
3016	LEFT WHITE LENTICULAR BRACKET
3017	RIGHT WHITE LENTICULAR BRACKET
3018	LEFT WHITE TORTOISE SHELL BRACKET
3019	RIGHT WHITE TORTOISE SHELL BRACKET
301A	LEFT WHITE SQUARE BRACKET
301B	RIGHT WHITE SQUARE BRACKET

The interpretation and rendering of any of these characters depend on the state related to the symmetric swapping characters (see F.2.2) and on the direction of the character being rendered that are in effect at the point in the CC-data-element where the coded representation of the character appears.

For example, if the character ACTIVATE SYMMETRIC SWAPPING occurs and if the direction of the character is from right to left, the character shall be interpreted as if the term LEFT or RIGHT in its name had been replaced by the term RIGHT or LEFT, respectively.

NOTE - In the context of Arabic bi-directional text, certain mathematical symbols may also have special significance (see annex E).

20 Special characters

There are some characters that do not have printable graphic symbols. These characters include space characters. They are

Code Position	Name
0020	SPACE
00A0	NO-BREAK SPACE
2000	EN QUAD
2001	EM QUAD
2002	EN SPACE
2003	EM SPACE
2004	THREE-PER-EM SPACE
2005	FOUR-PER-EM SPACE
2006	SIX-PER-EM SPACE
2007	FIGURE SPACE
2008	PUNCTUATION SPACE
2009	THIN SPACE
200A	HAIR SPACE
3000	IDEOGRAPHIC SPACE

Currency symbols in ISO/IEC 10646 do not necessarily identify the currency of a country. For example, YEN SIGN can be used for Japanese yen and Chinese yuan. Also, DOLLAR SIGN is used in numerous countries including the United States of America.

There is a special class of characters called Alternate Format Characters which are included for compatibility with some industry practices. These are described in annex F.

21 Presentation forms of characters

Each presentation form of a character provides an alternative form, for use in a particular context, to the nominal form of the character or sequence of characters from the other zones of graphic characters. The transformation from the nominal form to the presentation forms may involve substitution, superimposition, or combination.

The rules for the superimposition, choice of differently shaped characters, or combination into ligatures, or conjuncts which are often of extreme complexity are not specified in ISO/IEC 10646.

In general, presentation forms are not intended to be used as a substitute for the nominal forms of the graphic characters specified elsewhere within this coded character set. However, specific applications may encode these presentation forms instead of the nominal forms for specific reasons among which is compatibility with existing devices. The rules for searching, sorting, and other processing operations on presentation forms are outside the scope of ISO/IEC 10646.

Within the BMP these characters are mostly allocated to positions in rows FB to FF.

22 Compatibility characters

Compatibility characters are included in ISO/IEC 10646 primarily for compatibility with existing coded character sets to allow two-way code conversion without loss of information.

Within the BMP many of these characters are allocated to positions within rows F9, FA, FE, and FF, and within rows 31 and 33. Some compatibility characters are also allocated within other rows.

23 Order of characters

Usually, coded characters appear in a CC-data-element in logical order (logical or backing store order corresponds approximately to the order in which characters are entered from the keyboard, after corrections such as insertions, deletions, and overtyping have taken place). This applies even when characters of different dominant direction are mixed: left-to-right (Greek, Latin, Thai) with right-to-left (Arabic, Hebrew), or with vertical (Mongolian) script.

Some characters may not appear linearly in final rendered text. For example, the medial form of the short i in Devanagari is displayed before the character that it logically follows in the CC-data-element.

24 Combining characters

This clause specifies the use of combining characters. A list of combining characters is shown in clause B.1. A list of combining characters not allowed in implementation level 2 is shown in clause B.2.

NOTE - The names of many script-independent combining characters contain the word "COMBINING".

24.1 Order of combining characters

Coded representations of combining characters shall follow that of the graphic character with which they are associated (for example, coded representations of LATIN SMALL LETTER A followed by COMBINING TILDE represent a composite sequence for Latin "ã").

If a combining character is to be regarded as a composite sequence in its own right, it shall be coded as a composite sequence by association with the character SPACE. For example, grave accent can be composed as SPACE followed by COMBINING GRAVE ACCENT.

NOTE - Indic matras form a special category of combining characters, since the presentation can depend on more than one of the surrounding characters. Thus it might not be desirable to associate Indic matra with the character SPACE.

24.2 Appearance in code tables

Combining characters intended to be positioned relative to the associated character are depicted within the character code tables above, below, to the right of, to the left of, in, around, or through a dotted circle. In presentation, these characters are intended to be positioned relative to the preceding base character in some manner, and not to stand alone or function as base characters. This is the motivation for the term "combining". Diacritics are the principal class of combining characters used in European alphabets.

In the code tables for some scripts, such as Hebrew, Arabic, and the scripts of India and South East Asia, combining characters are indicated in relation to dotted circles to show their position relative to the base character. Many of these combining characters encode vowel letters; as such they are not generally referred to as "diacritical marks".

24.3 Multiple combining characters

There are instances where more than one combining character is applied to a single graphic character. ISO/IEC 10646 does not restrict the number of combining characters that can follow a base character. The following rules shall apply:

a) If the combining characters can interact in presentation (for example, COMBINING MACRON and COMBINING DIAERESIS), then the position of

the combining characters in the resulting graphic display is determined by the order of the coded representation of the combining characters. The presentations of combining characters are to be positioned from the base character outward. For example, combining characters placed above a base character are stacked vertically, starting with the first encountered in the sequence of coded representations and continuing for as many marks above as are required by the coded combining characters following the coded base character. For combining characters placed below a base character, the situation is inverted, with the combining characters starting from the base character and stacking downward.

An example of multiple combining characters above the base character is found in Thai, where a consonant letter can have above it one of the vowels 0000 0E34 to 0000 0E37 and, above that, one of four tone marks 0000 0E48 to 0000 0E4B. The order of the coded representation is: base consonant, followed by a vowel, followed by a tone mark.

b) Some specific combining characters override the default stacking behaviour by being positioned horizontally rather than stacking, or by forming a ligature with an adjacent combining character. When positioned horizontally, the order of coded representations is reflected by positioning in the dominant order of the script with which they are used. For example, horizontal accents in a left-to-right script are coded left-to-right. Prominent characters that show such override behaviour are associated with specific scripts or alphabets. For example, the COMBINING GREEK KORONIS (0000 0343) requires that, together with a following acute or grave accent, they be rendered side-by-side above a letter, rather than the accent marks being stacked above the COMBINING GREEK KORONIS. The order of the coded representations is: the letter itself, followed by that of the breathing mark, followed by that of the accent marks. Two Vietnamese tone marks which have the same graphic appearance as the Latin acute and grave accent marks do not stack above the three Vietnamese vowel letters which already contain the circumflex diacritic (â, ê, ô). Instead, they form ligatures with the circumflex component of the vowel letters.

c) If the combining characters do not interact in presentation (for example, when one combining character is above a graphic character and another is below), the resultant graphic symbol from the base character and combining characters in different orders may appear the same. For example, the coded representations of LATIN SMALL LETTER A, followed by COMBINING CARON, followed by COMBINING OGONEK may result in the same graphic symbol as the coded representations of LATIN SMALL LETTER A, followed by COMBINING OGONEK, followed by COMBINING CARON.

Combining characters in Hebrew or Arabic scripts do not normally interact. Therefore, the sequence of their coded representations in a composite sequence does not affect its graphic symbol. The rules for forming the combined graphic symbol are beyond the scope of ISO/IEC 10646.

NOTE - Where combining characters are used for the generation of composite sequences in implementation level 3, this facility may be used to provide an alternative coded representation of text. For example, in implementation level 3 the French word "là" may be represented by the characters LATIN SMALL LETTER L followed by LATIN SMALL LETTER A WITH GRAVE, or may be represented by the characters LATIN SMALL LETTER L followed by LATIN SMALL LETTER A followed by COMBINING GRAVE ACCENT.

24.4 Collections containing combining characters

In some collections of characters listed in annex A, such as collections 14 (BASIC ARABIC) or 25 (THAI), both combining characters and non-combining characters are included.

When implementation level 1 or 2 is adopted, a CC-data-element shall not contain the coded representations of combining characters listed in annex B, even though the adopted subset may include them.

Other collections of characters listed in annex A comprise only combining characters, for example collection 7 (COMBINING DIACRITICAL MARKS). Such a collection shall not be included in the adopted subset when implementation level 1 is adopted.

25 Special features of individual scripts

25.1 Hangul syllable composition method

In rendering, a sequence of Hangul Jamo (from HANGUL JAMO block: 1100 to 11FF) are displayed as a series of syllable blocks. Jamo can be classified into three classes: Choseong (syllable-initial character), Jungseong (syllable-peak character), and Jongseong (syllable-final character). A complete syllable block is composed of a Choseong and a Jungseong, and optionally a Jongseong.

An incomplete syllable is a string of one or more characters which does not constitute a complete syllable (for example, a Choseong alone, a Jungseong alone, a Jongseong alone, or a Jungseong followed by a Jongseong). An incomplete syllable which starts with a Jungseong or a Jongseong must be preceded by a CHOSEONG

FILLER (0000 115F). An incomplete syllable composed of a Choseong alone must be followed by a JUNGSEONG FILLER (0000 1160).

The implementation level 3 shall be used for the Hangul syllable composition method.

NOTES

1 Hangul Jamo are not combining characters.

2 When a combining character such as HANGUL SINGLE DOT TONE MARK (0000 302E) is intended to apply to a sequence of Hangul Jamo it should be placed at the end of the sequence, after the Hangul Jamo character which completes the syllable block.

25.2 Features of Indic alphabetic scripts

In the tables for Rows 09 to 0D and 0F, and for the MYANMAR block in Row 10, of the BMP (see 26) the graphic symbols shown for some characters appear to be formed as compounds of the graphic symbols for two other characters in the same table.

Examples:

Row 0B Tamil. The graphic symbol for 0B94 TAMIL LETTER AU appears is if it is constructed from the graphic symbols for:

0B93 TAMIL LETTER OO and 0BD7 TAMIL AU LENGTH MARK

Row 0D Malayalam. The graphic symbol for 0D4A MALAYALAM VOWEL SIGN O appears as if it is constructed from the graphic symbols for:

0D46 MALAYALAM VOWEL SIGN E and 0D3E MALAYALAM VOWEL SIGN AA

In such cases a single coded character may appear to the user to be equivalent to the sequence of two coded characters whose graphic symbols, when combined, are visually similar to the graphic symbol of that single character, as in a composite sequence (4.14).

In Levels 1 and 2 a "unique-spelling" rule shall apply. When this rule applies, no coded character from a table for Rows 09 to 0D or 0F, or for the MYANMAR block in Row 10, shall be regarded as equivalent to a sequence of two or more other coded characters taken from the same table.

NOTE - In Levels 1 and 2, if such a sequence occurs in a CC-data-element it is always made available to the user as two distinct characters in accordance with their respective character names.

26 Code tables and lists of character names

26.1 General

An overview of the Basic Multilingual Plane is shown in figure 3. Detailed code tables and lists of character names for the Basic Multilingual Plane are shown on the following pages and in applicable Amendments.

Guidelines to be used for constructing names of characters are given in annex L for information. In some cases, a name of a character is followed by additional explanatory statements not part of the name. These statements are in parentheses and not in capital letters except for the initials of the word, where required.

26.2 Character names and annotations for Hangul syllables

Names for the Hangul syllable characters in code positions (hex) 0000 AC00 - 0000 D7A3 are derived from their code position numbers by the numerical procedure described below. Lists of names for these characters are not provided.

1. Obtain the code position number of the Hangul syllable character. It is of the form 0000 $h_1h_2h_3h_4$ where h_1, h_2, h_3, and h_4 are hexadecimal digits; h_1h_2 is the Row number within the BMP and h_3h_4 is the cell number within the row. The number $h_1h_2h_3h_4$ lies within the range AC00 to D7A3.

2. Derive the decimal numbers d_1, d_2, d_3, d_4 that are numerically equal to the hexadecimal digits h_1, h_2, h_3, h_4 respectively.

3. Calculate the character index C from the formula:

$$C = 4096 \times (d_1 - 10) + 256 \times (d_2 - 12) + 16 \times d_3 + d_4$$

Note: If $C < 0$ or $> 11{,}171$ then the character is not in the HANGUL SYLLABLES block.

4. Calculate the syllable component indices I, P, F from the following formulae:

$I = C / 588$ (Note: $0 \le I \le 18$)

$P = (C \% 588) / 28$ (Note: $0 \le P \le 20$)

$F = C \% 28$ (Note: $0 \le F \le 27$)

where "/" indicates integer division (i.e. x / y is the integer quotient of the division), and "%" indicates the modulo operation (i.e. $x \% y$ is the remainder after the integer division x / y).

5. Obtain the Latin character strings that correspond to the three indices I, P, F from columns 2, 3, and 4 respectively of Table 1 below (for $I = 11$ and for $F = 0$ the corresponding strings are null). Concatenate these three strings in left-to-right order to make a single string, the syllable-name.

6. The character name for the character at position 0000 $h_1h_2h_3h_4$ is then:

HANGUL SYLLABLE *s-n*

where "*s-n*" indicates the syllable-name string derived in step 5.

Example.
For the character in code position D4DE:
d_1 = 13, d_2 = 4, d_3 = 13, d_4 = 14.
C = 10462
I = 17, P = 16, F = 18.
The corresponding Latin character strings are:
P , WI, BS.
The syllable-name is PWIBS, and the character name is:
HANGUL SYLLABLE PWIBS

Annotations for the Hangul syllable characters in code positions (hex) 0000 AC00 - 0000 D7A3 are also derived from their code position numbers by a similar numerical procedure described below.

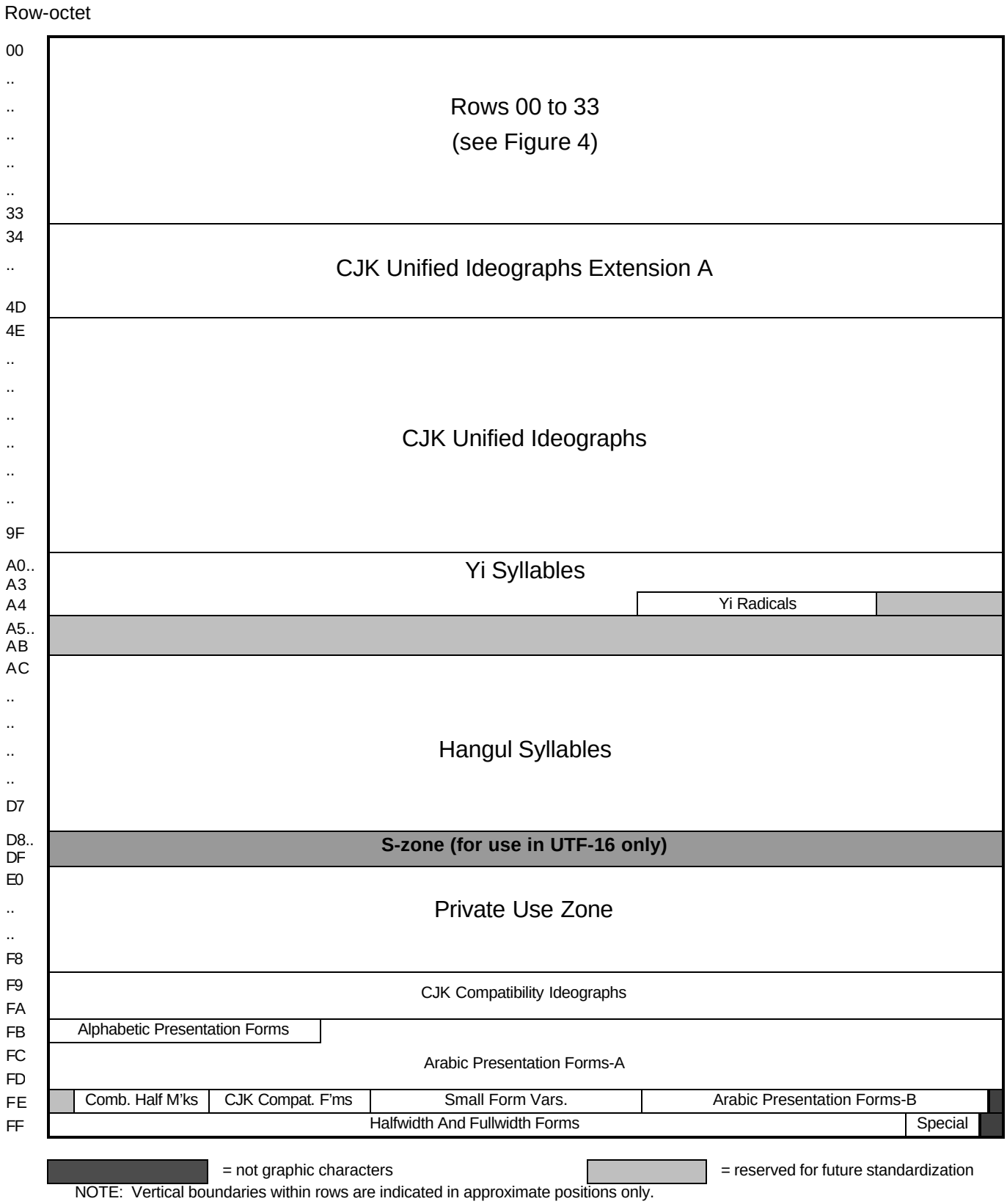
7. Carry out steps 1 to 4 as described above.

8. Obtain the Latin character strings that correspond to the three indices I, P, F from columns 5, 6, and 7 respectively of Table 1 below (for I = 11 and for F = 0 the corresponding strings are null). Concatenate these three strings in left-to-right order to make a single string, and enclose it within parentheses to form the annotation.

Example.
For the character in code position D4DE:
d_1 = 13, d_2 = 4, d_3 = 13, d_4 = 14.
C = 10462
I = 17, P = 16, F = 18.
The corresponding Latin character strings are:
ph, wi, ps,
and the annotation is (phwips).

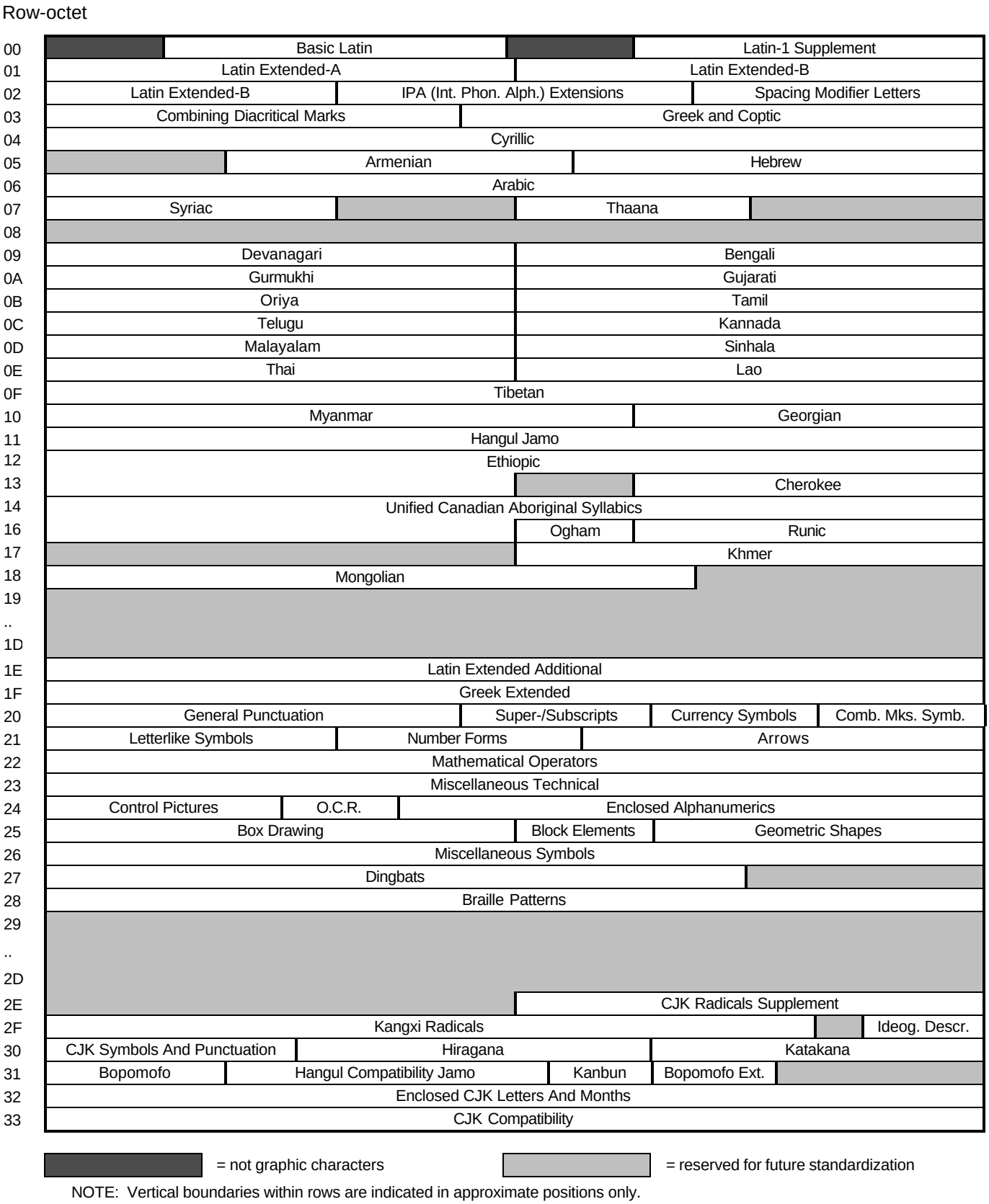
Table 1: Elements of Hangul syllable names and annotations

	Syllable name elements			Annotation elements		
Index number	I string	P string	F string	I string	P string	F string
0	G	A		k	a	
1	GG	AE	G	kk	ae	k
2	N	YA	GG	n	ya	kk
3	D	YAE	GS	t	yae	ks
4	DD	EO	N	tt	eo	n
5	R	E	NJ	r	e	nc
6	M	YEO	NH	m	yeo	nh
7	B	YE	D	p	ye	t
8	BB	O	L	pp	o	l
9	S	WA	LG	s	wa	lk
10	SS	WAE	LM	ss	wae	lm
11		OE	LB		oe	lp
12	J	YO	LS	c	yo	ls
13	JJ	U	LT	cc	u	lth
14	C	WEO	LP	ch	weo	lph
15	K	WE	LH	kh	we	lh
16	T	WI	M	th	wi	m
17	P	YU	B	ph	yu	p
18	H	EU	BS	h	eu	ps
19		YI	S		yi	s
20		I	SS		i	ss
21			NG			ng
22			J			c
23			C			ch
24			K			kh
25			T			th
26			P			ph
27			H			h



NOTE: Vertical boundaries within rows are indicated in approximate positions only.

Figure 3 - Overview of the Basic Multilingual Plane



NOTE: Vertical boundaries within rows are indicated in approximate positions only.

Figure 4 - Overview of Rows 00 to 33 of the Basic Multilingual Plane

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Tables of character graphic symbols and character names
for Rows 00 to 33, A0 to D7, and F9 to FF
will appear on the following pages in the Final Text.
(estimate: 280 pages)

27 CJK unified ideographs

Detailed code tables for:
- CJK (Chinese / Japanese / Korean) Unified Ideographs Extension A (starting at code position 3400), and
- CJK Unified Ideographs (starting at code position 4E00),

are shown on the following pages.

Entries in the code tables for both CJK Unified Ideographs and its Extension A are arranged as follows.

Row/Cell Hex code	C G- Hanzi	-T	J Kanji	K Hanja	V ChuNom
078/000					
4E00	0-523B 0-5027	1-4421 1-3601	0-306C 0-1676	0-6C69 0-7673	1-2121 1-0101

NOTE - Under each ideograph the two lines of numbers indicate the source code positions; the first line shows hexdecimal values, the second line shows decimal values.

The leftmost column of an entry shows the code position in ISO/IEC 10646, giving the code representation both in decimal and in hexadecimal notation.

Each of the other columns shows the graphic symbol for the character, and its coded representation, as specified in a source standard for character sets that is also identified in the table entry. Each of these source standards is assigned to one of five groups indicated by G, T, J, K, or V as shown in the lists below. In each table entry, a separate column is assigned for the corresponding character (if any) from each of those groups of source standards.

An entry in any of the G, T, J, K, or V columns includes a sample graphic symbol from the source character set standard, together with its coded representation in that standard. The first line below the graphic symbol shows the coded representation in hexadecimal notation. The second line shows the coded representation in decimal notation which comprises two digits for section number followed by two digits for position number. Each of the coded representations is prefixed by a one-character source code identification followed by a hyphen. This source code character identifies the coded character set standard from which the character is taken as shown in the lists below.

Hanzi G sources are

G0	GB2312-80
G1	GB12345-90 with 58 Hong Kong and 92 Korean “Idu” characters
G3	GB7589-87 unsimplified forms
G5	GB7590-87 unsimplified forms
G7	General Purpose Hanzi List for Modern Chinese Language, and General List of Simplified Hanzi
GS	Singapore Characters
G8	GB8565-88
GE	GB16500-95

Hanzi T sources are

T1	TCA-CNS 11643-1992 1st plane
T2	TCA-CNS 11643-1992 2nd plane
T3	TCA-CNS 11643-1992 3rd plane with some additional characters
T4	TCA-CNS 11643-1992 4th plane
T5	TCA-CNS 11643-1992 5th plane
T6	TCA-CNS 11643-1992 6th plane
T7	TCA-CNS 11643-1992 7th plane
TF	TCA-CNS 11643-1992 15th plane

Kanji J sources are

J0	JIS X 0208-1990
J1	JIS X 0212-1990
JA	Unified Japanese IT Vendors Contemporary Ideographs, 1993

Hanja K sources are

K0	KS C 5601-1987
K1	KS C 5657-1991
K2	PKS C 5700-1 1994
K3	PKS C 5700-2 1994

ChuNom V sources are

V0	TCVN 5773:1993
V1	TCVN 6056:1995

For CJK (Chinese/Japanese/Korean) Ideographs in the BMP, the names shall be algorithmically constructed by appending their two-octet coded representation in hexadecimal notation to “CJK UNIFIED IDEOGRAPH-”. For example, the first CJK ideograph character in the BMP has the name “CJK UNIFIED IDEOGRAPH-3400”.

Tables of character graphic symbols for Rows 34 to 9F
will appear on this and following pages in the Final Text.
(estimate 574 pages)

Annex A
(normative)

Collections of graphic characters for subsets

A.1 Collections of coded graphic characters

The collections listed below are ordered by collection number. An * in the “positions” column indicates that the collection is a fixed collection.

See Note 2 for an alphabetically-ordered index of the principal terms used in the names of these collections.

NOTE 1 - Use of implementation levels 1 and 2 restricts the repertoire of some character collections (see 24.4). Collections which include combining characters are 7, 10, 13 to 26, 35, 49 , 50, 63, 65, 72, 84, 85, 86, 87, 88, 89, 90, and 91.

Collection number and name	Positions
1 BASIC LATIN	0020 - 007E *
2 LATIN-1 SUPPLEMENT *	00A0 - 00FF
3 LATIN EXTENDED-A	0100 - 017F *
4 LATIN EXTENDED-B	0180 - 024F
5 IPA EXTENSIONS	0250 - 02AF
6 SPACING MODIFIER LETTERS	02B0 - 02FF
7 COMBINING DIACRITICAL MARKS	0300 - 036F
8 BASIC GREEK	0370 - 03CF
9 GREEK SYMBOLS AND COPTIC	03D0 - 03FF
10 CYRILLIC	0400 - 04FF
11 ARMENIAN	0530 - 058F
12 BASIC HEBREW *	05D0 - 05EA
13 HEBREW EXTENDED	0590 - 05CF 05EB - 05FF
14 BASIC ARABIC	0600 - 065F
15 ARABIC EXTENDED	0660 - 06FF
16 DEVANAGARI	0900 - 097F 200C, 200D
17 BENGALI	0980 - 09FF 200C, 200D
18 GURMUKHI	0A00 - 0A7F 200C, 200D
19 GUJARATI	0A80 - 0AFF 200C, 200D
20 ORIYA	0B00 - 0B7F 200C, 200D
21 TAMIL	0B80 - 0BFF 200C, 200D
22 TELUGU	0C00 - 0C7F 200C, 200D
23 KANNADA	0C80 - 0CFF 200C, 200D
24 MALAYALAM	0D00 - 0D7F 200C, 200D
25 THAI	0E00 - 0E7F
26 LAO	0E80 - 0EFF
27 BASIC GEORGIAN	10D0 - 10FF
28 GEORGIAN EXTENDED	10A0 - 10CF
29 HANGUL JAMO	1100 - 11FF
30 LATIN EXTENDED ADDITIONAL	1E00 - 1EFF
31 GREEK EXTENDED	1F00 - 1FFF
32 GENERAL PUNCTUATION	2000 - 206F
33 SUPERSCRIPTS AND SUBSCRIPTS	2070 - 209F
34 CURRENCY SYMBOLS	20A0 - 20CF
35 COMBINING DIACRITICAL MARKS FOR SYMBOLS	20D0 - 20FF
36 LETTERLIKE SYMBOLS	2100 - 214F
37 NUMBER FORMS	2150 - 218F
38 ARROWS	2190 - 21FF
39 MATHEMATICAL OPERATORS	2200 - 22FF
40 MISCELLANEOUS TECHNICAL	2300 - 23FF
41 CONTROL PICTURES	2400 - 243F
42 OPTICAL CHARACTER RECOGNITION	2440 - 245F
43 ENCLOSED ALPHANUMERICS	2460 - 24FF
44 BOX DRAWING	2500 - 257F *
45 BLOCK ELEMENTS	2580 - 259F
46 GEOMETRIC SHAPES	25A0 - 25FF

47	MISCELLANEOUS SYMBOLS	2600 - 26FF
48	DINGBATS	2700 - 27BF
49	CJK SYMBOLS AND PUNCTUATION	3000 - 303F
50	HIRAGANA	3040 - 309F
51	KATAKANA	30A0 - 30FF
52	BOPOMOFO	3100 - 312F 31A0 - 31BF
53	HANGUL COMPATIBILITY JAMO	3130 - 318F
54	CJK MISCELLANEOUS	3190 - 319F
55	ENCLOSED CJK LETTERS AND MONTHS	3200 - 32FF
56	CJK COMPATIBILITY	3300 - 33FF
57	[deleted at Amd.5]	
58	[deleted at Amd.5]	
58	[deleted at Amd.5]	
60	CJK UNIFIED IDEOGRAPHS	4E00 - 9FFF
61	PRIVATE USE AREA	E000 - F8FF
62	CJK COMPATIBILITY IDEOGRAPHS	F900 - FAFF
63	ALPHABETIC PRESENTATION FORMS	FB00 - FB4F
64	ARABIC PRESENTATION FORMS-A	FB50 - FDFF
65	COMBINING HALF MARKS	FE20 - FE2F
66	CJK COMPATIBILITY FORMS	FE30 - FE4F
67	SMALL FORM VARIANTS	FE50 - FE6F
68	ARABIC PRESENTATION FORMS-B	FE70 - FEFE
69	HALFWIDTH AND FULLWIDTH FORMS	FF00 - FFEF
70	SPECIALS	FFF0 - FFFD
71	HANGUL SYLLABLES *	AC00 - D7A3
72	BASIC TIBETAN	0F00 - 0FBF
73	ETHIOPIC	1200 - 137F
74	UNIFIED CANADIAN ABORIGINAL SYLLABICS	1400 - 167F
75	CHEROKEE	13A0 - 13FF
76	YI SYLLABLES	A000 - A48F
77	YI RADICALS	A490 - A4CF
78	KANGXI RADICALS	2F00 - 2FDF
79	CJK RADICALS SUPPLEMENT	2E80 - 2EFF
80	BRAILLE PATTERNS	2800 - 28FF
81	CJK UNIFIED IDEOGRAPHS EXTENSION A	3400 - 4DBF
82	OGHAM	1680 - 169F
83	RUNIC	16A0 - 16FF
84	SINHALA	0D80 - 0DFF
85	SYRIAC	0700 - 074F
86	THAANA	0780 - 07BF
87	BASIC MYANMAR	1000 - 104F 200C, 200D
88	KHMER	1780 - 17FF 200C, 200D
89	MONGOLIAN	1800 - 18AF
90	EXTENDED MYANMAR	1050 - 109F
91	TIBETAN	0F00 - 0FFF

The following collections specify characters used for alternate formats and script-specific formats. See annex F for more information.

200	ZERO-WIDTH BOUNDARY INDICATORS	200B - 200D FEFF
201	FORMAT SEPARATORS	2028 - 2029
202	BI-DIRECTIONAL FORMAT MARKS	200E - 200F
203	BI-DIRECTIONAL FORMAT EMBEDDINGS	202A - 202E
204	HANGUL FILL CHARACTERS	3164, FFA0
205	CHARACTER SHAPING SELECTORS	206A - 206D
206	NUMERIC SHAPE SELECTORS	206E - 206F
207	IDEOGRAPHIC DESCRIPTION CHARACTERS	2FF0 - 2FFF

The following specify collections which are the union of particular collections defined above.

250	GENERAL FORMAT CHARACTERS	Collections 200 - 203
251	SCRIPT-SPECIFIC FORMAT CHARACTERS	Collections 204 - 207

The following specify other collections.

270	COMBINING CHARACTERS	characters specified in annex B.1

271	COMBINING CHARACTERS B-2	characters specified in annex B.2	
[299	BMP FIRST EDITION]	see A.3	*]
300	BMP	0000 - D7FF E000 - FFFD	
301	BMP-AMD.7	see A.3	*
302	BMP SECOND EDITION	see A.3	*

The following collections are outside the Basic Multilingual Plane.

400	PRIVATE USE PLANES	G=00, P=0F, 10, & E0 - FF
500	PRIVATE USE GROUPS	G=60 - 7F

NOTE 2 - The principal terms (keywords) used in the collection names shown above are listed below in alphabetical order. The entry for a term shows the collection number of every collection whose name includes the term. These terms do not provide a complete cross-reference to all the collections where characters sharing a particular attribute, such as script name, may be found. Although most of the terms identify an attribute of the characters within the collection, some characters that possess that attribute may be present in other collections whose numbers do not appear in the entry for that term.

Alphabetic	63
Alphanumeric	43
Arabic	14 15 64 68
Armenian	11
Arrows	38
Bengali	17
Bi-directional	202 203
Block elements	45
BMP	300 301 302 (299)
Box drawing	44
Bopomofo	52
Braille patterns	80
Canadian Aboriginal	74
Cherokee	75
CJK	49 54 55 56 60 62 66 78 81
Combining	7 35 65 270 271
Compatibility	53 56 62 66
Control pictures	41
Coptic	9
Currency	34
Cyrillic	10
Devanagari	16
Diacritical marks	7 35
Dingbats	48
Enclosed	43 55
Ethiopic	73
Format	201 202 203 250 251
Fullwidth	69
Geometric shapes	46
Georgian	27 28
Greek	8 9 31
Gujarati	19
Gurmukhi	18
Half (marks, width)	65 69
Hangul	29 53 71 204
Hebrew	12 13
Hiragana	50
Ideographs	60 62 81 207
IPA extensions	5
Jamo	29 53
Kangxi	78
Kannada	23
Katakana	51
Khmer	88
Lao	26
Latin	1 2 3 4 30
Letter	36 55
Malayalam	24
Mathematical operators	39
Mongolian	89
Months	55
Myanmar	87 90
Number	37
Ogham	82
Optical character recognition	42
Oriya	20
Presentation forms	63 64 68
Private use	61 400 500
Punctuation	32 49
Radicals	77 78 79
Runic	83
Shape, shaping	205 206
Sinhala	84
Small form	67
Spacing modifier	6
Specials	70
Subscripts, superscripts	33
Syllables, syllabics	71 74 76
Symbols	9 34 35 36 47 49
Syriac	85
Tamil	21
Technical	40
Telugu	22
Thaana	86
Thai	25
Tibetan	72 91
Yi	76 77
Zero-width	200

A.2 Blocks in the BMP

The following blocks are specified in the Basic Multilingual Plane. They are ordered by code position.

Block name	from to
BASIC LATIN	0020 - 007E
LATIN-1 SUPPLEMENT	00A0 - 00FF
LATIN EXTENDED-A	0100 - 017F
LATIN EXTENDED-B	0180 - 024F
IPA (INTERNATIONAL PHONETIC ALPHABET) EXTENSIONS	0250 - 02AF
SPACING MODIFIER LETTERS	02B0 - 02FF
COMBINING DIACRITICAL MARKS	0300 - 036F
GREEK AND COPTIC	0370 - 03FF
CYRILLIC	0400 - 04FF
ARMENIAN	0530 - 058F
HEBREW	0590 - 05FF
ARABIC	0600 - 06FF
SYRIAC	0700 - 074F
THAANA	0780 - 07BF

DEVANAGARI	0900 - 097F
BENGALI	0980 - 09FF
GURMUKHI	0A00 - 0A7F
GUJARATI	0A80 - 0AFF
ORIYA	0B00 - 0B7F
TAMIL	0B80 - 0BFF
TELUGU	0C00 - 0C7F
KANNADA	0C80 - 0CFF
MALAYALAM	0D00 - 0D7F
SINHALA	0D80 - 0DFF
THAI	0E00 - 0E7F
LAO	0E80 - 0EFF
TIBETAN	0F00 - 0FFF
MYANMAR	1000 - 109F
GEORGIAN	10A0 - 10FF
HANGUL JAMO	1100 - 11FF
ETHIOPIC	1200 - 137F
CHEROKEE	13A0 - 13FF
UNIFIED CANADIAN ABORIGINAL SYLLABICS	1400 - 167F
OGHAM	1680 - 169F
RUNIC	16A0 - 16FF
KHMER	1780 - 17FF
MONGOLIAN	1800 - 18AF
LATIN EXTENDED ADDITIONAL	1E00 - 1EFF
GREEK EXTENDED	1F00 - 1FFF
GENERAL PUNCTUATION	2000 - 206F
SUPERSCRIPTS AND SUBSCRIPTS	2070 - 209F
CURRENCY SYMBOLS	20A0 - 20CF
COMBINING DIACRITICAL MARKS FOR SYMBOLS	20D0 - 20FF
LETTERLIKE SYMBOLS	2100 - 214F
NUMBER FORMS	2150 - 218F
ARROWS	2190 - 21FF
MATHEMATICAL OPERATORS	2200 - 22FF
MISCELLANEOUS TECHNICAL	2300 - 23FF
CONTROL PICTURES	2400 - 243F
OPTICAL CHARACTER RECOGNITION	2440 - 245F
ENCLOSED ALPHANUMERICS	2460 - 24FF
BOX DRAWING	2500 - 257F
BLOCK ELEMENTS	2580 - 259F
GEOMETRIC SHAPES	25A0 - 25FF
MISCELLANEOUS SYMBOLS	2600 - 26FF
DINGBATS	2700 - 27BF
BRAILLE PATTERNS	2800 - 28FF
CJK RADICALS SUPPLEMENT	2E80 - 2EFF
KANGXI RADICALS	2F00 - 2FDF
IDEOGRAPHIC DESCRIPTION CHARACTERS	2FF0 - 2FFF
CJK SYMBOLS AND PUNCTUATION	3000 - 303F
HIRAGANA	3040 - 309F
KATAKANA	30A0 - 30FF
BOPOMOFO	3100 - 312F
HANGUL COMPATIBILITY JAMO	3130 - 318F
KANBUN (CJK miscellaneous)	3190 - 319F
BOPOMOFO EXTENDED	31A0 - 31BF
ENCLOSED CJK LETTERS AND MONTHS	3200 - 32FF
CJK COMPATIBILITY	3300 - 33FF
CJK UNIFIED IDEOGRAPHS EXTENSION A	3400 - 4DBF
CJK UNIFIED IDEOGRAPHS	4E00 - 9FFF
YI SYLLABLES	A000 - A48F
YI RADICALS	A490 - A4CF
HANGUL SYLLABLES	AC00 - D7A3
PRIVATE USE AREA	E000 - F8FF
CJK COMPATIBILITY IDEOGRAPHS	F900 - FAFF
ALPHABETIC PRESENTATION FORMS	FB00 - FB4F
ARABIC PRESENTATION FORMS-A	FB50 - FDFF
COMBINING HALF MARKS	FE20 - FE2F
CJK COMPATIBILITY FORMS	FE30 - FE4F
SMALL FORM VARIANTS	FE50 - FE6F
ARABIC PRESENTATION FORMS-B	FE70 - FEFE
HALFWIDTH AND FULLWIDTH FORMS	FF00 - FFEF
SPECIALS	FFF0 - FFFD

A.3 Fixed collections of the whole BMP

A.3.1 301 BMP-AMD.7

The collection 301 BMP-AMD.7 is specified below as a fixed collection (4.19). It comprises only those coded characters that were in the BMP after amendments up to, but not after, AMD.7 were appplied to this International Standard. Accordingly the repertoire of this collection is not subject to change if new characters are added to the BMP by any subsequent amendments.

NOTE - The repertoire of the collection 300 BMP is subject to change if new characters are added to the BMP by an amendment to this International Standard.

301 BMP-AMD.7 is specified by the following ranges of code positions as indicated for each row or contiguous series of rows.

Rows	Positions (cells)
00	20-7E A0-FF
01	00-F5 FA-FF
02	00-17 50-A8 B0-DE E0-E9
03	00-45 60-61 74-75 7A 7E 84-8A 8C 8E-A1 A3-CE D0-D6 DA DC DE E0 E2-F3
04	01-0C 0E-4F 51-5C 5E-86 90-C4 C7-C8 CB-CC D0-EB EE-F5 F8-F9
05	31-56 59-5F 61-87 89 91-A1 A3-B9 BB-C4 D0-EA F0-F4
06	0C 1B 1F 21-3A 40-52 60-6D 70-B7 BA-BE C0-CE D0-ED F0-F9
09	01-03 05-39 3C-4D 50-54 58-70 81-83 85-8C 8F-90 93-A8 AA-B0 B2 B6-B9 BC BE-C4 C7-C8 CB-CD D7 DC-DD DF-E3 E6-FA
0A	02 05-0A 0F-10 13-28 2A-30 32-33 35-36 38-39 3C 3E-42 47-48 4B-4D 59-5C 5E 66-74 81-83 85-8B 8D 8F-91 93-A8 AA-B0 B2-B3 B5-B9 BC-C5 C7-C9 CB-CD D0 E0 E6-EF
0B	01-03 05-0C 0F-10 13-28 2A-30 32-33 36-39 3C-43 47-48 4B-4D 56-57 5C-5D 5F-61 66-70 82-83 85-8A 8E-90 92-25 99-9A 9C 9E-9F A3-A4 A8-AA AE-B5 B7-B9 BE-C2 C6-C8 CA-CD D7 E7-F2
0C	01-03 05-0C 0E-10 12-28 2A-33 35-39 3E-44 46-48 4A-4D 55-56 60-61 66-6F 82-83 85-8C 8E-90 92-A8 AA-B3 B5-B9 BE-C4 C6-C8 CA-CD D5-D6 DE E0-E1 E6-EF
0D	02-03 05-0C 0E-10 12-28 2A-39 3E-43 46-48 4A-4D 57 60-61 66-6F
0E	01-3A 3F-5B 81-82 84 87-88 8A 8D 94-97 99-9F A1-A3 A5 A7 AA-AB AD-B9 BB-BD C0-C4 C6 C8-CD D0-D9 DC-DD

0F	00-47 49-69 71-8B 90-95 97 99-AD B1-B7 B9
10	A0-C5 D0-F6 FB
11	00-59 5F-A2 A8-F9
1E	00-9B A0-F9
1F	00-15 18-1D 20-45 48-4D 50-57 59 5B 5D 5F-7D 80-B4 B6-C4 C6-D3 D6-DB DD-EF F2-F4 F6-FE
20	00-2E 30-46 6A-70 74-8E A0-AB D0-E1
21	00-38 53-82 90-EA
22	00-F1
23	00 02-7A
24	00-24 40-4A 60-EA
25	00-95 A0-EF
26	00-13 1A-6F
27	01-04 06-09 0C-27 29-4B 4D 4F-52 56 58-5E 61-67 76-94 98-AF B1-BE
30	00-37 3F 41-94 99-9E A1-FE
31	05-2C 31-8E 90-9F
32	00-1C 20-43 60-7B 7F-B0 C0-CB D0-FE
33	00-76 7B-DD E0-FE
4E-9F	4E00-9FA5
AC-D7	AC00-D7A3
E0-F8	E000-F8FF
F9-FA	F900-FA2D
FB	00-06 13-17 1E-36 38-3C 3E 40-41 43-44 46-B1 D3-FF
FC	00-FF
FD	00-3F 50-8F 92-C7 F0-FB
FE	20-23 30-44 49-52 54-66 68-6B 70-72 74 76-FC FF
FF	01-5E 61-BE C2-C7 CA-CF D2-D7 DA-DC E0-E6 E8-EE FD

A.3.2 299 BMP FIRST EDITION

The collection number and collection name:

299 BMP FIRST EDITION

have been reserved to identify the fixed collection comprising all of the coded characters that were in the BMP in the First Edition of this International Standard. This collection is not now in conformity with this International Standard.

NOTE - The specification of collection 299 BMP FIRST EDITION consisted of the specification of collection 301 BMP-AMD.7 except for the replacement of the corresponding entries in the list above with the entries shown below:

rows	positions
05	31-56 59-5F 61-87 89 B0-B9 BB-C3 D0-EA F0-F4
0F	[no positions]
1E	00-9A A0-F9
20	00-2E 30-46 6A-70 74-8E A0-AA D0-E1
AC-D7	[no positions]

and by including an additional entry:

34-4D 3400-4DFF

for the code position ranges of three collections (57, 58, 59) of coded characters which have been deleted from this International Standard since the First Edition.

A.3.3 302 BMP SECOND EDITION

The fixed collection 302 BMP SECOND EDITION comprises only those coded characters that are in the BMP in this Second Edition of ISO/IEC 10646-1. The repertoire of this collection is not subject to change if new characters are added to the BMP by any subsequent amendments.

302 BMP SECOND EDITION is specified by the following ranges of code positions as indicated for each row or contiguous series of rows.

Rows	Positions (cells)
00	20-7E A0-FF
01	00-FF
02	00-33 50-AD B0-EE
03	00-4E 60-62 74-75 7A 7E 84-8A 8C 8E-A1 A3-CE D0-D7 DA-F3
04	00-86 88-89 8C-CE D0-F5 F8-F9
05	31-56 59-5F 61-87 89-8A 91-A1 A3-B9 BB-C4 D0-EA F0-F4
06	0C 1B 1F 21-3A 40-55 60-6D 70-ED..F0-FE
07	00-0D 0F-2C 30-4A 80-BF
09	01-03 05-39 3C-4D 50-54 58-70 81-83 85-8C 8F-90 93-A8 AA-B0 B2 B6-B9 BC BE-C4 C7-C8 CB-CD D7 DC-DD DF-E3 E6-FA
0A	02 05-0A 0F-10 13-28 2A-30 32-33 35-36 38-39 3C 3E-42 47-48 4B-4D 59-5C 5E 66-74 81-83 85-8B 8D 8F-91 93-A8 AA-B0 B2-B3 B5-B9 BC-C5 C7-C9 CB-CD D0 E0 E6-EF
0B	01-03 05-0C 0F-10 13-28 2A-30 32-33 36-39 3C-43 47-48 4B-4D 56-57 5C-5D 5F-61 66-70 82-83 85-8A 8E-90 92-25 99-9A 9C 9E-9F A3-A4 A8-AA AE-B5 B7-B9 BE-C2 C6-C8 CA-CD D7 E7-F2
0C	01-03 05-0C 0E-10 12-28 2A-33 35-39 3E-44 46-48 4A-4D 55-56 60-61 66-6F 82-83 85-8C 8E-90 92-A8 AA-B3 B5-B9 BE-C4 C6-C8 CA-CD D5-D6 DE E0-E1 E6-EF
0D	02-03 05-0C 0E-10 12-28 2A-39 3E-43 46-48 4A-4D 57 60-61 66-6F 82-83 85-96 9A-B1 B3-BB BD C0-C6 CA CF-D4 D6 D8-DF F2-F4
0E	01-3A 3F-5B 81-82 84 87-88 8A 8D 94-97 99-9F A1-A3 A5 A7 AA-AB AD-B9 BB-BD C0-C4 C6 C8-CD D0-D9 DC-DD
0F	00-47 49-6A 71-8B 90-97 99-BC BE-CC CF
10	00-21 23-27 29-2A 2C-32 36-39 40-59 A0-C5 D0-F6 FB
11	00-59 5F-A2 A8-F9
12	20-26 28-46 48 4A-4D 50-56 58 5A-5D 60-86 88 8A-8D 90-AE B0 B2-B5 B8-BE C0 C2-C5 C8-CE D0-D6 D8-EE F0-FF
13	00-0E 10 12-15 18-1E 20-46 48-5A 61-7C A0-F4
14-15	1401-15FF
16	00-76 80-9C A0-F0
17	80-DC E0-E9
18	00-0E 10-19 20-77 80-A9
1E	00-9B A0-F9

1F	00-15 18-1D 20-45 48-4D 50-57 59 5B 5D 5F-7D 80-B4 B6-C4 C6-D3 D6-DB DD-EF F2-F4 F6-FE
20	00-46 48-4D 4F 6A-70 74-8E A0-AF D0-E3
21	00-3A 53-83 90-F3
22	00-F1
23	00-7B 7D-9A
24	00-26 40-4A 60-EA
25	00-95 A0-F7
26	00-13 19-71
27	01-04 06-09 0C-27 29-4B 4D 4F-52 56 58-5E 61-67 76-94 98-AF B1-BE
28	00-FF
2E	80-99 9B-F3
2F	00-D5 F0-FB
30	00-3A 3E-3F 41-94 99-9E A1-FE
31	05-2C 31-8E 90-B7
32	00-1C 20-43 60-7B 7F-B0 C0-CB D0-FE
33	00-76 7B-DD E0-FE
34-4D	3400-4DBF
4E-9F	4E00-9FA5
A0-A3	A000-A3FF
A4	00-8C 90-A1 A4-B3 B5-C0 C2-C4 C6
AC-D7	AC00-D7A3
E0-F8	E000-F8FF
F9-FA	F900-FA2D
FB	00-06 13-17 1D-36 38-3C 3E 40-41 43-44 46-B1 D3-FF
FC	00-FF
FD	00-3F 50-8F 92-C7 F0-FB
FE	20-23 30-44 49-52 54-66 68-6B 70-72 74 76-FC FF
FF	01-5E 61-BE C2-C7 CA-CF D2-D7 DA-DC E0-E6 E8-EE F9-FD

[Editor's note: The details of the above entries will be adjusted as necessary when the exact character repertoire of ISO/IEC 10646-1 Second Edition is finalised.]

Annex B
(normative)

List of combining characters

B.1 List of all combining characters

The characters in the subset collections COMBINING DIACRITICAL MARKS (0300 to 036F), COMBINING DIACRITICAL MARKS FOR SYMBOLS (20D0 to 20FF), and COMBINING HALF MARKS (FE20 to FE2F) are combining characters. In addition, the following characters are combining characters.

0483	COMBINING CYRILLIC TITLO
0484	COMBINING CYRILLIC PALATALIZATION
0485	COMBINING CYRILLIC DASIA PNEUMATA
0486	COMBINING CYRILLIC PSILI PNEUMATA
0488	COMBINING CYRILLIC HUNDRED THOUSANDS SIGN
0489	COMBINING CYRILLIC MILLIONS SIGN
0591	HEBREW ACCENT ETNAHTA
0592	HEBREW ACCENT SEGOL
0593	HEBREW ACCENT SHALSHELET
0594	HEBREW ACCENT ZAQEF QATAN
0595	HEBREW ACCENT ZAQEF GADOL
0596	HEBREW ACCENT TIPEHA
0597	HEBREW ACCENT REVIA
0598	HEBREW ACCENT ZARQA
0599	HEBREW ACCENT PASHTA
059A	HEBREW ACCENT YETIV
059B	HEBREW ACCENT TEVIR
059C	HEBREW ACCENT GERESH
059D	HEBREW ACCENT GERESH MUQDAM
059E	HEBREW ACCENT GERSHAYIM
059F	HEBREW ACCENT QARNEY PARA
05A0	HEBREW ACCENT TELISHA GEDOLA
05A1	HEBREW ACCENT PAZER
05A3	HEBREW ACCENT MUNAH
05A4	HEBREW ACCENT MAHAPAKH
05A5	HEBREW ACCENT MERKHA
05A6	HEBREW ACCENT MERKHA KEFULA
05A7	HEBREW ACCENT DARGA
05A8	HEBREW ACCENT QADMA
05A9	HEBREW ACCENT TELISHA QETANA
05AA	HEBREW ACCENT YERAH BEN YOMO
05AB	HEBREW ACCENT OLE
05AC	HEBREW ACCENT ILUY
05AD	HEBREW ACCENT DEHI
05AE	HEBREW ACCENT ZINOR
05AF	HEBREW MARK MASORA CIRCLE
05B0	HEBREW POINT SHEVA
05B1	HEBREW POINT HATAF SEGOL
05B2	HEBREW POINT HATAF PATAH
05B3	HEBREW POINT HATAF QAMATS
05B4	HEBREW POINT HIRIQ
05B5	HEBREW POINT TSERE
05B6	HEBREW POINT SEGOL
05B7	HEBREW POINT PATAH
05B8	HEBREW POINT QAMATS
05B9	HEBREW POINT HOLAM
05BB	HEBREW POINT QUBUTS
05BC	HEBREW POINT DAGESH OR MAPIQ
05BD	HEBREW POINT METEG
05BF	HEBREW POINT RAFE
05C1	HEBREW POINT SHIN DOT
05C2	HEBREW POINT SIN DOT
05C4	HEBREW MARK UPPER DOT
064B	ARABIC FATHATAN
064C	ARABIC DAMMATAN
064D	ARABIC KASRATAN
064E	ARABIC FATHA
064F	ARABIC DAMMA
0650	ARABIC KASRA
0651	ARABIC SHADDA
0652	ARABIC SUKUN
0653	ARABIC MADDAH ABOVE
0654	ARABIC HAMZA ABOVE
0655	ARABIC HAMZA BELOW
0670	ARABIC LETTER SUPERSCRIPT ALEF
06D7	ARABIC SMALL HIGH LIGATURE QAF WITH LAM WITH ALEF MAKSURA
06D8	ARABIC SMALL HIGH MEEM INITIAL FORM
06D9	ARABIC SMALL HIGH LAM ALEF
06DA	ARABIC SMALL HIGH JEEM
06DB	ARABIC SMALL HIGH THREE DOTS
06DC	ARABIC SMALL HIGH SEEN
06DD	ARABIC END OF AYAH
06DE	ARABIC START OF RUB EL HIZB
06DF	ARABIC SMALL HIGH ROUNDED ZERO
06E0	ARABIC SMALL HIGH UPRIGHT RECTANGULAR ZERO
06E1	ARABIC SMALL HIGH DOTLESS HEAD OF KHAH
06E2	ARABIC SMALL HIGH MEEM ISOLATED FORM
06E3	ARABIC SMALL LOW SEEN
06E4	ARABIC SMALL HIGH MADDA
06E7	ARABIC SMALL HIGH YEH
06E8	ARABIC SMALL HIGH NOON
06EA	ARABIC EMPTY CENTRE LOW STOP
06EB	ARABIC EMPTY CENTRE HIGH STOP
06EC	ARABIC ROUNDED HIGH STOP WITH FILLED CENTRE
06ED	ARABIC SMALL LOW MEEM
0711	SYRIAC LETTER SUPERSCRIPT ALAPH
0730	SYRIAC PTHAHA ABOVE
0731	SYRIAC PTHAHA BELOW
0732	SYRIAC PTHAHA DOTTED
0733	SYRIAC ZQAPHA ABOVE
0734	SYRIAC ZQAPHA BELOW
0735	SYRIAC ZQAPHA DOTTED
0736	SYRIAC RBASA ABOVE
0737	SYRIAC RBASA BELOW
0738	SYRIAC DOTTED ZLAMA HORIZONTAL
0739	SYRIAC DOTTED ZLAMA ANGULAR

073A	SYRIAC HBASA ABOVE
073B	SYRIAC HBASA BELOW
073C	SYRIAC HBASA-ESASA DOTTED
073D	SYRIAC ESASA ABOVE
073E	SYRIAC ESASA BELOW
073F	SYRIAC RWAHA
0740	SYRIAC FEMININE DOT
0741	SYRIAC QUSHSHAYA
0742	SYRIAC RUKKAKHA
0743	SYRIAC TWO VERTICAL DOTS ABOVE
0744	SYRIAC TWO VERTICAL DOTS BELOW
0745	SYRIAC THREE DOTS ABOVE
0746	SYRIAC THREE DOTS BELOW
0747	SYRIAC OBLIQUE LINE ABOVE
0748	SYRIAC OBLIQUE LINE BELOW
0749	SYRIAC MUSIC
074A	SYRIAC BARREKH
07A6	THAANA ABAFILI
07A7	THAANA AABAAFILI
07A8	THAANA IBIFILI
07A9	THAANA EEBEEFILI
07AA	THAANA UBUFILI
07AB	THAANA OOBOOFILI
07AC	THAANA EBEFILI
07AD	THAANA EYBEYFILI
07AE	THAANA OBOFILI
07AF	THAANA OABOAFILI
07B0	THAANA SUKUN
0901	DEVANAGARI SIGN CANDRABINDU
0902	DEVANAGARI SIGN ANUSVARA
0903	DEVANAGARI SIGN VISARGA
093C	DEVANAGARI SIGN NUKTA
093E	DEVANAGARI VOWEL SIGN AA
093F	DEVANAGARI VOWEL SIGN I
0940	DEVANAGARI VOWEL SIGN II
0941	DEVANAGARI VOWEL SIGN U
0942	DEVANAGARI VOWEL SIGN UU
0943	DEVANAGARI VOWEL SIGN VOCALIC R
0944	DEVANAGARI VOWEL SIGN VOCALIC RR
0945	DEVANAGARI VOWEL SIGN CANDRA E
0946	DEVANAGARI VOWEL SIGN SHORT E
0947	DEVANAGARI VOWEL SIGN E
0948	DEVANAGARI VOWEL SIGN AI
0949	DEVANAGARI VOWEL SIGN CANDRA O
094A	DEVANAGARI VOWEL SIGN SHORT O
094B	DEVANAGARI VOWEL SIGN O
094C	DEVANAGARI VOWEL SIGN AU
094D	DEVANAGARI SIGN VIRAMA
0951	DEVANAGARI STRESS SIGN UDATTA
0952	DEVANAGARI STRESS SIGN ANUDATTA
0953	DEVANAGARI GRAVE ACCENT
0954	DEVANAGARI ACUTE ACCENT
0962	DEVANAGARI VOWEL SIGN VOCALIC L
0963	DEVANAGARI VOWEL SIGN VOCALIC LL
0981	BENGALI SIGN CANDRABINDU
0982	BENGALI SIGN ANUSVARA
0983	BENGALI SIGN VISARGA
09BC	BENGALI SIGN NUKTA
09BE	BENGALI VOWEL SIGN AA
09BF	BENGALI VOWEL SIGN I
09C0	BENGALI VOWEL SIGN II
09C1	BENGALI VOWEL SIGN U
09C2	BENGALI VOWEL SIGN UU
09C3	BENGALI VOWEL SIGN VOCALIC R
09C4	BENGALI VOWEL SIGN VOCALIC RR
09C7	BENGALI VOWEL SIGN E
09C8	BENGALI VOWEL SIGN AI
09CB	BENGALI VOWEL SIGN O
09CC	BENGALI VOWEL SIGN AU
09CD	BENGALI SIGN VIRAMA
09D7	BENGALI AU LENGTH MARK
09E2	BENGALI VOWEL SIGN VOCALIC L
09E3	BENGALI VOWEL SIGN VOCALIC LL
0A02	GURMUKHI SIGN BINDI
0A3C	GURMUKHI SIGN NUKTA
0A3E	GURMUKHI VOWEL SIGN AA
0A3F	GURMUKHI VOWEL SIGN I
0A40	GURMUKHI VOWEL SIGN II
0A41	GURMUKHI VOWEL SIGN U
0A42	GURMUKHI VOWEL SIGN UU
0A47	GURMUKHI VOWEL SIGN EE
0A48	GURMUKHI VOWEL SIGN AI
0A4B	GURMUKHI VOWEL SIGN OO
0A4C	GURMUKHI VOWEL SIGN AU
0A4D	GURMUKHI SIGN VIRAMA
0A70	GURMUKHI TIPPI
0A71	GURMUKHI ADDAK
0A81	GUJARATI SIGN CANDRABINDU
0A82	GUJARATI SIGN ANUSVARA
0A83	GUJARATI SIGN VISARGA
0ABC	GUJARATI SIGN NUKTA
0ABE	GUJARATI VOWEL SIGN AA
0ABF	GUJARATI VOWEL SIGN I
0AC0	GUJARATI VOWEL SIGN II
0AC1	GUJARATI VOWEL SIGN U
0AC2	GUJARATI VOWEL SIGN UU
0AC3	GUJARATI VOWEL SIGN VOCALIC R
0AC4	GUJARATI VOWEL SIGN VOCALIC RR
0AC5	GUJARATI VOWEL SIGN CANDRA E
0AC7	GUJARATI VOWEL SIGN E
0AC8	GUJARATI VOWEL SIGN AI
0AC9	GUJARATI VOWEL SIGN CANDRA O
0ACB	GUJARATI VOWEL SIGN O
0ACC	GUJARATI VOWEL SIGN AU
0ACD	GUJARATI SIGN VIRAMA
0B01	ORIYA SIGN CANDRABINDU
0B02	ORIYA SIGN ANUSVARA
0B03	ORIYA SIGN VISARGA
0B3C	ORIYA SIGN NUKTA
0B3E	ORIYA VOWEL SIGN AA
0B3F	ORIYA VOWEL SIGN I
0B40	ORIYA VOWEL SIGN II
0B41	ORIYA VOWEL SIGN U
0B42	ORIYA VOWEL SIGN UU
0B43	ORIYA VOWEL SIGN VOCALIC R
0B47	ORIYA VOWEL SIGN E
0B48	ORIYA VOWEL SIGN AI
0B4B	ORIYA VOWEL SIGN O
0B4C	ORIYA VOWEL SIGN AU
0B4D	ORIYA SIGN VIRAMA
0B56	ORIYA AI LENGTH MARK
0B57	ORIYA AU LENGTH MARK
0B82	TAMIL SIGN ANUSVARA
0B83	TAMIL SIGN VISARGA
0BBE	TAMIL VOWEL SIGN AA
0BBF	TAMIL VOWEL SIGN I
0BC0	TAMIL VOWEL SIGN II
0BC1	TAMIL VOWEL SIGN U
0BC2	TAMIL VOWEL SIGN UU
0BC6	TAMIL VOWEL SIGN E
0BC7	TAMIL VOWEL SIGN EE
0BC8	TAMIL VOWEL SIGN AI

0BCA	TAMIL VOWEL SIGN O
0BCB	TAMIL VOWEL SIGN OO
0BCC	TAMIL VOWEL SIGN AU
0BCD	TAMIL SIGN VIRAMA
0BD7	TAMIL AU LENGTH MARK
0C01	TELUGU SIGN CANDRABINDU
0C02	TELUGU SIGN ANUSVARA
0C03	TELUGU SIGN VISARGA
0C3E	TELUGU VOWEL SIGN AA
0C3F	TELUGU VOWEL SIGN I
0C40	TELUGU VOWEL SIGN II
0C41	TELUGU VOWEL SIGN U
0C42	TELUGU VOWEL SIGN UU
0C43	TELUGU VOWEL SIGN VOCALIC R
0C44	TELUGU VOWEL SIGN VOCALIC RR
0C46	TELUGU VOWEL SIGN E
0C47	TELUGU VOWEL SIGN EE
0C48	TELUGU VOWEL SIGN AI
0C4A	TELUGU VOWEL SIGN O
0C4B	TELUGU VOWEL SIGN OO
0C4C	TELUGU VOWEL SIGN AU
0C4D	TELUGU SIGN VIRAMA
0C55	TELUGU LENGTH MARK
0C56	TELUGU AI LENGTH MARK
0C82	KANNADA SIGN ANUSVARA
0C83	KANNADA SIGN VISARGA
0CBE	KANNADA VOWEL SIGN AA
0CBF	KANNADA VOWEL SIGN I
0CC0	KANNADA VOWEL SIGN II
0CC1	KANNADA VOWEL SIGN U
0CC2	KANNADA VOWEL SIGN UU
0CC3	KANNADA VOWEL SIGN VOCALIC R
0CC4	KANNADA VOWEL SIGN VOCALIC RR
0CC6	KANNADA VOWEL SIGN E
0CC7	KANNADA VOWEL SIGN EE
0CC8	KANNADA VOWEL SIGN AI
0CCA	KANNADA VOWEL SIGN O
0CCB	KANNADA VOWEL SIGN OO
0CCC	KANNADA VOWEL SIGN AU
0CCD	KANNADA SIGN VIRAMA
0CD5	KANNADA LENGTH MARK
0CD6	KANNADA AI LENGTH MARK
0D02	MALAYALAM SIGN ANUSVARA
0D03	MALAYALAM SIGN VISARGA
0D3E	MALAYALAM VOWEL SIGN AA
0D3F	MALAYALAM VOWEL SIGN I
0D40	MALAYALAM VOWEL SIGN II
0D41	MALAYALAM VOWEL SIGN U
0D42	MALAYALAM VOWEL SIGN UU
0D43	MALAYALAM VOWEL SIGN VOCALIC R
0D46	MALAYALAM VOWEL SIGN E
0D47	MALAYALAM VOWEL SIGN EE
0D48	MALAYALAM VOWEL SIGN AI
0D4A	MALAYALAM VOWEL SIGN O
0D4B	MALAYALAM VOWEL SIGN OO
0D4C	MALAYALAM VOWEL SIGN AU
0D4D	MALAYALAM SIGN VIRAMA
0D57	MALAYALAM AU LENGTH MARK
0D82	SINHALA SIGN ANUSVARAYA
0D83	SINHALA SIGN VISARGAYA
0DCA	SINHALA SIGN AL-LAKUNA
0DCF	SINHALA VOWEL SIGN AELA-PILLA
0DD0	SINHALA VOWEL SIGN KETTI AEDA-PILLA
0DD1	SINHALA VOWEL SIGN DIGA AEDA-PILLA
0DD2	SINHALA VOWEL SIGN KETTI IS-PILLA
0DD3	SINHALA VOWEL SIGN DIGA IS-PILLA
0DD4	SINHALA VOWEL SIGN KETTI PAA-PILLA
0DD6	SINHALA VOWEL SIGN DIGA PAA-PILLA
0DD8	SINHALA VOWEL SIGN GAETTA-PILLA
0DD9	SINHALA VOWEL SIGN KOMBUVA
0DDA	SINHALA VOWEL SIGN DIGA KOMBUVA
0DDB	SINHALA VOWEL SIGN KOMBU DEKA
0DDC	SINHALA VOWEL SIGN KOMBUVA HAA AELA-PILLA
0DDD	SINHALA VOWEL SIGN KOMBUVA HAA DIGA AELA-PILLA
0DDE	SINHALA VOWEL SIGN KOMBUVA HAA GAYANUKITTA
0DDF	SINHALA VOWEL SIGN GAYANUKITTA
0DF2	SINHALA VOWEL SIGN DIGA GAETTA-PILLA
0DF3	SINHALA VOWEL SIGN DIGA GAYANUKITTA
0E31	THAI CHARACTER MAI HAN-AKAT
0E34	THAI CHARACTER SARA I
0E35	THAI CHARACTER SARA II
0E36	THAI CHARACTER SARA UE
0E37	THAI CHARACTER SARA UEE
0E38	THAI CHARACTER SARA U
0E39	THAI CHARACTER SARA UU
0E3A	THAI CHARACTER PHINTHU
0E47	THAI CHARACTER MAITAIKHU
0E48	THAI CHARACTER MAI EK
0E49	THAI CHARACTER MAI THO
0E4A	THAI CHARACTER MAI TRI
0E4B	THAI CHARACTER MAI CHATTAWA
0E4C	THAI CHARACTER THANTHAKHAT
0E4D	THAI CHARACTER NIKHAHIT
0E4E	THAI CHARACTER YAMAKKAN
0EB1	LAO VOWEL SIGN MAI KAN
0EB4	LAO VOWEL SIGN I
0EB5	LAO VOWEL SIGN II
0EB6	LAO VOWEL SIGN Y
0EB7	LAO VOWEL SIGN YY
0EB8	LAO VOWEL SIGN U
0EB9	LAO VOWEL SIGN UU
0EBB	LAO VOWEL SIGN MAI KON
0EBC	LAO SEMIVOWEL SIGN LO
0EC8	LAO TONE MAI EK
0EC9	LAO TONE MAI THO
0ECA	LAO TONE MAI TI
0ECB	LAO TONE MAI CATAWA
0ECC	LAO CANCELLATION MARK
0ECD	LAO NIGGAHITA
0F18	TIBETAN ASTROLOGICAL SIGN -KHYUD PA
0F19	TIBETAN ASTROLOGICAL SIGN SDONG TSHUGS
0F35	TIBETAN MARK NGAS BZUNG NYI ZLA
0F37	TIBETAN MARK NGAS BZUNG SGOR RTAGS
0F39	TIBETAN MARK TSA -PHRU
0F3E	TIBETAN SIGN YAR TSHES
0F3F	TIBETAN SIGN MAR TSHES
0F71	TIBETAN VOWEL SIGN AA
0F72	TIBETAN VOWEL SIGN I
0F73	TIBETAN VOWEL SIGN II
0F74	TIBETAN VOWEL SIGN U
0F75	TIBETAN VOWEL SIGN UU
0F76	TIBETAN VOWEL SIGN VOCALIC R
0F77	TIBETAN VOWEL SIGN VOCALIC RR
0F78	TIBETAN VOWEL SIGN VOCALIC L
0F79	TIBETAN VOWEL SIGN VOCALIC LL
0F7A	TIBETAN VOWEL SIGN E
0F7B	TIBETAN VOWEL SIGN EE
0F7C	TIBETAN VOWEL SIGN O
0F7D	TIBETAN VOWEL SIGN OO

0F7E	TIBETAN SIGN RJES SU NGA RO
0F7F	TIBETAN SIGN RNAM BCAD
0F80	TIBETAN VOWEL SIGN REVERSED I
0F81	TIBETAN VOWEL SIGN REVERSED II
0F82	TIBETAN SIGN NYI ZLA NAA DA
0F83	TIBETAN SIGN SNA LDAN
0F84	TIBETAN MARK HALANTA
0F86	TIBETAN MARK LCI RTAGS
0F87	TIBETAN MARK YANG RTAGS
0F90	TIBETAN SUBJOINED LETTER KA
0F91	TIBETAN SUBJOINED LETTER KHA
0F92	TIBETAN SUBJOINED LETTER GA
0F93	TIBETAN SUBJOINED LETTER GHA
0F94	TIBETAN SUBJOINED LETTER NGA
0F95	TIBETAN SUBJOINED LETTER CA
0F96	TIBETAN SUBJOINED LETTER CHA
0F97	TIBETAN SUBJOINED LETTER JA
0F99	TIBETAN SUBJOINED LETTER NYA
0F9A	TIBETAN SUBJOINED LETTER TTA
0F9B	TIBETAN SUBJOINED LETTER TTHA
0F9C	TIBETAN SUBJOINED LETTER DDA
0F9D	TIBETAN SUBJOINED LETTER DDHA
0F9E	TIBETAN SUBJOINED LETTER NNA
0F9F	TIBETAN SUBJOINED LETTER TA
0FA0	TIBETAN SUBJOINED LETTER THA
0FA1	TIBETAN SUBJOINED LETTER DA
0FA2	TIBETAN SUBJOINED LETTER DHA
0FA3	TIBETAN SUBJOINED LETTER NA
0FA4	TIBETAN SUBJOINED LETTER PA
0FA5	TIBETAN SUBJOINED LETTER PHA
0FA6	TIBETAN SUBJOINED LETTER BA
0FA7	TIBETAN SUBJOINED LETTER BHA
0FA8	TIBETAN SUBJOINED LETTER MA
0FA9	TIBETAN SUBJOINED LETTER TSA
0FAA	TIBETAN SUBJOINED LETTER TSHA
0FAB	TIBETAN SUBJOINED LETTER DZA
0FAC	TIBETAN SUBJOINED LETTER DZHA
0FAD	TIBETAN SUBJOINED LETTER WA
0FAE	TIBETAN SUBJOINED LETTER ZHA
0FAF	TIBETAN SUBJOINED LETTER ZA
0FB0	TIBETAN SUBJOINED LETTER -A
0FB1	TIBETAN SUBJOINED LETTER YA
0FB2	TIBETAN SUBJOINED LETTER RA
0FB3	TIBETAN SUBJOINED LETTER LA
0FB4	TIBETAN SUBJOINED LETTER SHA
0FB5	TIBETAN SUBJOINED LETTER SSA
0FB6	TIBETAN SUBJOINED LETTER SA
0FB7	TIBETAN SUBJOINED LETTER HA
0FB8	TIBETAN SUBJOINED LETTER A
0FB9	TIBETAN SUBJOINED LETTER KSSA
0FBA	TIBETAN SUBJOINED LETTER FIXED-FORM WA
0FBB	TIBETAN SUBJOINED LETTER FIXED-FORM YA
0FBC	TIBETAN SUBJOINED LETTER FIXED-FORM RA
0FC6	TIBETAN SYMBOL PADMA GDAN
102C	MYANMAR VOWEL SIGN AA
102D	MYANMAR VOWEL SIGN I
102E	MYANMAR VOWEL SIGN II
102F	MYANMAR VOWEL SIGN U
1030	MYANMAR VOWEL SIGN UU
1031	MYANMAR VOWEL SIGN E
1032	MYANMAR VOWEL SIGN AI
1036	MYANMAR SIGN ANUSVARA
1037	MYANMAR SIGN DOT BELOW
1038	MYANMAR SIGN VISARGA
1039	MYANMAR SIGN VIRAMA
1056	MYANMAR VOWEL SIGN VOCALIC R
1057	MYANMAR VOWEL SIGN VOCALIC RR
1058	MYANMAR VOWEL SIGN VOCALIC L
1059	MYANMAR VOWEL SIGN VOCALIC LL
17B4	KHMER VOWEL INHERENT AQ
17B5	KHMER VOWEL INHERENT AA
17B6	KHMER VOWEL SIGN AA
17B7	KHMER VOWEL SIGN I
17B8	KHMER VOWEL SIGN II
17B9	KHMER VOWEL SIGN Y
17BA	KHMER VOWEL SIGN YY
17BB	KHMER VOWEL SIGN U
17BC	KHMER VOWEL SIGN UU
17BD	KHMER VOWEL SIGN UA
17BE	KHMER VOWEL SIGN OE
17BF	KHMER VOWEL SIGN YA
17C0	KHMER VOWEL SIGN IE
17C1	KHMER VOWEL SIGN E
17C2	KHMER VOWEL SIGN AE
17C3	KHMER VOWEL SIGN AI
17C4	KHMER VOWEL SIGN OO
17C5	KHMER VOWEL SIGN AU
17C6	KHMER SIGN NIKAHIT
17C7	KHMER SIGN REAHMUK
17C8	KHMER SIGN YUUKALEAPINTU
17C9	KHMER SIGN MUUSIKATOAN
17CA	KHMER SIGN TRIISAP
17CB	KHMER SIGN BANTOC
17CC	KHMER SIGN ROBAT
17CD	KHMER SIGN TOANDAKHIAT
17CE	KHMER SIGN KAKABAT
17CF	KHMER SIGN AHSDA
17D0	KHMER SIGN SAMYOK SANNYA
17D1	KHMER SIGN VIRIAM
17D2	KHMER SIGN COENG
17D3	KHMER SIGN BATHAMASAT
18A9	MONGOLIAN LETTER AG DAGALGA
302A	IDEOGRAPHIC LEVEL TONE MARK
302B	IDEOGRAPHIC RISING TONE MARK
302C	IDEOGRAPHIC DEPARTING TONE MARK
302D	IDEOGRAPHIC ENTERING TONE MARK
302E	HANGUL SINGLE DOT TONE MARK
302F	HANGUL DOUBLE DOT TONE MARK
3099	COMBINING KATAKANA-HIRAGANA VOICED SOUND MARK
309A	COMBINING KATAKANA-HIRAGANA SEMI-VOICED SOUND MARK
FB1E	HEBREW POINT JUDEO-SPANISH VARIKA

B.2 List of characters not allowed in implementation level 2

The characters in the subset collections COMBINING DIACRITICAL MARKS (0300 to 036F), COMBINING DIACRITICAL MARKS FOR SYMBOLS (20D0 to 20FF), HANGUL JAMO (1100 to 11FF) and COMBINING HALF MARKS (FE20 to FE2F) are not allowed in implementation level 2. In addition, the following individual characters are also not allowed.

NOTE - This list is a subset of the list in clause B.1 except for HANGUL JAMO (see 25.1).

0483	COMBINING CYRILLIC TITLO
0484	COMBINING CYRILLIC PALATALIZATION
0485	COMBINING CYRILLIC DASIA PNEUMATA
0486	COMBINING CYRILLIC PSILI PNEUMATA

0591	HEBREW ACCENT ETNAHTA
0592	HEBREW ACCENT SEGOL
0593	HEBREW ACCENT SHALSHELET
0594	HEBREW ACCENT ZAQEF QATAN
0595	HEBREW ACCENT ZAQEF GADOL
0596	HEBREW ACCENT TIPEHA
0597	HEBREW ACCENT REVIA
0598	HEBREW ACCENT ZARQA
0599	HEBREW ACCENT PASHTA
059A	HEBREW ACCENT YETIV
059B	HEBREW ACCENT TEVIR
059C	HEBREW ACCENT GERESH
059D	HEBREW ACCENT GERESH MUQDAM
059E	HEBREW ACCENT GERSHAYIM
059F	HEBREW ACCENT QARNEY PARA
05A0	HEBREW ACCENT TELISHA GEDOLA
05A1	HEBREW ACCENT PAZER
05A3	HEBREW ACCENT MUNAH
05A4	HEBREW ACCENT MAHAPAKH
05A5	HEBREW ACCENT MERKHA
05A6	HEBREW ACCENT MERKHA KEFULA
05A7	HEBREW ACCENT DARGA
05A8	HEBREW ACCENT QADMA
05A9	HEBREW ACCENT TELISHA QETANA
05AA	HEBREW ACCENT YERAH BEN YOMO
05AB	HEBREW ACCENT OLE
05AC	HEBREW ACCENT ILUY
05AD	HEBREW ACCENT DEHI
05AE	HEBREW ACCENT ZINOR
05AF	HEBREW MARK MASORA CIRCLE
05C4	HEBREW MARK UPPER DOT
093C	DEVANAGARI SIGN NUKTA
0953	DEVANAGARI GRAVE ACCENT
0954	DEVANAGARI ACUTE ACCENT
09BC	BENGALI SIGN NUKTA
09D7	BENGALI AU LENGTH MARK
0A3C	GURMUKHI SIGN NUKTA
0A70	GURMUKHI TIPPI
0A71	GURMUKHI ADDAK
0ABC	GUJARATI SIGN NUKTA
0B3C	ORIYA SIGN NUKTA
0B56	ORIYA AI LENGTH MARK
0B57	ORIYA AU LENGTH MARK
0BD7	TAMIL AU LENGTH MARK
0C55	TELUGU LENGTH MARK
0C56	TELUGU AI LENGTH MARK
0CD5	KANNADA LENGTH MARK
0CD6	KANNADA AI LENGTH MARK
0D57	MALAYALAM AU LENGTH MARK
0F39	TIBETAN MARK TSA -PHRU
302A	IDEOGRAPHIC LEVEL TONE MARK
302B	IDEOGRAPHIC RISING TONE MARK
302C	IDEOGRAPHIC DEPARTING TONE MARK
302D	IDEOGRAPHIC ENTERING TONE MARK
302E	HANGUL SINGLE DOT TONE MARK
302F	HANGUL DOUBLE DOT TONE MARK
3099	COMBINING KATAKANA-HIRAGANA VOICED SOUND MARK
309A	COMBINING KATAKANA-HIRAGANA SEMI-VOICED SOUND MARK

Annex C
(normative)

Transformation format for 16 planes of Group 00 (UTF-16)

UTF-16 provides a coded representation of over a million graphic characters of UCS-4 in a form that is compatible with the two-octet BMP form of UCS-2 (13.1). This permits the coexistence of those characters from UCS-4 within coded character data that is in accordance with UCS-2.

In UTF-16 each graphic character from the UCS-2 repertoire retains its UCS-2 coded representation. In addition, the coded representation of any character from a single contiguous block of 16 Planes in Group 00 (1,048,576 code positions) consists of a pair of RC-elements (4.33), where each such RC-element corresponds to a cell in a single contiguous block of 8 Rows in the BMP (2,048 code positions). These code positions are reserved for the use of this coded representation form, and shall not be allocated for any other purpose.

C.1 Specification of UTF-16

The specification of UTF-16 is as follows:

1. The high-half zone shall be the 4 rows D8 to DB of the BMP, i.e., the 1,024 cells in the S-zone whose code positions are from D800 through DBFF.
2. The low-half zone shall be the 4 rows DC to DF of the BMP, i.e., the 1,024 cells in the S-zone whose code positions are from DC00 through DFFF.
3. All cells in the high-half zone and the low-half zone shall be permanently reserved for the use of the UTF-16 coded representation form.
4. In UTF-16, any UCS character from the BMP shall be represented by its UCS-2 coded representation as specified by the body of this international standard.
5. In UTF-16, any UCS character whose UCS-4 coded representation is in the range 0001 0000 to 0010 FFFF shall be represented by a sequence of two RC-elements from the S-zone, of which the first is an RC-element from the high-half zone, and the second is an RC-element from the low-half zone.

   The mapping between UCS-4 and UTF-16 for these characters shall be as shown in C.3; the reverse mapping is shown in C.4.

C.2 Notation

1. All numbers are in hexadecimal notation.
2. Double-octet boundaries in the notations for UTF-16 are indicated with semicolons.
3. The symbol “%” indicates the modulo operation, e.g.: x % y = x modulo y.
4. The symbol “/” indicates the integer division operation, e.g.: 7 / 3 = 2.
5. Precedence is integer-division > modulo-operation > integer-multiplication > integer-addition.

C.3 Mapping from UCS-4 form to UTF-16 form

UCS-4 (4-octet)		UTF-16, 2-octet elements
x =	0000 0000 .. 0000 FFFF (see Note 1)	x % 0001 0000;
x =	0001 0000 .. 0010 FFFF	y; z;
where	y = ((x - 0001 0000) / 400) + D800 z = ((x - 0001 0000) % 400) + DC00	
x	0011 0000 .. 7FFF FFFF	(no mapping (is defined

NOTE 1 - Code positions from 0000 D800 to 0000 DFFF are reserved for the UTF-16 form and do not occur in UCS-4. The values 0000 FFFE and 0000 FFFF also do not occur (see clause 8). The mapping of these code positions in UTF-16 is undefined.

Example:

The UCS-4 sequence [0000 0048] [0000 0069] [0001 0000] [0000 0021] [0000 0021]

represents “Hi<0001 0000>!!”.

It is mapped to UTF-16 as:

[0048] [0069] [D800] [DC00] [0021] [0021]

If interpreted as UCS-2 this sequence will be

“Hi<RC-element from high-half zone> <RC-element from low-half zone>!!”

C.4 Mapping from UTF-16 form to UCS-4 form

UTF-16, 2-octet elements		UCS-4 (4-octet)
x =	0000; .. D7FF;	x
x =	E000; .. FFFF;	x

pair (x, y) such that

x =	D800; .. DBFF;	((x - D800) * 400
y =	DC00; .. DFFF;	+ (y - DC00))
		+ 0001 0000

Example:

The UTF-16 sequence

[0048] [0069] [D800] [DC00] [0021] [0021]

is mapped to UCS-4 as

[0000 0048] [0000 0069] [0001 0000]
[0000 0021] [0000 0021]

and represents "Hi<0001 0000>!!".

C.5 Identification of UTF-16

When the escape sequences from ISO/IEC 2022 are used, the identification of UTF-16 and an implementation level (see clause 14) shall be by a designation sequence chosen from the following list:

ESC 02/05 02/15 04/10
UTF-16 with implementation level 1

ESC 02/05 02/15 04/11
UTF-16 with implementation level 2

ESC 02/05 02/15 04/12
UTF-16 with implementation level 3

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 2022, it shall consist only of the sequences of bit combinations as shown above.

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 10646, it shall be padded in accordance with clause 15.

When the escape sequences from ISO 2022 are used, the identification of a return, or transfer, from UTF-16 to the coding system of ISO 2022 shall be as specified in 16.5 for a return or transfer from UCS.

C.6 Unpaired RC-elements: Interpretation by receiving devices

According to C.1 an unpaired RC-element (4.33) is not in conformance with the requirements of UTF-16.

If a receiving device that has adopted the UTF-16 form receives an unpaired RC-element because of error conditions either:

- in an originating device, or
- in the interchange between an originating and the receiving device, or
- in the receiving device itself,

then it shall interpret that unpaired RC-element in the same way that it interprets a character that is outside the adopted subset that has been identified for the device (see 2.3c).

NOTE 2 - Since a high-half RC-element followed by a low-half RC-element is a sequence that is in accordance with UTF-16, the only possible type of syntactically malformed sequence is an unpaired RC-element.

Example:

A receiving/originating device which only handles the Latin-1 repertoire, and uses boxes to display missing glyphs would display:

"The Greek letter <alpha> corresponds to<hieroglyphicHigh>."

as:

"The Greek letter <box> corresponds to<box>."

Accordingly a similar device that can also interpret a UTF-16 data stream should display an unpaired RC-element as a <box> also.

C.7 Receiving devices, advisory notes

When a receiving device interprets a CC-data-element that is in accordance with UTF-16 the following advisory notes apply.

1. UTF-16 is designed to be compatible with the UCS-2 two-octet BMP Form (13.1). The high-half and low-half zones are assigned to separate ranges of code positions, to which characters can never be assigned. Thus the function of every RC-element (two-octet unit) within a UTF-16 data stream is always immediately identifiable from its value, without regard to context.

   For example, the valid UTF-16 sequence [0048] [0069] [D800] [DC00] [0021] [0021] may also be interpreted, by a receiving device, that has adopted only UCS-2, as the coded representation of

   "Hi<unrecognized><unrecognized>!!"

   This form of compatibility is possible because RC-elements from the S-zone are interpreted according to UTF-16 by receiving devices that have adopted UTF-16, and as unrecognized characters by receiving devices that have only adopted UCS-2. Consequently an originating device may transmit UTF-16 data even if the receiving device can only interpret that data as UCS-2 characters.

2. Designers of devices may choose to use UTF-16 as an internal representation for processing or other purposes. There are two primary issues for such devices:

   • Does the device interpret (i.e., process according to the assigned semantics) some subset of the pairs (high-half + low-half) of RC-elements , e.g., render the pair as the intended single character?

   • Does the device guarantee the integrity of every pair (high-half + low-half) of RC-elements, e.g., never separate such pairs in operations such as string truncation, insertion, or other modifications of the coded character sequence?

   The decisions on these issues give rise to four possible combinations of capability in a device:

   (U) UCS-2 implementations:

   - Interpret no pairs.

   - Do not guarantee integrity of pairs.

   (W) Weak UTF-16 implementations:

   - Interpret a non-null subset of pairs.

   - Do not guarantee integrity of pairs.

   (A) Aware UTF-16 implementations:

   - Interpret no pairs.

   - Guarantee integrity of pairs.

   (S) Strong UTF-16 implementations:

   - Interpret a non-null subset of pairs.

   - Guarantee integrity of pairs.

Example:

The following sentence could be displayed in three different ways, assuming that both the weak and strong implementations have Phoenician fonts but no hieroglyphics:

“The Greek letter <alpha> corresponds to<hieroglyphicHigh><hieroglyphicLow> and to <phoenicianHigh><phoenicianLow>.”

U: “The Greek letter <alpha> corresponds to<box><box> and to <box><box>.”

W: “The Greek letter <alpha> corresponds to <box><box> and to<Phoenician>.”

A: “The Greek letter <alpha> corresponds to <box> and to<box>.”

S: “The Greek letter <alpha> corresponds to <box> and to<Phoenician>.”

Annex D
(normative)

UCS Transformation Format 8 (UTF-8)

UTF-8 is an alternative coded representation form for all of the characters of the UCS. It can be used to transmit text data through communication systems which assume that individual octets in the range 00 to 7F have a definition according to ISO/IEC 4873, including a C0 set of control functions according to the 8-bit structure of ISO/IEC 2022. UTF-8 also avoids the use of octet values in this range which have special significance during the parsing of file-name character strings in widely-used file-handling systems.

The number of octets in the UTF-8 coded representation of the characters of the UCS ranges from one to six; the value of the first octet indicates the number of octets in that coded representation.

D.1 Features of UTF-8

- UCS characters from the BASIC LATIN collection are represented in UTF-8 in accordance with ISO/IEC 4873, i.e. single octets with values ranging from 20 to 7E.
- Control functions in positions 0000 0000 to 0000 001F, and the DELETE character in position 0000 007F, are represented without the padding octets specified in clause 15, i.e. as single octets with values ranging from 00 to 1F, and 7F respectively in accordance with ISO/IEC 4873 and with the 8-bit structure of ISO/IEC 2022.
- Octet values 00 to 7F do not otherwise occur in the UTF-8 coded representation of any character. This provides compatibility with existing file-handling systems and communications sub-systems which parse CC-data-elements for these octet values.
- The first octet in the UTF-8 coded representation of any character can be directly identified when a CC-data-element is examined, one octet at a time, starting from an arbitrary location. It indicates the number of continuing octets (if any) in the multi-octet sequence that constitutes the coded representation of that character.

D.2 Specification of UTF-8

In the UTF-8 coded representation form each character from this International Standard shall have a coded representation that comprises a sequence of octets of length 1, 2, 3, 4, 5, or 6 octets.

For all sequences of one octet the most significant bit shall be a ZERO bit.

For all sequences of more than one octet, the number of ONE bits in the first octet, starting from the most significant bit position, shall indicate the number of octets in the sequence. The next most significant bit shall be a ZERO bit.

NOTE 1 - For example, the first octet of a 2-octet sequence has bits 110 in the most significant positions, and the first octet of a 6-octet sequence has bits 1111110 in the most significant positions.

All of the octets, other than the first in a sequence, are known as continuing octets. The two most significant bits of a continuing octet shall be a ONE bit followed by a ZERO bit.

The remaining bit positions in the octets of the sequence shall be “free bit positions” that are used to distinguish between the characters of this International Standard. These free bit positions shall be used, in order of increasing significance, for the bits of the UCS-4 coded representation of the character, starting from its least significant bit. Some of the high-order ZERO bits of the UCS-4 representation shall be omitted, as specified below.

Table D.1 below shows the format of the octets of a coded character according to UTF-8. Each free bit position available for distinguishing between the characters is indicated by an x. Each entry in the column “Maximum UCS-4 value” indicates the upper end of the range of coded representations from UCS-4 that may be represented in a UTF-8 sequence having the length indicated in the “Octet usage” column.

Table D.1 - Format of octets in a UTF-8 sequence

Octet usage	Format (binary)	No. of free bits	Maximum UCS-4 value
1st of 1	0xxxxxxx	7	0000 007F
1st of 2	110xxxxx	5	0000 07FF
1st of 3	1110xxxx	4	0000 FFFF
1st of 4	11110xxx	3	001F FFFF
1st of 5	111110xx	2	03FF FFFF
1st of 6	1111110x	1	7FFF FFFF
continuing) 2nd .. 6th)	10xxxxxx	6	

Table D.1 shows that, in a CC-data-element conforming to UTF-8, the range of values for each octet indicates its usage as follows:

00 to 7F	first and only octet of a sequence;
80 to BF	continuing octet of a multi-octet sequence;
C0 to FD	first octet of a multi-octet sequence;
FE or FF	not used.

The mapping between UCS-4 and UTF-8 shall be as shown in D.4; the reverse mapping is shown in D.5.

NOTE 2 - Examples of UCS-4 coded representations and the corresponding UTF-8 coded representations are shown in Tables D.2 and D.3.

Table D.2 shows the UCS-4 and the UTF-8 coded representations, in binary notation, for a selection of code positions from the UCS.

Table D.3 shows the UCS-4 and the UTF-8 coded representations, in hexadecimal notation, for the same selection of code positions from the UCS.

Table D.3 - Examples in hexadecimal notation

UCS-4 form	UTF-8 form
0000 0001;	01;
0000 007F;	7F;
0000 0080;	C2; 80;
0000 07FF;	DF; BF;
0000 0800;	E0; A0; 80;
0000 FFFF;	EF; BF; BF;
0001 0000;	F0; 90; 80; 80;
0010 FFFF;	F4; 8F; BF; BF;
001F FFFF;	F7; BF; BF; BF;
0020 0000;	F8; 88; 80; 80; 80;
03FF FFFF;	FB; BF; BF; BF; BF;
0400 0000;	FC; 84; 80; 80; 80;80;
7FFF FFFF;	FD; BF; BF; BF; BF; BF;

Table D.2 - Examples in binary notation

Four-octet form - UCS-4	UTF-8 form
00000000 00000000 00000000 00000001;	00000001;
00000000 00000000 00000000 01111111;	01111111;
00000000 00000000 00000000 10000000;	11000010; 10000000;
00000000 00000000 00000111 11111111;	11011111; 10111111;
00000000 00000000 00001000 00000000;	11100000; 10100000; 10000000;
00000000 00000000 11111111 11111111;	11101111; 10111111; 10111111;
00000000 00000001 00000000 00000000;	11110000; 10010000; 10000000;10000000;
00000000 00011111 11111111 11111111;	11110111; 10111111; 10111111;10111111;
00000000 00100000 00000000 00000000;	11111000; 10001000; 10000000;10000000; 10000000;
00000011 11111111 11111111 11111111;	11111011; 10111111; 10111111;10111111; 10111111;
00000100 00000000 00000000 00000000;	11111100; 10000100; 10000000;10000000; 10000000; 10000000;
01111111 11111111 11111111 11111111;	11111101; 10111111; 10111111;10111111; 10111111; 10111111;

D.3 Notation

1. All numbers are in hexadecimal notation, except for the decimal numbers used in the power-of operation (see 5 below).
2. Boundaries of code elements are indicated with semicolons; these are single-octet boundaries within UTF-8 coded representations, and four-octet boundaries within UCS-4 coded representations.
3. The symbol "%" indicates the modulo operation, e.g.: x % y = x modulo y
4. The symbol "/" indicates the integer division operation, e.g.: 7 / 3 = 2
5. Superscripting indicates the power-of operation, e.g.: $2^3 = 8$
6. Precedence is: power-of operation > integer division > modulo operation > integer multiplication > integer addition.

   e.g.: $x / y^z \% w = ((x / (y^z)) \% w)$

D.4 Mapping from UCS-4 form to UTF-8 form

Table D.4 defines in mathematical notation the mapping from the UCS-4 coded representation form to the UTF-8 coded representation form.

In the left column (UCS-4) the notation x indicates the four-octet coded representation of a single character of the UCS. In the right column (UTF-8) x indicates the corresponding integer value.

NOTE 3 - Values of x in the range 0000 D800 .. 0000 DFFF are reserved for the UTF-16 form and do not occur in UCS-4. The values 0000 FFFE and 0000 FFFF also do not occur (see clause 8). The mappings of these code positions in UTF-8 are undefined.

NOTE 4 - The algorithm for converting from UCS-4 to UTF-8 can be summarised as follows.

For each coded character in UCS-4 the length of octet sequence in UTF-8 is determined by the entry in the right column of Table D.1. The bits in the UCS-4 coded representation, starting from the least significant bit, are then distributed across the free bit positions in order of increasing significance until no more free bit positions are available.

Table D.4 - Mapping from UCS-4 to UTF-8

Range of values in UCS-4	Sequence of octets in UTF-8
x = 0000 0000 .. 0000 007F;	x;
x = 0000 0080 .. 0000 07FF;	C0 + x / 2^6; 80 + x %2^6;
x = 0000 0800 .. 0000 FFFF; (see Note 3)	E0 + x/2^{12}; 80 + x/2^6%2^6; 80 + x%2^6;
x = 0001 0000 .. 001F FFFF;	F0 + x/2^{18}; 80 + x/2^{12}%2^6; 80 + x/2^6%2^6; 80 + x%2^6;
x = 0020 0000 .. 03FF FFFF;	F8 + x/2^{24}; 80 + x/2^{18}%2^6; 80 + x/2^{12}%2^6; 80 + x/2^6%2^6; 80 + x%2^6;
x = 0400 0000 .. 7FFF FFFF;	FC + x/2^{30}; 80 + x/2^{24}%2^6; 80 + x/2^{18}%2^6; 80 + x/2^{12}%2^6; 80 + x/2^6%2^6; 80 + x%2^6;

D.5 Mapping from UTF-8 form to UCS-4 form

Table D.5 defines in mathematical notation the mapping from the UTF-8 coded representation form to the UCS-4 coded representation form.

In the left column (UTF-8) the following notations apply:

z is the first octet of a sequence. Its value determines the number of continuing octets in the sequence.

y is the 2nd octet in the sequence.

x is the 3rd octet in the sequence.

w is the 4th octet in the sequence.

v is the 5th octet in the sequence.

u is the 6th octet in the sequence.

The ranges of values applicable to these octets are shown in D.2 above, following Table D.1.

NOTE 5- The algorithm for converting from UTF-8 to UCS-4 can be summarised as follows.

For each coded character in UTF-8 the bits in the free bit positions are concatenated as a bit-string. The bits from this string, in increasing order of significance, are then distributed across the bit positions of a four-octet sequence, starting from the least significant bit position. The remaining bit positions of that sequence are filled with ZERO bits.

Table D.5 - Mapping from UTF-8 to UCS-4

Sequence of octets in UTF-8	Four-octet sequences in UCS-4
z = 00 .. 7F;	z;
z = C0 .. DF; y;	(z-C0)*2^6 + (y-80);
z = E0 .. EF; y; x;	(z-E0)*2^{12} + (y-80)*2^6 + (x-80);
z = F0 .. F7; y; x; w;	(z-F0)*2^{18} + (y-80)*2^{12} +(x-80)*2^6 + (w-80);
z = F8 ..FB; y; x; w; v;	(z-F8)*2^{24} + (y-80)*2^{18} +(x-80)*2^{12} + (w-80)*2^6 + (v - 80);
z = FC, FD; y; x; w; v; u;	(z-FC)*2^{30} + (y-80)*2^{24} +(x-80)*2^{18} + (w-80)*2^{12} + (v-80)*2^6 + (u-80);

D.6 Identification of UTF-8

When the escape sequences from ISO/IEC 2022 are used, the identification of UTF-8 and an implementation level (see clause 14) shall be by a designation sequence chosen from the following list:

ESC 02/05 02/15 04/07
UTF-8 with implementation level 1

ESC 02/05 02/15 04/08
UTF-8 with implementation level 2

ESC 02/05 02/15 04/09
UTF-8 with implementation level 3

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 2022, it shall consist only of the sequences of bit combinations as shown above.

If such an escape sequence appears within a CC-data-element conforming to ISO/IEC 10646, it shall be padded in accordance with clause 15.

When the escape sequences from ISO/IEC 2022 are used, the identification of a return, or transfer, from UTF-8 to the coding system of ISO/IEC 2022 shall be as specified in 16.5 for a return or transfer from UCS.

NOTE 6 - The following escape sequence may also be used:

ESC 02/05 04/07 UTF-8.

The implementation level is not defined. The escape sequence used for a return to the coding system of ISO/IEC 2022 is not padded as specified in 16.5.

D.7 Incorrect sequences of octets: Interpretation by receiving devices

According to D.2 an octet in the range 00 .. 7F or C0 .. FB is the first octet of a UTF-8 sequence, and is followed by the appropriate number (from 0 to 5) of continuing octets in the range 80 .. BF. Furthermore, octets whose value is FE or FF are not used; thus they are invalid in UTF-8.

If a CC-data-element includes either:

- a first octet that is not immediately followed by the correct number of continuing octets, or
- one or more continuing octets that are not required to complete a sequence of first and continuing octets, or
- an invalid octet,

then according to D.2 such a sequence of octets is not in conformance with the requirements of UTF-8. It is known as a malformed sequence.

If a receiving device that has adopted the UTF-8 form receives a malformed sequence, because of error conditions either:

- in an originating device, or
- in the interchange between an originating and a receiving device, or
- in the receiving device itself,

then it shall interpret that malformed sequence in the same way that it interprets a character that is outside the adopted subset that has been identified for the device (see 2.3c).

Annex E
(informative)

Mirrored characters in Arabic bi-directional context

In the context of Arabic right-to-left (bi-directional) text, the following characters have semantic meaning. To preserve the meaning in right-to-left text, the graphic symbol representing the character may be rendered as the mirror image of the associated graphical symbol from the left-to-right context. These characters include mathematical symbols and paired characters such as the SQUARE BRACKETS. For example, in a right-to-left text segment, the GREATER-THAN SIGN (rendered as ">" in left-to-right text) may be rendered as the "<" graphic symbol.

0028	LEFT PARENTHESIS
0029	RIGHT PARENTHESIS
003C	LESS-THAN SIGN
003E	GREATER-THAN SIGN
005B	LEFT SQUARE BRACKET
005D	RIGHT SQUARE BRACKET
007B	LEFT CURLY BRACKET
007D	RIGHT CURLY BRACKET
00AB	LEFT-POINTING DOUBLE ANGLE QUOTATION MARK
00BB	RIGHT-POINTING DOUBLE ANGLE QUOTATION MARK
2039	SINGLE LEFT-POINTING ANGLE QUOTATION MARK
203A	SINGLE RIGHT-POINTING ANGLE QUOTATION MARK
2045	LEFT SQUARE BRACKET WITH QUILL
2046	RIGHT SQUARE BRACKET WITH QUILL
207D	SUPERSCRIPT LEFT PARENTHESIS
207E	SUPERSCRIPT RIGHT PARENTHESIS
208D	SUBSCRIPT LEFT PARENTHESIS
208E	SUBSCRIPT RIGHT PARENTHESIS
2201	COMPLEMENT
2202	PARTIAL DIFFERENTIAL
2203	THERE EXISTS
2204	THERE DOES NOT EXIST
2208	ELEMENT OF
2209	NOT AN ELEMENT OF
220A	SMALL ELEMENT OF
220B	CONTAINS AS MEMBER
220C	DOES NOT CONTAIN AS MEMBER
220D	SMALL CONTAINS AS MEMBER
2211	N-ARY SUMMATION
2215	DIVISION SLASH
2216	SET MINUS
221A	SQUARE ROOT
221B	CUBE ROOT
221C	FOURTH ROOT
221D	PROPORTIONAL TO
221F	RIGHT ANGLE
2220	ANGLE
2221	MEASURED ANGLE
2222	SPHERICAL ANGLE
2224	DOES NOT DIVIDE
2226	NOT PARALLEL TO
222B	INTEGRAL
222C	DOUBLE INTEGRAL
222D	TRIPLE INTEGRAL
222E	CONTOUR INTEGRAL
222F	SURFACE INTEGRAL
2230	VOLUME INTEGRAL
2231	CLOCKWISE INTEGRAL
2232	CLOCKWISE CONTOUR INTEGRAL
2233	ANTICLOCKWISE CONTOUR INTEGRAL
2239	EXCESS
223B	HOMOTHETIC
223C	TILDE OPERATOR
223D	REVERSED TILDE
223E	INVERTED LAZY S
223F	SINE WAVE
2240	WREATH PRODUCT
2241	NOT TILDE
2242	MINUS TILDE
2243	ASYMPTOTICALLY EQUAL TO
2244	NOT ASYMPTOTICALLY EQUAL TO
2245	APPROXIMATELY EQUAL TO
2246	APPROXIMATELY BUT NOT ACTUALLY EQUAL TO
2247	NEITHER APPROXIMATELY NOR ACTUALLY EQUAL TO
2248	ALMOST EQUAL TO
2249	NOT ALMOST EQUAL TO
224A	ALMOST EQUAL OR EQUAL TO
224B	TRIPLE TILDE
224C	ALL EQUAL TO
2252	APPROXIMATELY EQUAL TO OR THE IMAGE OF
2253	IMAGE OF OR APPROXIMATELY EQUAL TO
2254	COLON EQUALS
2255	EQUALS COLON
225F	QUESTIONED EQUAL TO
2260	NOT EQUAL TO
2262	NOT IDENTICAL TO
2264	LESS-THAN OR EQUAL TO
2265	GREATER-THAN OR EQUAL TO
2266	LESS-THAN OVER EQUAL TO
2267	GREATER-THAN OVER EQUAL TO
2268	LESS-THAN BUT NOT EQUAL TO
2269	GREATER-THAN BUT NOT EQUAL TO
226A	MUCH LESS-THAN
226B	MUCH GREATER-THAN
226E	NOT LESS-THAN
226F	NOT GREATER-THAN
2270	NEITHER LESS-THAN NOR EQUAL TO
2271	NEITHER GREATER-THAN NOR EQUAL TO
2272	LESS-THAN OR EQUIVALENT TO
2273	GREATER-THAN OR EQUIVALENT TO
2274	NEITHER LESS-THAN NOR EQUIVALENT TO
2275	NEITHER GREATER-THAN NOR EQUIVALENT TO

2276	LESS-THAN OR GREATER-THAN
2277	GREATER-THAN OR LESS-THAN
2278	NEITHER LESS-THAN NOR GREATER-THAN
2279	NEITHER GREATER-THAN NOR LESS-THAN
227A	PRECEDES
227B	SUCCEEDS
227C	PRECEDES OR EQUAL TO
227D	SUCCEEDS OR EQUAL TO
227E	PRECEDES OR EQUIVALENT TO
227F	SUCCEEDS OR EQUIVALENT TO
2280	DOES NOT PRECEDE
2281	DOES NOT SUCCEED
2282	SUBSET OF
2283	SUPERSET OF
2284	NOT A SUBSET OF
2285	NOT A SUPERSET OF
2286	SUBSET OF OR EQUAL TO
2287	SUPERSET OF OR EQUAL TO
2288	NEITHER A SUBSET OF NOR EQUAL TO
2289	NEITHER A SUPERSET OF NOR EQUAL TO
228A	SUBSET OF WITH NOT EQUAL TO
228B	SUPERSET OF WITH NOT EQUAL TO
228C	MULTISET
228F	SQUARE IMAGE OF
2290	SQUARE ORIGINAL OF
2291	SQUARE IMAGE OF OR EQUAL TO
2292	SQUARE ORIGINAL OF OR EQUAL TO
2298	CIRCLED DIVISION SLASH
22A2	RIGHT TACK
22A3	LEFT TACK
22A6	ASSERTION
22A7	MODELS
22A8	TRUE
22A9	FORCES
22AA	TRIPLE VERTICAL BAR TURNSTILE
22AB	DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE
22AC	DOES NOT PROVE
22AD	NOT TRUE
22AE	DOES NOT FORCE
22AF	NEGATED DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE
22B0	PRECEDES UNDER RELATION
22B1	SUCCEEDS UNDER RELATION
22B2	NORMAL SUBGROUP OF
22B3	CONTAINS AS NORMAL SUBGROUP
22B4	NORMAL SUBGROUP OF OR EQUAL TO
22B5	CONTAINS AS NORMAL SUBGROUP OR EQUAL TO
22B6	ORIGINAL OF
22B7	IMAGE OF
22B8	MULTIMAP
22BE	RIGHT ANGLE WITH ARC
22BF	RIGHT TRIANGLE
22C9	LEFT NORMAL FACTOR SEMIDIRECT PRODUCT
22CA	RIGHT NORMAL FACTOR SEMIDIRECT PRODUCT
22CB	LEFT SEMIDIRECT PRODUCT
22CC	RIGHT SEMIDIRECT PRODUCT
22CD	REVERSE TILDE EQUALS
22D0	DOUBLE SUBSET
22D1	DOUBLE SUPERSET
22D6	LESS-THAN WITH DOT
22D7	GREATER-THAN WITH DOT
22D8	VERY MUCH LESS-THAN
22D9	VERY MUCH GREATER-THAN
22DA	LESS-THAN EQUAL TO OR GREATER-THAN
22DB	GREATER-THAN EQUAL TO OR LESS-THAN
22DC	EQUAL TO OR LESS-THAN
22DD	EQUAL TO OR GREATER-THAN
22DE	EQUAL TO OR PRECEDES
22DF	EQUAL TO OR SUCCEEDS
22E0	DOES NOT PRECEDE OR EQUAL
22E1	DOES NOT SUCCEED OR EQUAL
22E2	NOT SQUARE IMAGE OF OR EQUAL TO
22E3	NOT SQUARE ORIGINAL OF OR EQUAL TO
22E4	SQUARE IMAGE OF OR NOT EQUAL TO
22E5	SQUARE ORIGINAL OF OR NOT EQUAL TO
22E6	LESS-THAN BUT NOT EQUIVALENT TO
22E7	GREATER-THAN BUT NOT EQUIVALENT TO
22E8	PRECEDES BUT NOT EQUIVALENT TO
22E9	SUCCEEDS BUT NOT EQUIVALENT TO
22EA	NOT NORMAL SUBGROUP OF
22EB	DOES NOT CONTAIN AS NORMAL SUBGROUP
22EC	NOT NORMAL SUBGROUP OF OR EQUAL TO
22ED	DOES NOT CONTAIN AS NORMAL SUBGROUP OR EQUAL
22F0	UP RIGHT DIAGONAL ELLIPSIS
22F1	DOWN RIGHT DIAGONAL ELLIPSIS
2308	LEFT CEILING
2309	RIGHT CEILING
230A	LEFT FLOOR
230B	RIGHT FLOOR
2320	TOP HALF INTEGRAL
2321	BOTTOM HALF INTEGRAL
2329	LEFT-POINTING ANGLE BRACKET
232A	RIGHT-POINTING ANGLE BRACKET
3008	LEFT ANGLE BRACKET
3009	RIGHT ANGLE BRACKET
300A	LEFT DOUBLE ANGLE BRACKET
300B	RIGHT DOUBLE ANGLE BRACKET
300C	LEFT CORNER BRACKET
300D	RIGHT CORNER BRACKET
300E	LEFT WHITE CORNER BRACKET
300F	RIGHT WHITE CORNER BRACKET
3010	LEFT BLACK LENTICULAR BRACKET
3011	RIGHT BLACK LENTICULAR BRACKET
3014	LEFT TORTOISE SHELL BRACKET
3015	RIGHT TORTOISE SHELL BRACKET
3016	LEFT WHITE LENTICULAR BRACKET
3017	RIGHT WHITE LENTICULAR BRACKET
3018	LEFT WHITE TORTOISE SHELL BRACKET
3019	RIGHT WHITE TORTOISE SHELL BRACKET
301A	LEFT WHITE SQUARE BRACKET
301B	RIGHT WHITE SQUARE BRACKET

Annex F
(informative)

Alternate format characters

There is a special class of characters called Alternate Format Characters which are included for compatibility with some industry practices. These characters do not have printable graphic symbols, and are thus represented in the character code tables by dotted boxes.

The function of most of these characters is to indicate the correct presentation of a sequence of characters. For any text processing other than presentation (such as sorting and searching), the alternate format characters, except for ZWJ and ZWNJ described in F.1.1, can be ignored by filtering them out. The alternate format characters are not intended to be used in conjunction with bi-directional control functions from ISO/IEC 6429.

There are collections of graphic characters for selected subsets which consist of Alternate Format Characters (see annex A).

F.1 General format characters

F.1.1 Zero-width boundary indicators

The following characters are used to indicate whether or not the adjacent characters are separated by a word boundary. Each of these zero-width boundary indicators has no width in its own presentation.

ZERO WIDTH SPACE (200B): This character behaves like a SPACE in that it indicates a word boundary, but unlike SPACE it has no presentational width. For example, this character could be used to indicate word boundaries in Thai, which does not use visible gaps to separate words.

ZERO WIDTH NO-BREAK SPACE (FEFF): This character behaves like a NO-BREAK SPACE in that it indicates the absence of word boundaries, but unlike NO-BREAK SPACE it has no presentational width. For example, this character could be inserted after the fourth character in the text "base+delta" to indicate that there is to be no word break between the "e" and the "+".

NOTE - For additional usages of this character for "signature", see annex H.

The following characters are used to indicate whether or not the adjacent characters are joined together in rendering (cursive joiners).

ZERO WIDTH NON-JOINER (200C): This character indicates that the adjacent characters are not joined together in cursive connection even when they would normally join together as cursive letter forms. For example, ZERO WIDTH NON-JOINER between ARABIC LETTER NOON and ARABIC LETTER MEEM indicates that the characters are not rendered with the normal cursive connection.

ZERO WIDTH JOINER (200D): This character indicates that the adjacent characters are represented with joining forms in cursive connection even when they would not normally join together as cursive letter forms. For example, in the sequence SPACE followed by ARABIC LETTER BEH followed by SPACE, ZERO WIDTH JOINER can be inserted between the first two characters to display the final form of the ARABIC LETTER BEH.

F.1.2 Format separators

The following characters are used to indicate formatting boundaries between lines or paragraphs.

LINE SEPARATOR (2028): This character indicates where a new line starts; although the text continues to the next line, it does not start a new paragraph; e.g. no inter-paragraph indentation might be applied.

PARAGRAPH SEPARATOR (2029): This character indicates where a new paragraph starts; e.g. the text continues on the next line and inter-paragraph line spacing or paragraph indentation might be applied.

F.1.3 Bi-directional text formatting

The following characters are used in formatting bi-directional text. If the specification of a subset includes these characters, then text containing right-to-left characters are to be rendered with an implicit bi-directional algorithm.

An implicit algorithm uses the directional character properties to determine the correct display order of characters on a horizontal line of text.

The following characters are format characters that act exactly like right-to-left or left-to-right characters in terms of affecting ordering (Bi-directional format marks). They have no visible graphic symbols, and they do not have any other semantic effect.

Their use can be more convenient than the explicit embeddings or overrides, since their scope is more local.

LEFT-TO-RIGHT MARK (200E): In bi-directional formatting, this character acts like a left-to-right character (such as LATIN SMALL LETTER A). RIGHT-TO-LEFT MARK (200F): In bi-directional formatting, this character acts like a right-to-left character (such as ARABIC LETTER NOON).

The following format characters indicate that a piece of text is to be treated as embedded, and is to have a particular ordering attached to it (Bi-directional format embeddings). For example, an English quotation in the middle of an Arabic sentence can be marked as being an embedded left-to-right string. These format characters nest in blocks, with the embedding and override characters initiating (pushing) a block, and the pop character terminating (popping) a block.

The function of the embedding and override characters are very similar; the main difference is that the embedding characters specify the implicit direction of the text, while the override characters specify the explicit direction of the text. When text has an explicit direction, the normal directional character properties are ignored, and all of the text is assumed to have the ordering direction determined by the override character.

LEFT-TO-RIGHT EMBEDDING (202A): This character is used to indicate the start of a left-to-right implicit embedding.

RIGHT-TO-LEFT EMBEDDING (202B): This character is used to indicate the start of a right-to-left implicit embedding.

LEFT-TO-RIGHT OVERRIDE (202D): This character is used to indicate the start of a left-to-right explicit embedding.

RIGHT-TO-LEFT OVERRIDE (202E): This character is used to indicate the start of a right-to-left explicit embedding.

POP DIRECTIONAL FORMATTING (202C): This character is used to indicate the termination of an implicit or explicit directional embedding initiated by the above characters.

F.1.4 Other boundary indicators

NARROW NO-BREAK SPACE (202F): This character is a non-breaking space. It is similar to 00A0 NO-BREAK SPACE, except that it is rendered with a narrower width. When used with the Mongolian script this character is usually rendered at one-third of the width of a normal space, and it separates a suffix from the Mongolian word-stem. This allows for the normal rules of Mongolian character shaping to apply, while indicating that there is no word boundary at that position.

F.2 Script-specific format characters

F.2.1 Hangul fill characters

The following format characters have a special usage for Hangul characters.

HANGUL FILLER (3164): This character represents the fill value used with the standard spacing Jamos.

HALFWIDTH HANGUL FILLER (FFA0): As with the other halfwidth characters, this character is included for compatibility with certain systems that provide halfwidth forms of characters.

F.2.2 Symmetric swapping format characters

The following characters are used in conjunction with the class of left/right handed pairs of characters listed in clause 19. The following format characters indicate whether the interpretation of the term LEFT or RIGHT in the character names is OPENING or CLOSING respectively. The following characters do not nest.

The default state of interpretation may be set by a higer level protocol or standard, such as ISO/IEC 6429. In the absence of such a protocol, the default state is as established by ACTIVATE SYMMETRIC SWAPPING.

INHIBIT SYMMETRIC SWAPPING (206A): Between this character and the following ACTIVATE SYMMETRIC SWAPPING format character (if any), the stored characters listed in clause 19 are interpreted and rendered as LEFT and RIGHT, and the processing specified in that clause is not performed.

ACTIVATE SYMMETRIC SWAPPING (206B): Between this character and the following INHIBIT SYMMETRIC SWAPPING format character (if any), the stored characters listed in clause 19 are interpreted and rendered as OPENING and CLOSING characters as specified in that clause.

F.2.3 Character shaping selectors

The following characters are used in conjunction with Arabic presentation forms. During the presentation process, certain characters may be joined together in cursive connection or ligatures. The following characters indicate that the character shape determination process used to achieve this presentation effect is either activated or inhibited. The following characters do not nest.

INHIBIT ARABIC FORM SHAPING (206C): Between this character and the following ACTIVATE ARABIC FORM SHAPING format character (if any), the character shaping determination process is inhibited. The stored Arabic presentation forms are

presented without shape modification. This is the default state.

ACTIVATE ARABIC FORM SHAPING (206D): Between this character and the following INHIBIT ARABIC FORM SHAPING format character (if any), the stored Arabic presentation forms are presented with shape modification by means of the character shaping determination process.

NOTE - These characters have no effect on characters that are not presentation forms: in particular, Arabic nominal characters as from 0600 to 06FF are always subject to character shaping, and are unaffected by these formatting characters.

F.2.4 Numeric shape selectors

The following characters allow the selection of the shapes in which the digits from 0030 to 0039 are rendered. The following characters do not nest. NATIONAL DIGIT SHAPES (206E): Between this character and the following NOMINAL DIGIT SHAPES format character (if any), digits from 0030 to 0039 are rendered with the appropriate national digit shapes as specified by means of appropriate agreements. For example, they could be displayed with shapes such as the ARABIC-INDIC digits from 0660 to 0669.

NOMINAL DIGIT SHAPES (206F): Between this character and the following NATIONAL DIGIT SHAPES format character (if any), the digits from 0030 to 0039 are rendered with the shapes as those shown in the code tables for those digits. This is the default state.

F.2.5 Mongolian shaping selectors

The following characters are used in conjunction with the letters in the Mongolian script.

MONGOLIAN FREE VARIATION SELECTOR ONE (180B):
MONGOLIAN FREE VARIATION SELECTOR TWO (180C):
MONGOLIAN FREE VARIATION SELECTOR THREE (180D):
A Mongolian Free Variation Selector character may immediately follow another character from the Mongolian collection to indicate a specific variant form of graphic symbol for that character, when the appropriate variant cannot be determined from the context. For each Mongolian character the number of variant forms that it can take is predetermined within each context. This number does not exceed three for any character.

MONGOLIAN VOWEL SEPARATOR (180E): This character may be used between the Mongolian letter A or the Mongolian letter E and the preceding consonant letter. It indicates a special form of the graphic symbol for the letter A or E and the preceding consonant. When rendered in visible form it is generally shown as a narrow space between the letters, but it may sometimes be shown as a distinct graphic symbol to assist the user.

F.3 Ideographic description characters

An Ideographic Description Character (IDC) is a graphic character, which is used with a sequence of other graphic characters to form an Ideographic Description Sequence (IDS). Such a sequence may be used to describe an ideographic character which is not specified within this International Standard.

The IDS describes the ideograph in the abstract form. It is not interpreted as a composed character and does not imply any specific form of rendering.

F.3.1 Syntax of an ideographic description sequence

An IDS consists of an IDC followed by a fixed number of Description Components (DC). A DC may be any one of the following :

- a coded ideograph
- a coded radical
- another IDS

NOTE - The above description implies that any IDS may be nested within another IDS.

Each IDC has four properties as summarized in Table-F.1 below.

- the number of DCs used in the IDS that commences with that IDC,
- the definition of its acronym,
- the syntax of the corresponding IDS,
- the relative positions of the DCs in the visual representation of the ideograph that is being described in its abstract form.

The syntax of the IDS introduced by each IDC is indicated in the "IDS Acronym and Syntax" column of the table by the abbreviated name of the IDC (e.g. IDC-LTR) followed by the corresponding number of DCs, i.e. (D_1 D_2) or (D_1 D_2 D_3).

F.3.2 Individual definitions of the ideographic description characters

IDEOGRAPHIC DESCRIPTION CHARACTER LEFT TO RIGHT (2FF0):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 on the left and D_2 on the right.

IDEOGRAPHIC DESCRIPTION CHARACTER ABOVE TO BELOW (2FF1):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 above D_2.

IDEOGRAPHIC DESCRIPTION CHARACTER LEFT TO MIDDLE AND RIGHT (2FF2):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 on the left of D_2, and D_2 on the left of D_3.

IDEOGRAPHIC DESCRIPTION CHARACTER ABOVE TO MIDDLE AND BELOW (2FF3):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 above D_2, and D_2 above D_3.

IDEOGRAPHIC DESCRIPTION CHARACTER FULL SURROUND (2FF4):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 surrounding D_2 .

IDEOGRAPHIC DESCRIPTION CHARACTER SURROUND FROM ABOVE (2FF5):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 above D_2, and surrounding D_2 on both sides.

IDEOGRAPHIC DESCRIPTION CHARACTER SURROUND FROM BELOW (2FF6):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 below D_2, and surrounding D_2 on both sides.

IDEOGRAPHIC DESCRIPTION CHARACTER SURROUND FROM LEFT (2FF7):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 on the left of D_2, and surrounding D_2 above and below.

IDEOGRAPHIC DESCRIPTION CHARACTER SURROUND FROM UPPER LEFT (2FF8):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 at the top left corner of D_2, and partly surrounding D_2 above and to the left.

IDEOGRAPHIC DESCRIPTION CHARACTER SURROUND FROM UPPER RIGHT (2FF9):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 at the top right corner of D_2, and partly surrounding D_2 above and to the right.

IDEOGRAPHIC DESCRIPTION CHARACTER SURROUND FROM LOWER LEFT (2FFA):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 at the bottom left corner of D_2, and partly surrounding D_2 below and to the left.

IDEOGRAPHIC DESCRIPTION CHARACTER OVERLAID (2FFB):

The IDS introduced by this character describes the abstract form of the ideograph with D_1 and D_2 overlaying each other.

F.4 Interlinear annotation characters

The following characters are used to indicate that an identified character string (the annotation string) is regarded as providing an annotation for another identified character string (the base string).

INTERLINEAR ANNOTATION ANCHOR (FFF9): This character indicates the beginning of the base string.

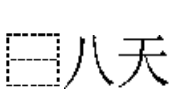
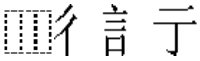
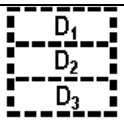
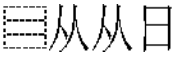
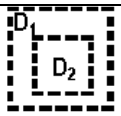
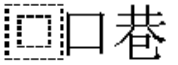
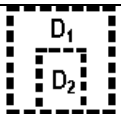
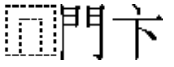
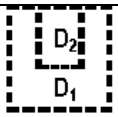
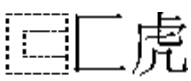
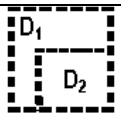
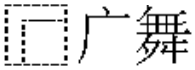
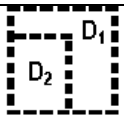
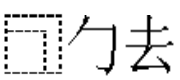
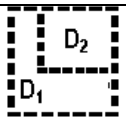
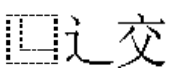
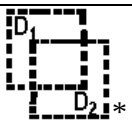
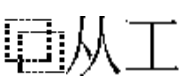
INTERLINEAR ANNOTATION SEPARATOR (FFFA): This character indicates the end of the base string and the beginning of the annotation string.

INTERLINEAR ANNOTATION TERMINATOR (FFFB): This character indicates the end of the annotation string.

The relationship between the annotation string and the base string is defined by agreement between the user of the originating device and the user of the receiving device. For example, if the base string is rendered in a visible form the annotation string may be rendered on a different line from the base string, in a position close to the base string.

If the interlinear annotation characters are filtered out during processing, then all characters between the Interlinear Annotation Separator and the Interlinear Annotation Terminator should also be filtered out.

Table F.1: Properties of ideographic description characters

Character Name: IDEOGRAPHIC DESCRIPTION CHARACTER ...	no. of DCs	IDS Acronym and Syntax	Relative positions of DCs	Example of IDS	IDS example represents:
LEFT TO RIGHT	2	IDC-LTR D_1 D_2			侮
ABOVE TO BELOW	2	IDC-ATB D_1 D_2			关
LEFT TO MIDDLE AND RIGHT	3	IDC-LMR D_1 D_2 D_3			衍
ABOVE TO MIDDLE AND BELOW	3	IDC-AMB D_1 D_2 D_3			昝
FULL SURROUND	2	IDC-FSD D_1 D_2			圈
SURROUND FROM ABOVE	2	IDC-SAV D_1 D_2			閑
SURROUND FROM BELOW	2	IDC-SBL D_1 D_2			凵
SURROUND FROM LEFT	2	IDC-SLT D_1 D_2			匿
SURROUND FROM UPPER LEFT	2	IDC-SUL D_1 D_2			廡
SURROUND FROM UPPER RIGHT	2	IDC-SUR D_1 D_2			匄
SURROUND FROM LOWER LEFT	2	IDC-SLL D_1 D_2			这
OVERLAID	2	IDC-OVL D_1 D_2			巫

* NOTE - D_1 and D_2 overlap each other. This diagram does not imply that D_1 is on the top left corner and D_2 is on the bottom right corner.

Annex G
(informative)

Alphabetically sorted list of character names

This annex lists all the character names from this part of ISO/IEC 10646 except Hangul syllables and CJK-ideographs (these are characters from blocks HANGUL SYLLABLES, CJK UNIFIED IDEOGRAPHS, CJK UNIFIED IDEOGRAPHS EXTENSION A and CJK COMPATIBILITY IDEOGRAPHS). They are shown with their code positions in the two-octet form.

2100	ACCOUNT OF
206D	ACTIVATE ARABIC FORM SHAPING
206B	ACTIVATE SYMMETRIC SWAPPING
00B4	ACUTE ACCENT
2101	ADDRESSED TO THE SUBJECT
262C	ADI SHAKTI
2708	AIRPLANE
2135	ALEF SYMBOL
232E	ALL AROUND-PROFILE
224C	ALL EQUAL TO
224A	ALMOST EQUAL OR EQUAL TO
2248	ALMOST EQUAL TO
2387	ALTERNATIVE KEY SYMBOL
0026	AMPERSAND
2220	ANGLE
212B	ANGSTROM SIGN
2625	ANKH
	-
	-
	-
	-
	-
	-
	-
	-
	-
	-
A2E8	YI SYLLABLE ZZYX
262F	YIN YANG
200D	ZERO WIDTH JOINER
FEFF	ZERO WIDTH NO-BREAK SPACE
200C	ZERO WIDTH NON-JOINER
200B	ZERO WIDTH SPACE

Editor's note: The complete list of character names will be provided in the Final Text of the Second Edition. Estimate: 55 pages.

Annex H
(informative)

The use of "signatures" to identify UCS

This annex describes a convention for the identification of features of the UCS, by the use of "signatures" within data streams of coded characters. The convention makes use of the character ZERO WIDTH NO-BREAK SPACE, and is applied by a certain class of applications.

When this convention is used, a signature at the beginning of a stream of coded characters indicates that the characters following are encoded in the UCS-2 or UCS-4 coded representation, and indicates the ordering of the octets within the coded representation of each character (see 6.3). It is typical of the class of applications mentioned above, that some make use of the signatures when receiving data, while others do not. The signatures are therefore designed in a way that makes it easy to ignore them.In this convention, the ZERO WIDTH NO-BREAK SPACE character has the following significance when it is present at the beginningof a stream of coded characters:

UCS-2 signature: FEFF

UCS-4 signature: 0000 FEFF

UTF-8 signature: EF BB BF

UTF-16 signature: FEFF

An application receiving data may either use these signatures to identify the coded representation form, or may ignore them and treat FEFF as the ZERO WIDTH NO-BREAK SPACE character.

If an application which uses one of these signatures recognises its coded representation in reverse sequence (e.g. hexadecimal FFFE), the application can identify that the coded representations of the following characters use the opposite octet sequence to the sequence expected, and may take the necessary action to recognise the characters correctly.

NOTE - The hexadecimal value FFFE does not correspond to any coded character within ISO/IEC 10646.

Annex J
(informative)

Recommendation for combined receiving/originating devices with internal storage

This annex is applicable to a widely-used class of devices that can store received CC-data elements for subsequent retransmission.

This recommendation is intended to ensure that loss of information is minimised between the receipt of a CC-data-element and its retransmission.

A device of this class includes a receiving device component and an originating device component as in 2.3, and can also store received CC-data-elements for retransmission, with or without modification by the actions of the user on the corresponding characters represented within it. Within this class of device, two distinct types are identified here, as follows.

1. Receiving device with full retransmission capability

   The originating device component will retransmit the coded representations of any received characters, including those that are outside the identified subset of the receiving device component, without change to their coded representation, unless modified by the user.

2. Receiving device with subset retransmission capability

   The originating device component can retransmit only the coded representations of the characters of the subset adopted by the receiving device component.

Annex K
(informative)

Notations of octet value representations

Representation of octet values in ISO/IEC 10646 except in clause 16 is different from other character coding standards such as ISO/IEC 2022, ISO/IEC 6429 and ISO 8859. This annex clarifies the relationship between the two notations.

- In ISO/IEC 10646, the notation used to express an octet value is z, where z is a hexadecimal number in the range 00 to FF.

  For example, the character ESCAPE (ESC) of ISO/IEC 2022 is represented by 1B.

- In other character coding standards, the notation used to express an octet value is x/y, where x and y are two numbers in the range 00 to 15. The correspondence between the notations of the form x/y and the octet value is as follows.

  x is the number represented by bit 8, bit 7, bit 6 and bit 5 where these bits are given the weight 8, 4, 2 and 1 respectively;

  y is the number represented by bit 4, bit 3, bit 2 and bit 1 where these bits are given the weight 8, 4, 2 and 1 respectively.

  For example, the character ESC of ISO/IEC 2022 is represented by 01/11.

Thus ISO/IEC 2022 (and other character coding standards) octet value notation can be converted to ISO/IEC 10646 octet value notation by converting the value of x and y to hexadecimal notation. For example; 04/15 is equivalent to 4F.

Annex L
(informative)

Character naming guidelines

Guidelines for generating and presenting unique names of characters in ISO/IEC JTC1/SC2 standards are listed in this annex for reference. These guidelines are used in information technology coded character set standards such as ISO/IEC 646, ISO/IEC 6937, ISO/IEC 8859, ISO/IEC 10367 as well as in ISO/IEC 10646.

These Guidelines specify rules for generating and presenting unique names of characters in those versions of the standards that are in the English language.

NOTE. In a version of such a standard in another language:

a) these rules may be amended to permit names of characters to be generated using words and syntax that are considered appropriate within that language;

b) the names of the characters from this version of the standard may be replaced by equivalent unique names constructed according to the rules amended as in a) above.

Rules 1 to 3 are implemented without exceptions. However it must be accepted that in some cases (e.g. historical or traditional usage, unforeseen special cases, difficulties inherent to the nature of the character considered), exceptions to some of the other rules will have to be tolerated. Nonetheless, these rules are applied wherever possible.

Rule 1

By convention, only Latin capital letters A to Z, space, and hyphen are used for writing the names of characters.

NOTE - Names of characters may also include digits 0 to 9 (provided that a digit is not the first character in a word) if inclusion of the name of the corresponding digit(s) would be inappropriate. As an example the name of the character at position 201A is SINGLE LOW-9 QUOTATION MARK; the symbol for the digit 9 is included in this name to illustrate the shape of the character, and has no numerical significance.

Rule 2

The names of control functions are coupled with an acronym consisting of Latin capital letters A to Z and, where required, digits. Once the name has been specified for the first time, the acronym may be used in the remainder of the text where required for simplification and clarity of the text. Exceptionally, acronyms may be used for graphic characters where usage already exists and clarity requires it, in particular in code tables.

Examples:

Name: LOCKING-SHIFT TWO RIGHT

Acronym: LS2R

Name: SOFT-HYPHEN

Acronym: SHY

NOTE - In ISO/IEC 6429, also the names of the modes have been presented in the same way as control functions.

Rule 3

In some cases, the name of a character can be followed by an additional explanatory statement not part of the name. These statements are in parentheses and not in capital Latin letters except the initials of the word where required. See examples in rule 12.

The name of a character may also be followed by a single * symbol. This indicates that additional information on the character appears in Annex P. Any * symbols are omitted from the character names listed in Annex G.

Rule 4

The name of a character wherever possible denotes its customary meaning, for examples PLUS SIGN. Where this is not possible, names describe shapes, not usage; for example: UPWARDS ARROW.

The name of a character is not intended to identify its properties or attributes, or to provide information on its linguistic characteristics, except as defined in Rule 6 below.

Rule 5

Only one name is given to each character.

Rule 6

The names are constructed from an appropriate set of the applicable terms of the following grid and ordered in the sequence of this grid. Exceptions are specified in Rule 11. The words WITH and AND may be included for additional clarity when needed.

1	Script
2	Case
3	Type
4	Language
5	Attribute
6	Designation
7	Mark(s)
8	Qualifier

Examples of such terms:

Script	Latin, Cyrillic, Arabic
Case	capital, small
Type	letter, ligature, digit
Language	Ukrainian
Attribute	final, sharp, subscript, vulgar
Designation	customary name, name of letter
Mark	acute, ogonek, ring above, diaeresis
Qualifier	sign, symbol

Examples of names:

LATIN CAPITAL LETTER A WITH ACUTE

1 2 3 6 7

DIGIT FIVE

3 6

LEFT CURLY BRACKET

5 5 6

NOTES

1 A ligature is a graphic symbol in which two or more other graphic symbols are imaged as single graphic symbol.

2 Where a character comprises a base letter with multiple marks, the sequence of those in the name is the order in which the marks are positioned relative to the base letter, starting with the marks above the letters taken in upwards sequence, and followed by the marks below the letters taken in downwards sequece.

Rule 7

The letters of the Latin script are represented within their name by their basic graphic symbols (A, B, C, ...). The letters of all other scripts are represented by their transcription in the language of the first published International Standard.

Examples:

K	LATIN CAPITAL LETTER K
Ю	CYRILLIC CAPITAL LETTER YU

Rule 8

In principle when a character of a given script is used in more than one language, no language name is specified. Exceptions are tolerated where an ambiguity would otherwise result.

Examples:

И	CYRILLIC CAPITAL LETTER I
І	CYRILLIC CAPITAL LETTER BYELORUSSIAN-UKRAINIAN I

Rule 9

Letters that are elements of more than one script are considered different even if their shape is the same; they have different names.

Examples:

A	LATIN CAPITAL LETTER A
Α	GREEK CAPITAL LETTER ALPHA
А	CYRILLIC CAPITAL LETTER A

Rule 10

A character of one script used in isolation in another script, for example as a graphic symbol in relation with physical units of dimension, is considered as a character different from the character of its native script.

Example:

µ	MICRO SIGN

Rule 11

A number of characters have a traditional name consisting of one or two words. It is not intended to change this usage.

Examples:

'	APOSTROPHE
:	COLON
@	COMMERCIAL AT
_	LOW LINE
~	TILDE

Rule 12

In some cases, characters of a given script, often punctuation marks, are used in another script for a different usage. In these cases the customary name reflecting the most general use is given to the character. The customary name may be followed in the list of characters of a particular standard by the name in parentheses which this character has in the script specified by this particular standard.

Example:

UNDERTIE (Enotikon)

Rule 13

The above rules do not apply to ideographic characters. These characters are identified by alpha-numeric identifiers specified for each ideographic character (see clause 27).

Annex M
(informative)

Sources of characters

Several sources and contributions were used for constructing this coded character set. In particular, characters of the following national and international standards are included in this part of ISO/IEC 10646.

ISO 233:1984, *Documentation - Transliteration of Arabic characters into Latin characters*.

ISO/IEC 646:1991, *Information technology - ISO 7-bit coded character set for information interchange*.

ISO 2033:1983, *Information processing - Coding of machine-readable characters (MICR and OCR)*.

ISO 2047:1975, *Information processing - Graphical representations for the control characters of the 7-bit coded character set*.

ISO 5426:1983, *Extension of the Latin alphabet coded character set for bibliographic information interchange.*

ISO 5427:1984, *Extension of the Cyrillic alphabet coded character set for bibliographic information interchange.*

ISO 5428:1984, *Greek alphabet coded character set for bibliographic information interchange.*

ISO 6438:1983, *Documentation - African coded character set for bibliographic information interchange.*

ISO 6861, *Information and documentation - Cyrillic alphabet coded character set for historic Slavonic languages and European non-Slavonic languages written in a Cyrillic script for bibliographic information interchange.*

ISO 6862, *Information and documentation - Mathematical coded character set for bibliographic information interchange.*

ISO 6937:1993, *Information technology - Coded graphic character sets for text communication - Latin alphabet.*

ISO/IEC 8859, *Information technology - 8-bit single-byte coded graphic character sets*

-Part 1. Latin alphabet No. 1 (1998).

-Part 2. Latin alphabet No. 2 (1999).

-Part 3. Latin alphabet No. 3 (1999).

-Part 4. Latin alphabet No. 4 (1998).

-Part 5. Latin/Cyrillic alphabet (1999)

-Part 6. Latin/Arabic alphabet (1999)

-Part 7. Latin/Greek alphabet (1987)

-Part 8. Latin/Hebrew alphabet (1999)

-Part 9. Latin alphabet No. 5 (1999)

-Part 10. Latin alphabet No. 6 (1998).

ISO 8879:1986, *Information processing - Text and office systems - Standard Generalized Markup Language (SGML).*

ISO 8957:1993, *Information and documentation - Hebrew alphabet coded character sets for bibliographic information interchange.*

ISO 9036:1987, *Information processing - Arabic 7-bit coded character set for information interchange.*

ISO/IEC 10367:1991, *Information technology - Standardized coded graphic character sets for use in 8-bit codes.*

ISO/IEC TR 15285:1998, *Information technology - An operational model for characters and glyphs.*

ISO international register of character sets to be used with escape sequences. (registration procedure ISO 2375:1985) .

ANSI X3.4-1986 American National Standards Institute. *Coded character set - 7-bit American national standard code for information interchange.*

ANSI X3.32-1973 American National Standards Institute. *American national standard graphic representation of the control characters of American national standard code for information interchange.*

ANSI Y10.20-1988 American National Standards Institute. *Mathematic signs and symbols for use in physical sciences and technology.*

ANSI Y14.5M-1982 American National Standard. *Engineering drawings and related document practices, dimensioning and tolerances.*

ANSI Z39.47-1985 American National Standards Institute. *Extended Latin alphabet coded character set for bibliographic use.*

ANSI Z39.64-1989 American National Standards Institute. *East Asian character code for bibliographic use.*

ASMO 449-1982 Arab Organization for Standardization and Methodology. *Data processing - 7-bit coded character set for information interchange.*

GB2312-80 *Code of Chinese Graphic Character Set for Information Interchange: Jishu Biaozhun Chubanshe* (Technical Standards Publishing).

NOTE - For additional sources of the CJK unified ideographs in this part of ISO/IEC 10646 refer to clause 27.

GBK (*Guo Biao Kuo*) *Han character internal code extension specification: Jishu Biaozhun Chubanshe* (Technical Standards Publishing)

LTD 37(1610)-1988 *Indian standard code for information interchange.*

JIS X 0201-1976 Japanese Standards Association. *Jouhou koukan you fugou (Code for Information Interchange).*

JIS X 0208-1990 Japanese Standards Association. *Jouhou koukan you kanji fugoukei (Code of the Japanese Graphic Character Set for Information Interchange).*

JIS X 0212-1990 Japanese Standards Association. *Jouhou koukan you kanji fugou-hojo kanji (Code of the supplementary Japanese graphic character set for information interchange).*

KS C 5601-1992 Korean Industrial Standards Association. *Jeongbo gyohwanyong buho (Code for Information Interchange).*

SI 1311.2 - 1996 The Standards Institution of Israel Information Technology. *ISO 8-bit coded character set for information interchange with Hebrew points and cantillation marks.*

TIS 620-2533:1990 *Thai Industrial Standard for Thai Character Code for Computer.*

Esling, John. *Computer coding of the IPA: supplementary report*. Journal of the International Phonetic Association, 20:1 (1990), p. 22-26.

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Annex N
(informative)

External references to character repertoires

N.1 Methods of reference to character repertoires and their coding

Within programming languages and other methods for defining the syntax of data objects there is commonly a need to declare a specific character repertoire from among those that are specified in ISO/IEC 10646. There may also be a need to declare the corresponding coded representations applicable to that repertoire.

For any character repertoire that is in accordance with ISO/IEC 10646 a precise declaration of that repertoire should include the following parameters: - identification of ISO/IEC 10646,

- the adopted subset of the repertoire, identified by one or more collection numbers,
- the adopted implementation level (1, 2 or 3),
- the adopted coded representation form (4-octet or 2-octet).

One of the methods now in common use for defining the syntax of data objects is Abstract Syntax Notation 1 (ASN.1) specified in ISO/IEC 8824. The corresponding coded representations are specified in ISO/IEC 8825. When this method is used the forms of the references to character repertoires and coding are as indicated in the following clauses.

N.2 Identification of ASN.1 character abstract syntaxes

The set of all character strings that can be formed from the characters of an identified repertoire in accordance with ISO/IEC 10646 is defined to be a "character abstract syntax" in the terminology of ISO/IEC 8824. For each such character abstract syntax, a corresponding object identifier value is defined to permit references to be made to that syntax when the ASN.1 notation is used.

ISO/IEC 8824 annex B specifies the form of object identifier values for objects that are specified in an ISO standard. In such an object identifier the features and options of this part of ISO/IEC 10646 are identified by means of numbers (arcs) which follow the arcs "10646" and "1" which identify the part one of ISO/IEC 10646.

The first such arc identifies the adopted implementation level, and is either:

- level-1 (1), or
- level-2 (2), or
- level-3 (3).

The second such arc identifies the repertoire subset, and is either:

- all (0), or
- collections (1).

Arc (0) identifies the entire collection of characters specified in this part of ISO/IEC 10646. No further arc follow this arc.

NOTE - This collection includes private groups and planes, and is therefore not fully-defined. Its use without additional prior agreement is deprecated.

Arc (1) is followed by one or a sequence of further arcs, each of which is a collection number from annex A, in ascending numerical order. This sequence identifies the subset consisting of the collections whose numbers appear in the sequence.

NOTE - As an example, the object identifier for the subset comprising the collections BASIC LATIN, LATIN-1 SUPPLEMENT, and MATHEMATICAL OPERATORS, at implementation level 1, is:

{iso standard 10646 1 level-1 (1) collections (1) 1 2 39}

ISO/IEC 8824 also specifies object descriptors corresponding to object identifier values. For each combination of arcs the corresponding object descriptors are as follows:

1 0 : "ISO 10646 part-1 level-1 unrestricted"
2 0 : "ISO 10646 part-1 level-2 unrestricted"
3 0 : "ISO 10646 part-1 level-3 unrestricted"

For a single collection with collection name "xxx".

1 1 : "ISO 10646 part-1 level-1 xxx"
2 1 : "ISO 10646 part-1 level-2 xxx"
3 1 : "ISO 10646 part-1 level-3 xxx"

For a repertoire comprising more than one collection, numbered m1, m2, etc.

1 1 : "ISO 10646 part-1 level-1 collections m1,m2, m3, ... "

2 1 : "ISO 10646 part-1 level-2 collections m1,m2, m3, ... "

3 1 : "ISO 10646 part-1 level-3 collections m1,m2, m3, ... "

NOTE - All spaces are single spaces.

N.3 Identification of ASN.1 character transfer syntaxes

The coding method for character strings that can be formed from the characters in accordance with ISO/IEC 10646 is defined to be a "character transfer syntax" in the terminology of ISO/IEC 8824. For each such character transfer syntax, a corresponding object identifier value is defined to permit references to be made to that syntax when the ASN.1 notation is used.

In an object identifier in accordance with ISO/IEC 8824 annex B, the coded representation form specified in this part of ISO/IEC 10646 is identified by means of numbers (arcs) which follow the arcs "10646" and "1" which identify this part of ISO/IEC 10646.

The first such arc is:
- transfer-syntaxes (0).

The second such arc identifies the form and is either:

- two-octet-BMP-form (2), or
- four-octet-form (4), or
- UTF16-form (5), or
- UTF8-form (8).

NOTE - As an example, the object identifier for the two-octet coded representation form is:

{iso standard 10646 1 transfer-syntaxes (0) two-octet-BMP-form (2)}

The corresponding object descriptors are:

- "ISO 10646 part-1 form 2"

- "ISO 10646 part-1 form 4"

- “ISO 10646 part-1 utf-16”

- “ISO 10646 part-1 utf-8”.

Annex P
(Informative)

Additional information on characters

This Annex contains additional information on some of the characters specified in clause 26 of this International Standard. This information is intended to clarify some feature of a character, such as its naming or usage, or its associated graphic symbol.

Each entry in this Annex consists of the name of a character and its code position in the two-octet form, followed by the related additional information. Entries are arranged in ascending sequence of code position.

When an entry for a character is included in this Annex an * symbol appears immediately following its name in the corresponding table in clause 26 of this International Standard.

Group 00, Plane 00 (BMP)

00AB LEFT-POINTING DOUBLE ANGLE QUOTATION MARK

This character may be used as an Arabic opening quotation mark, if it appears in a bidirectional context as described in clause 19. The graphic symbol associated with it may differ from that in the table for Row 00.

00BB RIGHT-POINTING DOUBLE ANGLE QUOTATION MARK

This character may be used as an Arabic closing quotation mark, if it appears in a bidirectional context as described in clause 19. The graphic symbol associated with it may differ from that in the table for Row 00.

00C6 LATIN CAPITAL LETTER AE (ash)

In the first edition of this International Standard the name of this character was:

LATIN CAPITAL LIGATURE AE

00E6 LATIN SMALL LETTER AE (ash)

In the first edition of this International Standard the name of this character was:

LATIN SMALL LIGATURE AE

0189 LATIN CAPITAL LETTER AFRICAN D

This character is the capital letter form of:

0256 LATIN SMALL LETTER D WITH TAIL

019F LATIN CAPITAL LETTER O WITH MIDDLE TILDE

This character is the capital letter form of:

0275 LATIN SMALL LETTER BARRED O

01A6 LATIN LETTER YR

This character is the capital letter form of:

0280 LATIN LETTER SMALL CAPITAL R

01E2 LATIN CAPITAL LETTER AE WITH MACRON (ash)

In the first edition of this International Standard the name of this character was:

LATIN CAPITAL LIGATURE AE WITH MACRON

01E3 LATIN SMALL LETTER AE WITH MACRON (ash)

In the first edition of this International Standard the name of this character was:

LATIN SMALL LIGATURE AE WITH MACRON

01FC LATIN CAPITAL LETTER AE WITH ACUTE (ash)

In the first edition of this International Standard the name of this character was:

LATIN CAPITAL LIGATURE AE WITH ACUTE

01FD LATIN SMALL LETTER AE WITH ACUTE (ash)

In the first edition of this International Standard the name of this character was:

LATIN SMALL LIGATURE AE WITH ACUTE

0218 LATIN CAPITAL LETTER S WITH COMMA BELOW

This character is intended for use only in those cases where it is necessary to make a distinction from the letter with cedilla. Both forms of the letter may be found in a single document written in a single language, e.g. Romanian or Turkish.

In ISO/IEC 8859-2 only a single (8-bit) coded character is provided, LATIN CAPITAL LETTER S WITH CEDILLA, which maps to 015E in ISO/IEC 10646 by default, and may map by mutual agreement between sender and receiver to this letter with comma below. See ISO/IEC 8859-2 for further information on the use of that standard.

0219 LATIN SMALL LETTER S WITH COMMA BELOW

This character is intended for use only in those cases where it is necessary to make a distinction from the letter with cedilla. Both forms of the letter may be found in a single document written in a single language, e.g. Romanian or Turkish.

In ISO/IEC 8859-2 only a single (8-bit) coded character is provided, LATIN SMALL LETTER S WITH CEDILLA, which maps to 015F in ISO/IEC 10646 by default, and may map by mutual agreement between sender and receiver to this letter with comma below. See ISO/IEC 8859-2 for further information on the use of that standard.

021A LATIN CAPITAL LETTER T WITH COMMA BELOW

This character is intended for use only in those cases where it is necessary to make a distinction from the letter with cedilla. Both forms of the

letter may be found in a single document written in a single language, e.g. Romanian.

In ISO/IEC 8859-2 only a single (8-bit) coded character is provided, LATIN CAPITAL LETTER T WITH CEDILLA, which maps to 0162 in ISO/IEC 10646 by default, and may map by mutual agreement between sender and receiver to this letter with comma below. See ISO/IEC 8859-2 for further information on the use of that standard.

021B LATIN SMALL LETTER T WITH COMMA BELOW

This character is intended for use only in those cases where it is necessary to make a distinction from the letter with cedilla. Both forms of the letter may be found in a single document written in a single language, e.g. Romanian.

In ISO/IEC 8859-2 only a single (8-bit) coded character is provided, LATIN SMALL LETTER T WITH CEDILLA, which maps to 0163 in ISO/IEC 10646 by default, and may map by mutual agreement between sender and receiver to this letter with comma below. See ISO/IEC 8859-2 for further information on the use of that standard.

0280 LATIN LETTER SMALL CAPITAL R

This character is the small letter form of:

01A6 LATIN LETTER YR

0596 HEBREW ACCENT TIPEHA

This character may be used as a Hebrew accent tarha.

0598 HEBREW ACCENT ZARQA

This character may be used as a Hebrew accent zinorit.

05A5 HEBREW ACCENT MERKHA

This character may be used as a Hebrew accent yored.

05A8 HEBREW ACCENT QADMA

This character may be used as a Hebrew accent azla.

05AA HEBREW ACCENT YERAH BEN YOMO

This character may be used as a Hebrew accent galgal.

05BD HEBREW POINT METEG

This character may be used as a Hebrew accent sof pasuq or siluq.

05C0 HEBREW PUNCTUATION PASEQ

This character may be used as a Hebrew accent legarme.

05C3 HEBREW PUNCTUATION SOF PASUQ

This character may be used as a Hebrew punctuation colon.

06AF ARABIC LETTER GAF

The symbol for a Hamza (see position 0633) may appear in the centre of the graphic symbol associated with this character.

06D0 ARABIC LETTER E

This character may be used as an Arabic letter Sindhi bbeh.

0FAD TIBETAN SUBJOINED LETTER WA

The graphic symbol for this character occurs in two alternative forms, a full form and a short form (known as *wa.zur* (wazur)). The short form of the letter is shown in the table, since it occurs more frequently.

0FB1 TIBETAN SUBJOINED LETTER YA

The graphic symbol for this character occurs in two alternative forms, a full form and a short form (known as *ya.btags* (ya ta)). The short form of the letter is shown in the table, since it occurs more frequently.

0FB2 TIBETAN SUBJOINED LETTER RA

The graphic symbol for this character occurs in two alternative forms, a full form and a short form (known as *ra.btags* (ra ta)). The short form of the letter is shown in the table, since it occurs more frequently.

0F6A TIBETAN LETTER FIXED-FORM RA

This character has the same graphic symbol as that shown in the table for:

0F62 TIBETAN LETTER RA

It may be used when the graphic symbol is required to remain unchanged regardless of context.

1100 HANGUL CHOSEONG KIYEOK .....
1112 HANGUL CHOSEONG HIEUH

The Latin letters shown in parenthesis after the names of the characters in the range hex 1100 to 1112 (except 110B) are transliterations of these Hangul characters. These transliterations are used in the construction of the names of the Hangul syllables that are allocated in code positions hex AC00 to D7A3 in this International Standard.

11A8 HANGUL JONGSEONG KIYEOK .....
11C2 HANGUL JONGSEONG HIEUH

The Latin letters shown in parenthesis after the names of the characters in the range hex 11A8 to 11C2 are transliterations of these Hangul characters. These transliterations are used in the construction of the names of the Hangul syllables that are allocated in code positions hex AC00 to D7A3 in this International Standard.

234A APL FUNCTIONAL SYMBOL DOWN TACK UNDERBAR

The relation between the name of this character and the orientation of the “tack” element in its

graphical symbol is inconsistent with that of other characters in this International Standard, such as:

22A4 DOWN TACK and 22A5 UP TACK

234E APL FUNCTIONAL SYMBOL DOWN TACK JOT

Information for the character at 234A applies.

2351 APL FUNCTIONAL SYMBOL UP TACK OVERBAR

Information for the character at 234A applies.

2355 APL FUNCTIONAL SYMBOL UP TACK JOT

Information for the character at 234A applies.

2361 APL FUNCTIONAL SYMBOL UP TACK DIAERESIS

Information for the character at 234A applies.

FA1F CJK COMPATIBILITY IDEOGRAPH-FA1F

This character should be considered as an extension to the block of characters CJK UNIFIED IDEOGRAPHS EXTENSION A (see clause 27). It is not a duplicate of a character already allocated in the blocks of CJK Unified Ideographs, unlike many other characters in the block CJK COMPATIBILITY IDEO-GRAPHS. The source of this character, shown as described in clause 27, is:

C	J	K	V
G - Hanzi - T	Kanji A-264B A-0643	Hanja	ChuNom

FA23 CJK COMPATIBILITY IDEOGRAPH-FA23

This character should be considered as an extension to the block of characters CJK UNIFIED IDEOGRAPHS EXTENSION A (see clause 27). It is not a duplicate of a character already allocated in the blocks of CJK Unified Ideographs, unlike many other characters in the block CJK COMPATIBILITY IDEOGRAPHS. The sources of this character, shown as described in clause 27, are:

C	J	K	V
G - Hanzi - T F-3862 F-2466	Kanji A-2728 A-0708	Hanja	ChuNom

FFE3 FULLWIDTH MACRON

This character is the full-width form of the character: 00AF MACRON. It may also be used as the full-width form of the character:

203E OVERLINE

Annex Q
(informative)

Code mapping table for Hangul syllables

This Annex provides a cross-reference between the Hangul syllables (and code positions) that were specified in the First Edition of this International Standard and their amended code positions as now specified in this edition.

In the First Edition of this International Standard 6656 Hangul syllables were allocated to consecutive code positions in the range hexadecimal 3400 to 4DFF. These Hangul syllables are now re-allocated non-consecutively to code positions in the larger range hexadecimal AC00 to D7A3.

For each Hangul syllable in the First Edition its code position provides an index to a cell in Table Q.1 which appears on the following pages. The first three hexadecimal digits of the code position identify a row in the table, and the final hexadecimal digit identifies a column in the table. The cell at the identified row and column position contains the code position (in hexadecimal) to which the Hangul syllable is now allocated.

Example:
In the table for Row 38 (Table 67) of the First Edition of this International Standard

HANGUL SYLLABLE SIOS O RIEUL

is found at position 389D. In row 389, column D, of Table Q.1 the entry C194 is found. This entry indicates that this Hangul syllable is now allocated to code position C194.

NOTE - The name shown for the Hangul syllable at C194 is:
HANGUL SYLLABLE SOL.
This is because the names of Hangul syllables are now constructed from the Latin transliterations shown in the tables for Row 11 (see also 26.2 and Annex P).

Table Q.1 - Code mapping for Hangul syllables

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
340 :	AC00	AC01	AC04	AC07	AC08	AC09	AC0A	AC10	AC11	AC12	AC13	AC14	AC15	AC16	AC17	AC19
341 :	AC1A	AC1B	AC1C	AC1D	AC20	AC24	AC2C	AC2D	AC2F	AC30	AC31	AC38	AC39	AC3C	AC40	AC4B
342 :	AC4D	AC54	AC58	AC5C	AC70	AC71	AC74	AC77	AC78	AC7A	AC80	AC81	AC83	AC84	AC85	AC86
343 :	AC89	AC8A	AC8B	AC8C	AC90	AC94	AC9C	AC9D	AC9F	ACA0	ACA1	ACA8	ACA9	ACAA	ACAC	ACAF
344 :	ACB0	ACB8	ACB9	ACBB	ACBC	ACBD	ACC1	ACC4	ACC8	ACCC	ACD5	ACD7	ACE0	ACE1	ACE4	ACE7
345 :	ACE8	ACEA	ACEC	ACEF	ACF0	ACF1	ACF3	ACF5	ACF6	ACFC	ACFD	AD00	AD04	AD06	AD0C	AD0D
346 :	AD0F	AD11	AD18	AD1C	AD20	AD29	AD2C	AD2D	AD34	AD35	AD38	AD3C	AD44	AD45	AD47	AD49
347 :	AD50	AD54	AD58	AD61	AD63	AD6C	AD6D	AD70	AD73	AD74	AD75	AD76	AD7B	AD7C	AD7D	AD7F
348 :	AD81	AD82	AD88	AD89	AD8C	AD90	AD9C	AD9D	ADA4	ADB7	ADC0	ADC1	ADC4	ADC8	ADD0	ADD1
349 :	ADD3	ADDC	ADE0	ADE4	ADF8	ADF9	ADFC	ADFF	AE00	AE01	AE08	AE09	AE0B	AE0D	AE14	AE30
34A :	AE31	AE34	AE37	AE38	AE3A	AE40	AE41	AE43	AE45	AE46	AE4A	AE4C	AE4D	AE4E	AE50	AE54
34B :	AE56	AE5C	AE5D	AE5F	AE60	AE61	AE65	AE68	AE69	AE6C	AE70	AE78	AE79	AE7B	AE7C	AE7D
34C :	AE84	AE85	AE8C	AEBC	AEBD	AEBE	AEC0	AEC4	AECC	AECD	AECF	AED0	AED1	AED8	AED9	AEDC
34D :	AEE8	AEEB	AEED	AEF4	AEF8	AEFC	AF07	AF08	AF0D	AF10	AF2C	AF2D	AF30	AF32	AF34	AF3C
34E :	AF3D	AF3F	AF41	AF42	AF43	AF48	AF49	AF50	AF5C	AF5D	AF64	AF65	AF79	AF80	AF84	AF88
34F :	AF90	AF91	AF95	AF9C	AFB8	AFB9	AFBC	AFC0	AFC7	AFC8	AFC9	AFCB	AFCD	AFCE	AFD4	AFDC
350 :	AFE8	AFE9	AFF0	AFF1	AFF4	AFF8	B000	B001	B004	B00C	B010	B014	B01C	B01D	B028	B044
351 :	B045	B048	B04A	B04C	B04E	B053	B054	B055	B057	B059	B05D	B07C	B07D	B080	B084	B08C
352 :	B08D	B08F	B091	B098	B099	B09A	B09C	B09F	B0A0	B0A1	B0A2	B0A8	B0A9	B0AB	B0AC	B0AD
353 :	B0AE	B0AF	B0B1	B0B3	B0B4	B0B5	B0B8	B0BC	B0C4	B0C5	B0C7	B0C8	B0C9	B0D0	B0D1	B0D4
354 :	B0D8	B0E0	B0E5	B108	B109	B10B	B10C	B110	B112	B113	B118	B119	B11B	B11C	B11D	B123
355 :	B124	B125	B128	B12C	B134	B135	B137	B138	B139	B140	B141	B144	B148	B150	B151	B154
356 :	B155	B158	B15C	B160	B178	B179	B17C	B180	B182	B188	B189	B18B	B18D	B192	B193	B194
357 :	B198	B19C	B1A8	B1CC	B1D0	B1D4	B1DC	B1DD	B1DF	B1E8	B1E9	B1EC	B1F0	B1F9	B1FB	B1FD
358 :	B204	B205	B208	B20B	B20C	B214	B215	B217	B219	B220	B234	B23C	B258	B25C	B260	B268
359 :	B269	B274	B275	B27C	B284	B285	B289	B290	B291	B294	B298	B299	B29A	B2A0	B2A1	B2A3
35A :	B2A5	B2A6	B2AA	B2AC	B2B0	B2B4	B2C8	B2C9	B2CC	B2D0	B2D2	B2D8	B2D9	B2DB	B2DD	B2E2
35B :	B2E4	B2E5	B2E6	B2E8	B2EB	B2EC	B2ED	B2EE	B2EF	B2F3	B2F4	B2F5	B2F7	B2F8	B2F9	B2FA
35C :	B2FB	B2FF	B300	B301	B304	B308	B310	B311	B313	B314	B315	B31C	B354	B355	B356	B358
35D :	B35B	B35C	B35E	B35F	B364	B365	B367	B369	B36B	B36E	B370	B371	B374	B378	B380	B381
35E :	B383	B384	B385	B38C	B390	B394	B3A0	B3A1	B3A8	B3AC	B3C4	B3C5	B3C8	B3CB	B3CC	B3CE
35F :	B3D0	B3D4	B3D5	B3D7	B3D9	B3DB	B3DD	B3E0	B3E4	B3E8	B3FC	B410	B418	B41C	B420	B428
360 :	B429	B42B	B434	B450	B451	B454	B458	B460	B461	B463	B465	B46C	B480	B488	B49D	B4A4
361 :	B4A8	B4AC	B4B5	B4B7	B4B9	B4C0	B4C4	B4C8	B4D0	B4D5	B4DC	B4DD	B4E0	B4E3	B4E4	B4E6
362 :	B4EC	B4ED	B4EF	B4F1	B4F8	B514	B515	B518	B51B	B51C	B524	B525	B527	B528	B529	B52A
363 :	B530	B531	B534	B538	B540	B541	B543	B544	B545	B54B	B54C	B54D	B550	B554	B55C	B55D
364 :	B55F	B560	B561	B5A0	B5A1	B5A4	B5A8	B5AA	B5AB	B5B0	B5B1	B5B3	B5B4	B5B5	B5BB	B5BC
365 :	B5BD	B5C0	B5C4	B5CC	B5CD	B5CF	B5D0	B5D1	B5D8	B5EC	B610	B611	B614	B618	B625	B62C
366 :	B634	B648	B664	B668	B69C	B69D	B6A0	B6A4	B6AB	B6AC	B6B1	B6D4	B6F0	B6F4	B6F8	B700
367 :	B701	B705	B728	B729	B72C	B72F	B730	B738	B739	B73B	B744	B748	B74C	B754	B755	B760
368 :	B764	B768	B770	B771	B773	B775	B77C	B77D	B780	B784	B78C	B78D	B78F	B790	B791	B792
369 :	B796	B797	B798	B799	B79C	B7A0	B7A8	B7A9	B7AB	B7AC	B7AD	B7B4	B7B5	B7B8	B7C7	B7C9
36A :	B7EC	B7ED	B7F0	B7F4	B7FC	B7FD	B7FF	B800	B801	B807	B808	B809	B80C	B810	B818	B819
36B :	B81B	B81D	B824	B825	B828	B82C	B834	B835	B837	B838	B839	B840	B844	B851	B853	B85C
36C :	B85D	B860	B864	B86C	B86D	B86F	B871	B878	B87C	B88D	B8A8	B8B0	B8B4	B8B8	B8C0	B8C1
36D :	B8C3	B8C5	B8CC	B8D0	B8D4	B8DD	B8DF	B8E1	B8E8	B8E9	B8EC	B8F0	B8F8	B8F9	B8FB	B8FD
36E :	B904	B918	B920	B93C	B93D	B940	B944	B94C	B94F	B951	B958	B959	B95C	B960	B968	B969
36F :	B96B	B96D	B974	B975	B978	B97C	B984	B985	B987	B989	B98A	B98D	B98E	B9AC	B9AD	B9B0

Table Q.1 (continued)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
370 :	B9B4	B9BC	B9BD	B9BF	B9C1	B9C8	B9C9	B9CC	B9CE	B9CF	B9D0	B9D1	B9D2	B9D8	B9D9	B9DB
371 :	B9DD	B9DE	B9E1	B9E3	B9E4	B9E5	B9E8	B9EC	B9F4	B9F5	B9F7	B9F8	B9F9	B9FA	BA00	BA01
372 :	BA08	BA15	BA38	BA39	BA3C	BA40	BA42	BA48	BA49	BA4B	BA4D	BA4E	BA53	BA54	BA55	BA58
373 :	BA5C	BA64	BA65	BA67	BA68	BA69	BA70	BA71	BA74	BA78	BA83	BA84	BA85	BA87	BA8C	BAA8
374 :	BAA9	BAAB	BAAC	BAB0	BAB2	BAB8	BAB9	BABB	BABD	BAC4	BAC8	BAD8	BAD9	BAFC	BB00	BB04
375 :	BB0D	BB0F	BB11	BB18	BB1C	BB20	BB29	BB2B	BB34	BB35	BB36	BB38	BB3B	BB3C	BB3D	BB3E
376 :	BB44	BB45	BB47	BB49	BB4D	BB4F	BB50	BB54	BB58	BB61	BB63	BB6C	BB88	BB8C	BB90	BBA4
377 :	BBA8	BBAC	BBB4	BBB7	BBC0	BBC4	BBC8	BBD0	BBD3	BBF8	BBF9	BBFC	BBFF	BC00	BC02	BC08
378 :	BC09	BC0B	BC0C	BC0D	BC0F	BC11	BC14	BC15	BC16	BC17	BC18	BC1B	BC1C	BC1D	BC1E	BC1F
379 :	BC24	BC25	BC27	BC29	BC2D	BC30	BC31	BC34	BC38	BC40	BC41	BC43	BC44	BC45	BC49	BC4C
37A :	BC4D	BC50	BC5D	BC84	BC85	BC88	BC8B	BC8C	BC8E	BC94	BC95	BC97	BC99	BC9A	BCA0	BCA1
37B :	BCA4	BCA7	BCA8	BCB0	BCB1	BCB3	BCB4	BCB5	BCBC	BCBD	BCC0	BCC4	BCCD	BCCF	BCD0	BCD1
37C :	BCD5	BCD8	BCDC	BCF4	BCF5	BCF6	BCF8	BCFC	BD04	BD05	BD07	BD09	BD10	BD14	BD24	BD2C
37D :	BD40	BD48	BD49	BD4C	BD50	BD58	BD59	BD64	BD68	BD80	BD81	BD84	BD87	BD88	BD89	BD8A
37E :	BD90	BD91	BD93	BD95	BD99	BD9A	BD9C	BDA4	BDB0	BDB8	BDD4	BDD5	BDD8	BDDC	BDE9	BDF0
37F :	BDF4	BDF8	BE00	BE03	BE05	BE0C	BE0D	BE10	BE14	BE1C	BE1D	BE1F	BE44	BE45	BE48	BE4C
380 :	BE4E	BE54	BE55	BE57	BE59	BE5A	BE5B	BE60	BE61	BE64	BE68	BE6A	BE70	BE71	BE73	BE74
381 :	BE75	BE7B	BE7C	BE7D	BE80	BE84	BE8C	BE8D	BE8F	BE90	BE91	BE98	BE99	BEA8	BED0	BED1
382 :	BED4	BED7	BED8	BEE0	BEE3	BEE4	BEE5	BEEC	BF01	BF08	BF09	BF18	BF19	BF1B	BF1C	BF1D
383 :	BF40	BF41	BF44	BF48	BF50	BF51	BF55	BF94	BFB0	BFC5	BFCC	BFCD	BFD0	BFD4	BFDC	BFDF
384 :	BFE1	C03C	C051	C058	C05C	C060	C068	C069	C090	C091	C094	C098	C0A0	C0A1	C0A4	C0A5
385 :	C0AC	C0AD	C0AF	C0B0	C0B3	C0B4	C0B5	C0B6	C0BC	C0BD	C0BF	C0C0	C0C1	C0C5	C0C8	C0C9
386 :	C0CC	C0D0	C0D8	C0D9	C0DB	C0DC	C0DD	C0E4	C0E5	C0E8	C0EC	C0F4	C0F5	C0F7	C0F9	C100
387 :	C104	C108	C110	C115	C11C	C11D	C11E	C11F	C120	C123	C124	C126	C127	C12C	C12D	C12F
388 :	C130	C131	C136	C138	C139	C13C	C140	C148	C149	C14B	C14C	C14D	C154	C155	C158	C15C
389 :	C164	C165	C167	C168	C169	C170	C174	C178	C185	C18C	C18D	C18E	C190	C194	C196	C19C
38A :	C19D	C19F	C1A1	C1A5	C1A8	C1A9	C1AC	C1B0	C1BD	C1C4	C1C8	C1CC	C1D4	C1D7	C1D8	C1E0
38B :	C1E4	C1E8	C1F0	C1F1	C1F3	C1FC	C1FD	C200	C204	C20C	C20D	C20F	C211	C218	C219	C21C
38C :	C21F	C220	C228	C229	C22B	C22D	C22F	C231	C232	C234	C248	C250	C251	C254	C258	C260
38D :	C265	C26C	C26D	C270	C274	C27C	C27D	C27F	C281	C288	C289	C290	C298	C29B	C29D	C2A4
38E :	C2A5	C2A8	C2AC	C2AD	C2B4	C2B5	C2B7	C2B9	C2DC	C2DD	C2E0	C2E3	C2E4	C2EB	C2EC	C2ED
38F :	C2EF	C2F1	C2F6	C2F8	C2F9	C2FB	C2FC	C300	C308	C309	C30C	C30D	C313	C314	C315	C318
390 :	C31C	C324	C325	C328	C329	C345	C368	C369	C36C	C370	C372	C378	C379	C37C	C37D	C384
391 :	C388	C38C	C3C0	C3D8	C3D9	C3DC	C3DF	C3E0	C3E2	C3E8	C3E9	C3ED	C3F4	C3F5	C3F8	C408
392 :	C410	C424	C42C	C430	C434	C43C	C43D	C448	C464	C465	C468	C46C	C474	C475	C479	C480
393 :	C494	C49C	C4B8	C4BC	C4E9	C4F0	C4F1	C4F4	C4F8	C4FA	C4FF	C500	C501	C50C	C510	C514
394 :	C51C	C528	C529	C52C	C530	C538	C539	C53B	C53D	C544	C545	C548	C549	C54A	C54C	C54D
395 :	C54E	C553	C554	C555	C557	C558	C559	C55D	C55E	C560	C561	C564	C568	C570	C571	C573
396 :	C574	C575	C57C	C57D	C580	C584	C587	C58C	C58D	C58F	C591	C595	C597	C598	C59C	C5A0
397 :	C5A9	C5B4	C5B5	C5B8	C5B9	C5BB	C5BC	C5BD	C5BE	C5C4	C5C5	C5C6	C5C7	C5C8	C5C9	C5CA
398 :	C5CC	C5CE	C5D0	C5D1	C5D4	C5D8	C5E0	C5E1	C5E3	C5E5	C5EC	C5ED	C5EE	C5F0	C5F4	C5F6
399 :	C5F7	C5FC	C5FD	C5FE	C5FF	C600	C601	C605	C606	C607	C608	C60C	C610	C618	C619	C61B
39A :	C61C	C624	C625	C628	C62C	C62D	C62E	C630	C633	C634	C635	C637	C639	C63B	C640	C641
39B :	C644	C648	C650	C651	C653	C654	C655	C65C	C65D	C660	C66C	C66F	C671	C678	C679	C67C
39C :	C680	C688	C689	C68B	C68D	C694	C695	C698	C69C	C6A4	C6A5	C6A7	C6A9	C6B0	C6B1	C6B4
39D :	C6B8	C6B9	C6BA	C6C0	C6C1	C6C3	C6C5	C6CC	C6CD	C6D0	C6D4	C6DC	C6DD	C6E0	C6E1	C6E8
39E :	C6E9	C6EC	C6F0	C6F8	C6F9	C6FD	C704	C705	C708	C70C	C714	C715	C717	C719	C720	C721
39F :	C724	C728	C730	C731	C733	C735	C737	C73C	C73D	C740	C744	C74A	C74C	C74D	C74F	C751

Table Q.1 (continued)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
3A0 :	C752	C753	C754	C755	C756	C757	C758	C75C	C760	C768	C76B	C774	C775	C778	C77C	C77D
3A1 :	C77E	C783	C784	C785	C787	C788	C789	C78A	C78E	C790	C791	C794	C796	C797	C798	C79A
3A2 :	C7A0	C7A1	C7A3	C7A4	C7A5	C7A6	C7AC	C7AD	C7B0	C7B4	C7BC	C7BD	C7BF	C7C0	C7C1	C7C8
3A3 :	C7C9	C7CC	C7CE	C7D0	C7D8	C7DD	C7E4	C7E8	C7EC	C800	C801	C804	C808	C80A	C810	C811
3A4 :	C813	C815	C816	C81C	C81D	C820	C824	C82C	C82D	C82F	C831	C838	C83C	C840	C848	C849
3A5 :	C84C	C84D	C854	C870	C871	C874	C878	C87A	C880	C881	C883	C885	C886	C887	C88B	C88C
3A6 :	C88D	C894	C89D	C89F	C8A1	C8A8	C8BC	C8BD	C8C4	C8C8	C8CC	C8D4	C8D5	C8D7	C8D9	C8E0
3A7 :	C8E1	C8E4	C8F5	C8FC	C8FD	C900	C904	C905	C906	C90C	C90D	C90F	C911	C918	C92C	C934
3A8 :	C950	C951	C954	C958	C960	C961	C963	C96C	C970	C974	C97C	C988	C989	C98C	C990	C998
3A9 :	C999	C99B	C99D	C9C0	C9C1	C9C4	C9C7	C9C8	C9CA	C9D0	C9D1	C9D3	C9D5	C9D6	C9D9	C9DA
3AA :	C9DC	C9DD	C9E0	C9E2	C9E4	C9E7	C9EC	C9ED	C9EF	C9F0	C9F1	C9F8	C9F9	C9FC	CA00	CA08
3AB :	CA09	CA0B	CA0C	CA0D	CA14	CA18	CA29	CA4C	CA4D	CA50	CA54	CA5C	CA5D	CA5F	CA60	CA61
3AC :	CA68	CA7D	CA84	CA98	CABC	CABD	CAC0	CAC4	CACC	CACD	CACF	CAD1	CAD3	CAD8	CAD9	CAE0
3AD :	CAEC	CAF4	CB08	CB10	CB14	CB18	CB20	CB21	CB41	CB48	CB49	CB4C	CB50	CB58	CB59	CB5D
3AE :	CB64	CB78	CB79	CB9C	CBB8	CBD4	CBE4	CBE7	CBE9	CC0C	CC0D	CC10	CC14	CC1C	CC1D	CC21
3AF :	CC22	CC27	CC28	CC29	CC2C	CC2E	CC30	CC38	CC39	CC3B	CC3C	CC3D	CC3E	CC44	CC45	CC48
3B0 :	CC4C	CC54	CC55	CC57	CC58	CC59	CC60	CC64	CC66	CC68	CC70	CC75	CC98	CC99	CC9C	CCA0
3B1 :	CCA8	CCA9	CCAB	CCAC	CCAD	CCB4	CCB5	CCB8	CCBC	CCC4	CCC5	CCC7	CCC9	CCD0	CCD4	CCE4
3B2 :	CCEC	CCF0	CD01	CD08	CD09	CD0C	CD10	CD18	CD19	CD1B	CD1D	CD24	CD28	CD2C	CD39	CD5C
3B3 :	CD60	CD64	CD6C	CD6D	CD6F	CD71	CD78	CD88	CD94	CD95	CD98	CD9C	CDA4	CDA5	CDA7	CDA9
3B4 :	CDB0	CDC4	CDCC	CDD0	CDE8	CDEC	CDF0	CDF8	CDF9	CDFB	CDFD	CE04	CE08	CE0C	CE14	CE19
3B5 :	CE20	CE21	CE24	CE28	CE30	CE31	CE33	CE35	CE58	CE59	CE5C	CE5F	CE60	CE61	CE68	CE69
3B6 :	CE6B	CE6D	CE74	CE75	CE78	CE7C	CE84	CE85	CE87	CE89	CE90	CE91	CE94	CE98	CEA0	CEA1
3B7 :	CEA3	CEA4	CEA5	CEAC	CEAD	CEC1	CEE4	CEE5	CEE8	CEEB	CEEC	CEF4	CEF5	CEF7	CEF8	CEF9
3B8 :	CF00	CF01	CF04	CF08	CF10	CF11	CF13	CF15	CF1C	CF20	CF24	CF2C	CF2D	CF2F	CF30	CF31
3B9 :	CF38	CF54	CF55	CF58	CF5C	CF64	CF65	CF67	CF69	CF70	CF71	CF74	CF78	CF80	CF85	CF8C
3BA :	CFA1	CFA8	CFB0	CFC4	CFE0	CFE1	CFE4	CFE8	CFF0	CFF1	CFF3	CFF5	CFFC	D000	D004	D011
3BB :	D018	D02D	D034	D035	D038	D03C	D044	D045	D047	D049	D050	D054	D058	D060	D06C	D06D
3BC :	D070	D074	D07C	D07D	D081	D0A4	D0A5	D0A8	D0AC	D0B4	D0B5	D0B7	D0B9	D0C0	D0C1	D0C4
3BD :	D0C8	D0C9	D0D0	D0D1	D0D3	D0D4	D0D5	D0DC	D0DD	D0E0	D0E4	D0EC	D0ED	D0EF	D0F0	D0F1
3BE :	D0F8	D10D	D130	D131	D134	D138	D13A	D140	D141	D143	D144	D145	D14C	D14D	D150	D154
3BF :	D15C	D15D	D15F	D161	D168	D16C	D17C	D184	D188	D1A0	D1A1	D1A4	D1A8	D1B0	D1B1	D1B3
3C0 :	D1B5	D1BA	D1BC	D1C0	D1D8	D1F4	D1F8	D207	D209	D210	D22C	D22D	D230	D234	D23C	D23D
3C1 :	D23F	D241	D248	D25C	D264	D280	D281	D284	D288	D290	D291	D295	D29C	D2A0	D2A4	D2AC
3C2 :	D2B1	D2B8	D2B9	D2BC	D2BF	D2C0	D2C2	D2C8	D2C9	D2CB	D2D4	D2D8	D2DC	D2E4	D2E5	D2F0
3C3 :	D2F1	D2F4	D2F8	D300	D301	D303	D305	D30C	D30D	D30E	D310	D314	D316	D31C	D31D	D31F
3C4 :	D320	D321	D325	D328	D329	D32C	D330	D338	D339	D33B	D33C	D33D	D344	D345	D37C	D37D
3C5 :	D380	D384	D38C	D38D	D38F	D390	D391	D398	D399	D39C	D3A0	D3A8	D3A9	D3AB	D3AD	D3B4
3C6 :	D3B8	D3BC	D3C4	D3C5	D3C8	D3C9	D3D0	D3D8	D3E1	D3E3	D3EC	D3ED	D3F0	D3F4	D3FC	D3FD
3C7 :	D3FF	D401	D408	D41D	D440	D444	D45C	D460	D464	D46D	D46F	D478	D479	D47C	D47F	D480
3C8 :	D482	D488	D489	D48B	D48D	D494	D4A9	D4CC	D4D0	D4D4	D4DC	D4DF	D4E8	D4EC	D4F0	D4F8
3C9 :	D4FB	D4FD	D504	D508	D50C	D514	D515	D517	D53C	D53D	D540	D544	D54C	D54D	D54F	D551
3CA :	D558	D559	D55C	D560	D565	D568	D569	D56B	D56D	D574	D575	D578	D57C	D584	D585	D587
3CB :	D588	D589	D590	D5A5	D5C8	D5C9	D5CC	D5D0	D5D2	D5D8	D5D9	D5DB	D5DD	D5E4	D5E5	D5E8
3CC :	D5EC	D5F4	D5F5	D5F7	D5F9	D600	D601	D604	D608	D610	D611	D613	D614	D615	D61C	D620
3CD :	D624	D62D	D638	D639	D63C	D640	D645	D648	D649	D64B	D64D	D651	D654	D655	D658	D65C
3CE :	D667	D669	D670	D671	D674	D683	D685	D68C	D68D	D690	D694	D69D	D69F	D6A1	D6A8	D6AC
3CF :	D6B0	D6B9	D6BB	D6C4	D6C5	D6C8	D6CC	D6D1	D6D4	D6D7	D6D9	D6E0	D6E4	D6E8	D6F0	D6F5

Table Q.1 (continued)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
3D0 :	D6FC	D6FD	D700	D704	D711	D718	D719	D71C	D720	D728	D729	D72B	D72D	D734	D735	D738
3D1 :	D73C	D744	D747	D749	D750	D751	D754	D756	D757	D758	D759	D760	D761	D763	D765	D769
3D2 :	D76C	D770	D774	D77C	D77D	D781	D788	D789	D78C	D790	D798	D799	D79B	D79D	AC02	AC0B
3D3 :	AC0C	AC22	AC23	AC32	AC35	AC36	AC3F	AC41	AC47	AC48	AC49	AC4C	AC64	AC65	AC73	AC75
3D4 :	AC79	AC87	AC8D	AC93	ACA5	ACA7	ACB1	ACB4	ACB7	ACBE	ACBF	ACC2	ACC5	ACCB	ACD4	ACD8
3D5 :	ACD9	ACE9	ACEB	ACEE	ACF7	ACF9	ACFA	ACFB	AD03	AD10	AD19	AD1F	AD22	AD28	AD2B	AD3B
3D6 :	AD3E	AD48	AD51	AD57	AD60	AD65	AD78	AD83	AD86	AD8F	AD99	AD9B	ADA5	ADA8	ADAB	ADAC
3D7 :	ADB4	ADB5	ADB8	ADB9	ADC7	ADCA	ADD4	ADD5	ADDD	ADE8	ADEC	ADED	ADEF	ADF1	ADFE	AE02
3D8 :	AE03	AE04	AE07	AE0E	AE0F	AE11	AE12	AE13	AE15	AE18	AE1C	AE20	AE24	AE25	AE27	AE29
3D9 :	AE39	AE3C	AE44	AE47	AE49	AE4B	AE53	AE62	AE63	AE6A	AE6F	AE73	AE76	AE81	AE88	AE8B
3DA :	AE8D	AE97	AE99	AEA0	AEB5	AEC2	AEC3	AED2	AED3	AED5	AEDA	AEDF	AEE0	AEE9	AEEC	AEF1
3DB :	AEF5	AEFB	AF04	AF05	AF09	AF17	AF25	AF33	AF36	AF38	AF3B	AF45	AF47	AF4C	AF4F	AF58
3DC :	AF59	AF5B	AF68	AF6B	AF6C	AF74	AF75	AF78	AF81	AF87	AF93	AF94	AFA0	AFA3	AFA4	AFAC
3DD :	AFAD	AFB2	AFBF	AFC1	AFCF	AFD5	AFD8	AFDB	AFE4	AFE7	AFF7	B003	B005	B00D	B013	B01F
3DE :	B021	B02C	B030	B038	B039	B04B	B04D	B05B	B05F	B060	B061	B067	B068	B06B	B073	B075
3DF :	B083	B08B	B090	B095	B09B	B0A4	B0AA	B0B0	B0B2	B0BB	B0CE	B0D7	B0E1	B0E3	B0E6	B0E9
3E0 :	B0EC	B101	B10A	B10F	B117	B11E	B120	B121	B122	B12B	B13C	B13D	B13E	B13F	B143	B147
3E1 :	B14B	B153	B159	B15A	B15B	B15D	B163	B164	B16C	B16D	B16F	B171	B17A	B17B	B17E	B17F
3E2 :	B18E	B190	B191	B195	B19B	B1A4	B1A5	B1A7	B1A9	B1B0	B1B4	B1B8	B1C4	B1CD	B1D3	B1E0
3E3 :	B1E1	B1E6	B1EF	B1F8	B20D	B210	B213	B21B	B21E	B221	B224	B227	B228	B230	B231	B233
3E4 :	B235	B23D	B240	B243	B244	B24C	B24D	B24F	B250	B251	B259	B25F	B26B	B26D	B26F	B278
3E5 :	B27B	B287	B28A	B28B	B297	B29C	B2A7	B2AB	B2AD	B2B3	B2BC	B2BD	B2BF	B2C0	B2C1	B2CF
3E6 :	B2D1	B2D3	B2D4	B2DE	B2E0	B2E3	B2F0	B2F2	B2F6	B2FC	B2FD	B307	B319	B31D	B320	B324
3E7 :	B327	B32C	B32D	B32F	B331	B338	B33C	B34D	B359	B366	B368	B36A	B36D	B36F	B377	B386
3E8 :	B38A	B38D	B38F	B393	B398	B39C	B39D	B39F	B3A9	B3B0	B3B8	B3B9	B3BB	B3BD	B3C6	B3C7
3E9 :	B3CF	B3D3	B3DA	B3DC	B3DE	B3DF	B3E1	B3F0	B3F1	B3F3	B3F4	B3F5	B400	B403	B404	B40C
3EA :	B40D	B40F	B419	B41F	B424	B42C	B42D	B435	B438	B43B	B43C	B444	B445	B447	B449	B44F
3EB :	B457	B459	B45A	B45B	B46A	B46D	B470	B473	B474	B47C	B47D	B47F	B481	B489	B48C	B48F
3EC :	B490	B498	B499	B49B	B49C	B4A5	B4AB	B4B4	B4B8	B4C1	B4D1	B4D3	B4E5	B4E7	B4E8	B4F9
3ED :	B4FC	B4FF	B500	B508	B509	B50B	B50D	B52B	B52D	B52E	B52F	B532	B537	B539	B53A	B53B
3EE :	B53F	B54E	B553	B567	B568	B569	B56C	B57D	B584	B588	B5A7	B5AF	B5C3	B5D9	B5DC	B5DF
3EF :	B5E8	B5E9	B5EB	B5ED	B5F4	B5F8	B605	B612	B617	B619	B61A	B61F	B620	B621	B623	B62D
3F0 :	B630	B641	B649	B64C	B64F	B650	B658	B659	B65B	B65C	B665	B66B	B66C	B674	B675	B677
3F1 :	B678	B679	B680	B681	B6A3	B6A6	B6A7	B6AD	B6AF	B6B5	B6B8	B6BC	B6BF	B6CB	B6D8	B6DB
3F2 :	B6DC	B6E4	B6E5	B6E8	B6E9	B6F7	B703	B70C	B70D	B714	B71C	B721	B732	B733	B737	B73D
3F3 :	B759	B761	B767	B77B	B783	B788	B793	B794	B795	B79F	B7B0	B7B1	B7B2	B7BB	B7BC	B7C4
3F4 :	B7C5	B7D0	B7E3	B7F2	B7F3	B7FE	B802	B804	B806	B80F	B81C	B821	B822	B823	B82B	B830
3F5 :	B83C	B83E	B841	B847	B848	B850	B855	B863	B868	B86B	B874	B876	B877	B879	B880	B888
3F6 :	B889	B88B	B88C	B894	B898	B89B	B89C	B8A7	B8B1	B8B5	B8B7	B8C4	B8CD	B8D3	B8DC	B8EF
3F7 :	B8F3	B900	B902	B905	B908	B90B	B90C	B914	B915	B917	B919	B921	B924	B928	B930	B931
3F8 :	B933	B934	B935	B943	B94D	B950	B95F	B97B	B97D	B980	B98B	B98F	B990	B991	B994	B998
3F9 :	B99E	B9A0	B9A1	B9A3	B9A5	B9B3	B9BE	B9C0	B9C4	B9C6	B9CA	B9D4	B9DC	B9DF	B9E0	B9E2
3FA :	B9EB	B9ED	B9FB	B9FD	B9FE	BA04	BA10	BA11	BA13	BA18	BA1C	BA3B	BA3F	BA41	BA4C	BA4F
3FB :	BA5B	BA60	BA6A	BA6B	BA6D	BA77	BA7A	BA80	BA81	BA89	BA8D	BA90	BA93	BA94	BA9C	BA9D
3FC :	BA9F	BAA1	BAA3	BAA5	BAA6	BAAF	BAB1	BAB4	BABF	BAC3	BAC5	BACB	BACC	BAD4	BAD5	BAD7
3FD :	BAE0	BAE4	BAE8	BAF1	BAF4	BAFD	BB03	BB0C	BB19	BB1F	BB28	BB2D	BB3A	BB40	BB4B	BB51
3FE :	BB57	BB60	BB64	BB65	BB6D	BB70	BB74	BB7C	BB7D	BB7F	BB80	BB81	BB89	BB8A	BB98	BB99
3FF :	BB9B	BB9C	BB9D	BBA5	BBAB	BBB5	BBB9	BBC1	BBC7	BBC9	BBCC	BBCF	BBD1	BBD5	BBD9	BBDC

Table Q.1 (continued)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
400 :	BBDD	BBE0	BBE4	BBEC	BBED	BBEF	BBF1	BBF2	BC01	BC04	BC0E	BC10	BC20	BC23	BC28	BC2B
401 :	BC2C	BC2F	BC37	BC46	BC54	BC5C	BC5F	BC61	BC67	BC68	BC70	BC77	BC7D	BC86	BC8D	BC90
402 :	BC98	BC9C	BC9D	BCA2	BCB8	BCB9	BCC3	BCC8	BCCC	BCD2	BCD3	BCD4	BCD9	BCE0	BCE8	BCE9
403 :	BCEB	BCED	BCF7	BCFB	BCFD	BCFF	BD0A	BD0B	BD0D	BD0F	BD11	BD17	BD18	BD20	BD21	BD23
404 :	BD25	BD30	BD33	BD34	BD4A	BD4F	BD5B	BD5C	BD5D	BD65	BD6C	BD74	BD75	BD77	BD79	BD82
405 :	BD8B	BD8E	BD96	BD97	BD98	BD9B	BD9D	BDA0	BDA3	BDAC	BDAD	BDAF	BDB1	BDB4	BDB9	BDBC
406 :	BDBF	BDC0	BDC8	BDC9	BDCB	BDCC	BDCD	BDDB	BDE4	BDE5	BDE7	BDF1	BDF7	BE01	BE13	BE15
407 :	BE17	BE18	BE1B	BE21	BE23	BE25	BE27	BE28	BE29	BE2C	BE30	BE38	BE39	BE3B	BE3D	BE4B
408 :	BE58	BE5C	BE5D	BE5F	BE62	BE67	BE69	BE76	BE79	BE7E	BE83	BE9C	BEB4	BEB8	BEE1	BEE6
409 :	BEED	BEF0	BEF3	BEF4	BEFC	BEFD	BEFF	BF0C	BF0F	BF10	BF1F	BF21	BF24	BF37	BF38	BF39
40A :	BF47	BF53	BF5B	BF5C	BF60	BF63	BF78	BF7F	BFA4	BFA5	BFAC	BFC0	BFC1	BFD3	BFD5	BFDD
40B :	BFE8	BFEF	C004	C020	C021	C043	C044	C059	C05F	C06B	C074	C097	C0A3	C0A6	C0A7	C0AB
40C :	C0AE	C0B7	C0B8	C0BA	C0BB	C0C2	C0C3	C0C4	C0C6	C0C7	C0CB	C0CF	C0E3	C0EB	C0F8	C0FB
40D :	C0FE	C0FF	C125	C128	C12A	C134	C13F	C14E	C151	C152	C157	C15B	C15F	C160	C171	C173
40E :	C180	C181	C183	C184	C193	C195	C197	C198	C1A3	C1A6	C1B8	C1B9	C1BB	C1BC	C1C5	C1CB
40F :	C1D5	C1D9	C1E1	C1E7	C1F4	C1F5	C203	C216	C221	C224	C227	C22E	C233	C235	C238	C23B
410 :	C23C	C244	C245	C247	C249	C257	C261	C263	C264	C273	C286	C28C	C28F	C299	C2AB	C2AE
411 :	C2AF	C2B0	C2B2	C2B3	C2BA	C2BB	C2BE	C2C0	C2C1	C2C4	C2C8	C2D0	C2D1	C2D3	C2D5	C2DE
412 :	C2E2	C2E5	C2E6	C2E8	C2F0	C2F3	C2F4	C2FF	C301	C302	C30B	C30E	C311	C31B	C327	C32F
413 :	C330	C331	C334	C337	C338	C340	C341	C343	C34C	C350	C354	C35C	C361	C36A	C36F	C37B
414 :	C382	C385	C38B	C394	C395	C397	C398	C399	C39D	C3A0	C3A1	C3A4	C3A7	C3A8	C3B0	C3B1
415 :	C3B3	C3B4	C3B5	C3BC	C3BD	C3CC	C3CD	C3CF	C3D0	C3D1	C3EB	C3F1	C3FB	C3FC	C404	C405
416 :	C407	C409	C411	C414	C417	C418	C423	C42D	C433	C43F	C440	C441	C449	C44C	C44F	C450
417 :	C458	C459	C45B	C45D	C46B	C477	C47E	C481	C484	C487	C488	C490	C491	C493	C495	C49D
418 :	C4A0	C4A3	C4A4	C4AC	C4AD	C4AF	C4B0	C4B1	C4B9	C4BF	C4C0	C4C8	C4C9	C4CB	C4CD	C4D3
419 :	C4D4	C4D5	C4D8	C4DB	C4DC	C4E4	C4E5	C4E7	C4F7	C503	C505	C50D	C51D	C51F	C521	C52F
41A :	C531	C53C	C53F	C540	C543	C54B	C54F	C552	C556	C55A	C55B	C55F	C567	C579	C57A	C57E
41B :	C583	C590	C592	C594	C599	C59F	C5A8	C5AB	C5AC	C5AD	C5B6	C5BA	C5BF	C5CF	C5D7	C5E4
41C :	C5E9	C5EA	C5F1	C5F3	C5F8	C604	C609	C60F	C61D	C620	C626	C62A	C62B	C62F	C632	C63A
41D :	C63D	C63E	C647	C658	C659	C663	C664	C66D	C670	C67F	C682	C68C	C692	C69B	C69D	C6AC
41E :	C6B7	C6BC	C6C2	C6C6	C6C7	C6C9	C6D2	C6D3	C6DF	C6E4	C6E5	C6EF	C6FB	C6FC	C701	C70B
41F :	C70E	C713	C718	C71C	C71D	C727	C736	C738	C739	C743	C745	C746	C747	C74E	C759	C75F
420 :	C766	C769	C76D	C77B	C780	C782	C786	C78B	C78C	C78D	C78F	C793	C799	C7A7	C7A9	C7AA
421 :	C7AB	C7B2	C7B3	C7C2	C7CF	C7D9	C7DB	C7EB	C7F4	C7F5	C7F7	C7F9	C802	C806	C807	C809
422 :	C814	C819	C81B	C823	C830	C832	C839	C83F	C841	C842	C843	C847	C84B	C84E	C851	C853
423 :	C855	C858	C85C	C864	C865	C867	C869	C877	C890	C892	C893	C895	C89C	C8A0	C8A9	C8AC
424 :	C8AF	C8B0	C8B8	C8BB	C8C5	C8CB	C8D8	C8E7	C8E8	C8F0	C8F1	C8F3	C8FB	C903	C908	C917
425 :	C919	C91C	C91F	C920	C928	C929	C92B	C92D	C935	C938	C93B	C93C	C944	C945	C947	C948
426 :	C949	C957	C965	C96D	C97D	C97F	C981	C98F	C991	C992	C994	C99E	C9A4	C9A5	C9A8	C9AC
427 :	C9B4	C9B5	C9B7	C9B9	C9CF	C9D2	C9D4	C9D7	C9DB	C9DE	C9E3	C9E8	C9F7	C9FF	CA15	CA1A
428 :	CA1C	CA24	CA25	CA27	CA2D	CA30	CA53	CA57	CA58	CA5B	CA67	CA69	CA6C	CA6F	CA70	CA78
429 :	CA79	CA7B	CA7C	CA81	CA85	CA88	CA8B	CA8C	CA94	CA95	CA97	CA99	CAA0	CAA1	CAA4	CAA8
42A :	CAB0	CAB1	CAB3	CAB5	CABE	CAC3	CAC6	CAD2	CAD7	CADC	CADF	CAE8	CAE9	CAEB	CAED	CAF5
42B :	CAF8	CAFB	CAFC	CB11	CB17	CB23	CB24	CB25	CB27	CB2C	CB2D	CB30	CB34	CB3C	CB3D	CB3F
42C :	CB4A	CB4F	CB52	CB5B	CB65	CB68	CB6B	CB6C	CB74	CB75	CB77	CB80	CB81	CB84	CB87	CB88
42D :	CB90	CB91	CB93	CB95	CB9D	CBA0	CBA3	CBA4	CBAC	CBAD	CBAF	CBB1	CBB9	CBBC	CBC0	CBC8
42E :	CBC9	CBCB	CBCD	CBD5	CBD8	CBDB	CBDC	CBE5	CBEA	CBF0	CBF1	CBF4	CBF8	CC00	CC01	CC03
42F :	CC05	CC06	CC13	CC1F	CC26	CC2F	CC31	CC3F	CC42	CC4B	CC5B	CC5E	CC61	CC71	CC73	CC7A

Table Q.1 (continued)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
430 :	CC7C	CC91	CC9F	CCA7	CCAE	CCB2	CCBB	CCC3	CCC8	CCD1	CCD7	CCD8	CCE0	CCE1	CCE3	CCE5
431 :	CCED	CCF4	CCFC	CCFD	CCFF	CD0F	CD25	CD2B	CD34	CD35	CD37	CD40	CD53	CD54	CD5D	CD63
432 :	CD70	CD79	CD7C	CD80	CD89	CD8B	CD8D	CD9B	CDB1	CDB4	CDB7	CDB8	CDC0	CDC1	CDC3	CDC5
433 :	CDCD	CDD4	CDDC	CDDD	CDDF	CDE0	CDE1	CDE9	CDEF	CE05	CE15	CE17	CE27	CE29	CE2C	CE3C
434 :	CE3D	CE40	CE44	CE4C	CE4D	CE4F	CE51	CE62	CE6C	CE6E	CE70	CE72	CE7B	CE88	CE8D	CE8E
435 :	CE97	CEA9	CEAA	CEB0	CEB4	CEBC	CEBD	CEBF	CEC8	CECC	CEFB	CEFD	CEFE	CF07	CF14	CF19
436 :	CF1A	CF1D	CF23	CF39	CF3C	CF40	CF48	CF49	CF4B	CF4C	CF4D	CF5B	CF6B	CF6E	CF81	CF83
437 :	CF8D	CF90	CF93	CF94	CF9C	CF9D	CF9F	CFA9	CFAC	CFB8	CFB9	CFBB	CFBD	CFC5	CFC8	CFCC
438 :	CFD4	CFD5	CFD7	CFD9	CFE7	CFFA	CFFD	D003	D00C	D00D	D010	D019	D01C	D020	D028	D029
439 :	D02B	D02C	D03B	D051	D061	D063	D065	D068	D072	D076	D07F	D088	D089	D08C	D090	D098
43A :	D099	D09B	D09D	D0AB	D0B8	D0BE	D0C7	D0CA	D0CF	D0DA	D0E2	D0E3	D0E5	D0F6	D0F9	D0FC
43B :	D100	D108	D109	D10B	D114	D118	D11A	D137	D139	D13B	D153	D160	D166	D169	D16F	D170
43C :	D178	D179	D17B	D17D	D185	D18C	D194	D197	D199	D1A7	D1B7	D1B8	D1B9	D1BD	D1C4	D1CC
43D :	D1CD	D1CF	D1D1	D1EC	D1ED	D1F5	D1FB	D1FC	D204	D205	D208	D211	D214	D218	D220	D221
43E :	D223	D225	D233	D236	D249	D24C	D24F	D250	D254	D258	D259	D25B	D25D	D265	D268	D26B
43F :	D26C	D274	D275	D277	D278	D279	D287	D293	D29D	D2AD	D2AF	D2BB	D2C1	D2C4	D2CD	D2D5
440 :	D2E0	D2E7	D2E9	D2F7	D308	D30A	D313	D323	D326	D32F	D341	D348	D34C	D354	D355	D357
441 :	D359	D360	D383	D38E	D395	D39F	D3AC	D3B2	D3B5	D3B9	D3BB	D3C7	D3D1	D3D4	D3D7	D3E0
442 :	D3E5	D3EE	D3F3	D404	D405	D406	D409	D40C	D410	D418	D419	D41B	D424	D441	D448	D450
443 :	D451	D453	D455	D45D	D463	D46C	D471	D495	D498	D49B	D49C	D4A4	D4A5	D4A7	D4A8	D4B0
444 :	D4B1	D4B4	D4B8	D4C0	D4C1	D4C3	D4C5	D4CD	D4DD	D4E1	D4E9	D4EF	D4F9	D505	D50B	D510
445 :	D519	D520	D521	D524	D528	D530	D531	D533	D535	D543	D555	D556	D55F	D561	D563	D564
446 :	D567	D56C	D56E	D571	D57B	D58D	D591	D594	D598	D5A0	D5A1	D5A3	D5AB	D5AC	D5C0	D5CF
447 :	D5D1	D5D7	D5DC	D5E1	D5E2	D5EB	D5F8	D5FE	D607	D61D	D62C	D62F	D630	D631	D63D	D63F
448 :	D641	D644	D647	D65B	D660	D664	D665	D666	D668	D677	D678	D680	D681	D684	D693	D69C
449 :	D6A9	D6AF	D6B8	D6BD	D6CB	D6CD	D6CE	D6D2	D6D3	D6D5	D6DC	D6DD	D6E1	D6F1	D6F3	D6F4
44A :	D703	D70C	D70D	D70F	D710	D71F	D73A	D73B	D743	D745	D74D	D755	D75D	D75F	D768	D76A
44B :	D76B	D76D	D773	D77F	D78F	D797	D79C	D7A0	BBC3	D63B	BF59	BFE5	CB94	C6D8	AC03	AC05
44C :	AC06	AC0D	AC0E	AC0F	AC18	AC1E	AC1F	AC21	AC25	AC26	AC27	AC28	AC29	AC2A	AC2B	AC2E
44D :	AC33	AC34	AC37	AC3A	AC3B	AC3D	AC3E	AC42	AC43	AC44	AC45	AC46	AC4A	AC4E	AC4F	AC50
44E :	AC51	AC52	AC53	AC55	AC56	AC57	AC59	AC5A	AC5B	AC5D	AC5E	AC5F	AC60	AC61	AC62	AC63
44F :	AC66	AC67	AC68	AC69	AC6A	AC6B	AC6C	AC6D	AC6E	AC6F	AC72	AC76	AC7B	AC7C	AC7D	AC7E
450 :	AC7F	AC82	AC88	AC8E	AC8F	AC91	AC92	AC95	AC96	AC97	AC98	AC99	AC9A	AC9B	AC9E	ACA2
451 :	ACA3	ACA4	ACA6	ACAB	ACAD	ACAE	ACB2	ACB3	ACB5	ACB6	ACBA	ACC0	ACC3	ACC6	ACC7	ACC9
452 :	ACCA	ACCD	ACCE	ACCF	ACD0	ACD1	ACD2	ACD3	ACD6	ACDA	ACDB	ACDC	ACDD	ACDE	ACDF	ACE2
453 :	ACE3	ACE5	ACE6	ACED	ACF2	ACF4	ACF8	ACFE	ACFF	AD01	AD02	AD05	AD07	AD08	AD09	AD0A
454 :	AD0B	AD0E	AD12	AD13	AD14	AD15	AD16	AD17	AD1A	AD1B	AD1D	AD1E	AD21	AD23	AD24	AD25
455 :	AD26	AD27	AD2A	AD2E	AD2F	AD30	AD31	AD32	AD33	AD36	AD37	AD39	AD3A	AD3D	AD3F	AD40
456 :	AD41	AD42	AD43	AD46	AD4A	AD4B	AD4C	AD4D	AD4E	AD4F	AD52	AD53	AD55	AD56	AD59	AD5A
457 :	AD5B	AD5C	AD5D	AD5E	AD5F	AD62	AD64	AD66	AD67	AD68	AD69	AD6A	AD6B	AD6E	AD6F	AD71
458 :	AD72	AD77	AD79	AD7A	AD7E	AD80	AD84	AD85	AD87	AD8A	AD8B	AD8D	AD8E	AD91	AD92	AD93
459 :	AD94	AD95	AD96	AD97	AD98	AD9A	AD9E	AD9F	ADA0	ADA1	ADA2	ADA3	ADA6	ADA7	ADA9	ADAA
45A :	ADAD	ADAE	ADAF	ADB0	ADB1	ADB2	ADB3	ADB6	ADBA	ADBB	ADBC	ADBD	ADBE	ADBF	ADC2	ADC3
45B :	ADC5	ADC6	ADC9	ADCB	ADCC	ADCD	ADCE	ADCF	ADD2	ADD6	ADD7	ADD8	ADD9	ADDA	ADDB	ADDE
45C :	ADDF	ADE1	ADE2	ADE3	ADE5	ADE6	ADE7	ADE9	ADEA	ADEB	ADEE	ADF0	ADF2	ADF3	ADF4	ADF5
45D :	ADF6	ADF7	ADFA	ADFB	ADFD	AE05	AE06	AE0A	AE0C	AE10	AE16	AE17	AE19	AE1A	AE1B	AE1D
45E :	AE1E	AE1F	AE21	AE22	AE23	AE26	AE28	AE2A	AE2B	AE2C	AE2D	AE2E	AE2F	AE32	AE33	AE35
45F :	AE36	AE3B	AE3D	AE3E	AE3F	AE42	AE48	AE4F	AE51	AE52	AE55	AE57	AE58	AE59	AE5A	AE5B

Table Q.1 (continued)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
460 :	AE5E	AE64	AE66	AE67	AE6B	AE6D	AE6E	AE71	AE72	AE74	AE75	AE77	AE7A	AE7E	AE7F	AE80
461 :	AE82	AE83	AE86	AE87	AE89	AE8A	AE8E	AE8F	AE90	AE91	AE92	AE93	AE94	AE95	AE96	AE98
462 :	AE9A	AE9B	AE9C	AE9D	AE9E	AE9F	AEA1	AEA2	AEA3	AEA4	AEA5	AEA6	AEA7	AEA8	AEA9	AEAA
463 :	AEAB	AEAC	AEAD	AEAE	AEAF	AEB0	AEB1	AEB2	AEB3	AEB4	AEB6	AEB7	AEB8	AEB9	AEBA	AEBB
464 :	AEBF	AEC1	AEC5	AEC6	AEC7	AEC8	AEC9	AECA	AECB	AECE	AED4	AED6	AED7	AEDB	AEDD	AEDE
465 :	AEE1	AEE2	AEE3	AEE4	AEE5	AEE6	AEE7	AEEA	AEEE	AEEF	AEF0	AEF2	AEF3	AEF6	AEF7	AEF9
466 :	AEFA	AEFD	AEFE	AEFF	AF00	AF01	AF02	AF03	AF06	AF0A	AF0B	AF0C	AF0E	AF0F	AF11	AF12
467 :	AF13	AF14	AF15	AF16	AF18	AF19	AF1A	AF1B	AF1C	AF1D	AF1E	AF1F	AF20	AF21	AF22	AF23
468 :	AF24	AF26	AF27	AF28	AF29	AF2A	AF2B	AF2E	AF2F	AF31	AF35	AF37	AF39	AF3A	AF3E	AF40
469 :	AF44	AF46	AF4A	AF4B	AF4D	AF4E	AF51	AF52	AF53	AF54	AF55	AF56	AF57	AF5A	AF5E	AF5F
46A :	AF60	AF61	AF62	AF63	AF66	AF67	AF69	AF6A	AF6D	AF6E	AF6F	AF70	AF71	AF72	AF73	AF76
46B :	AF77	AF7A	AF7B	AF7C	AF7D	AF7E	AF7F	AF82	AF83	AF85	AF86	AF89	AF8A	AF8B	AF8C	AF8D
46C :	AF8E	AF8F	AF92	AF96	AF97	AF98	AF99	AF9A	AF9B	AF9D	AF9E	AF9F	AFA1	AFA2	AFA5	AFA6
46D :	AFA7	AFA8	AFA9	AFAA	AFAB	AFAE	AFAF	AFB0	AFB1	AFB3	AFB4	AFB5	AFB6	AFB7	AFBA	AFBB
46E :	AFBD	AFBE	AFC2	AFC3	AFC4	AFC5	AFC6	AFCA	AFCC	AFD0	AFD1	AFD2	AFD3	AFD6	AFD7	AFD9
46F :	AFDA	AFDD	AFDE	AFDF	AFE0	AFE1	AFE2	AFE3	AFE5	AFE6	AFEA	AFEB	AFEC	AFED	AFEE	AFEF
470 :	AFF2	AFF3	AFF5	AFF6	AFF9	AFFA	AFFB	AFFC	AFFD	AFFE	AFFF	B002	B006	B007	B008	B009
471 :	B00A	B00B	B00E	B00F	B011	B012	B015	B016	B017	B018	B019	B01A	B01B	B01E	B020	B022
472 :	B023	B024	B025	B026	B027	B029	B02A	B02B	B02D	B02E	B02F	B031	B032	B033	B034	B035
473 :	B036	B037	B03A	B03B	B03C	B03D	B03E	B03F	B040	B041	B042	B043	B046	B047	B049	B04F
474 :	B050	B051	B052	B056	B058	B05A	B05C	B05E	B062	B063	B064	B065	B066	B069	B06A	B06C
475 :	B06D	B06E	B06F	B070	B071	B072	B074	B076	B077	B078	B079	B07A	B07B	B07E	B07F	B081
476 :	B082	B085	B086	B087	B088	B089	B08A	B08E	B092	B093	B094	B096	B097	B09D	B09E	B0A3
477 :	B0A5	B0A6	B0A7	B0B6	B0B7	B0B9	B0BA	B0BD	B0BE	B0BF	B0C0	B0C1	B0C2	B0C3	B0C6	B0CA
478 :	B0CB	B0CC	B0CD	B0CF	B0D2	B0D3	B0D5	B0D6	B0D9	B0DA	B0DB	B0DC	B0DD	B0DE	B0DF	B0E2
479 :	B0E4	B0E7	B0E8	B0EA	B0EB	B0ED	B0EE	B0EF	B0F0	B0F1	B0F2	B0F3	B0F4	B0F5	B0F6	B0F7
47A :	B0F8	B0F9	B0FA	B0FB	B0FC	B0FD	B0FE	B0FF	B100	B102	B103	B104	B105	B106	B107	B10D
47B :	B10E	B111	B114	B115	B116	B11A	B11F	B126	B127	B129	B12A	B12D	B12E	B12F	B130	B131
47C :	B132	B133	B136	B13A	B13B	B142	B145	B146	B149	B14A	B14C	B14D	B14E	B14F	B152	B156
47D :	B157	B15E	B15F	B161	B162	B165	B166	B167	B168	B169	B16A	B16B	B16E	B170	B172	B173
47E :	B174	B175	B176	B177	B17D	B181	B183	B184	B185	B186	B187	B18A	B18C	B18F	B196	B197
47F :	B199	B19A	B19D	B19E	B19F	B1A0	B1A1	B1A2	B1A3	B1A6	B1AA	B1AB	B1AC	B1AD	B1AE	B1AF
480 :	B1B1	B1B2	B1B3	B1B5	B1B6	B1B7	B1B9	B1BA	B1BB	B1BC	B1BD	B1BE	B1BF	B1C0	B1C1	B1C2
481 :	B1C3	B1C5	B1C6	B1C7	B1C8	B1C9	B1CA	B1CB	B1CE	B1CF	B1D1	B1D2	B1D5	B1D6	B1D7	B1D8
482 :	B1D9	B1DA	B1DB	B1DE	B1E2	B1E3	B1E4	B1E5	B1E7	B1EA	B1EB	B1ED	B1EE	B1F1	B1F2	B1F3
483 :	B1F4	B1F5	B1F6	B1F7	B1FA	B1FC	B1FE	B1FF	B200	B201	B202	B203	B206	B207	B209	B20A
484 :	B20E	B20F	B211	B212	B216	B218	B21A	B21C	B21D	B21F	B222	B223	B225	B226	B229	B22A
485 :	B22B	B22C	B22D	B22E	B22F	B232	B236	B237	B238	B239	B23A	B23B	B23E	B23F	B241	B242
486 :	B245	B246	B247	B248	B249	B24A	B24B	B24E	B252	B253	B254	B255	B256	B257	B25A	B25B
487 :	B25D	B25E	B261	B262	B263	B264	B265	B266	B267	B26A	B26C	B26E	B270	B271	B272	B273
488 :	B276	B277	B279	B27A	B27D	B27E	B27F	B280	B281	B282	B283	B286	B288	B28C	B28D	B28E
489 :	B28F	B292	B293	B295	B296	B29B	B29D	B29E	B29F	B2A2	B2A4	B2A8	B2A9	B2AE	B2AF	B2B1
48A :	B2B2	B2B5	B2B6	B2B7	B2B8	B2B9	B2BA	B2BB	B2BE	B2C2	B2C3	B2C4	B2C5	B2C6	B2C7	B2CA
48B :	B2CB	B2CD	B2CE	B2D5	B2D6	B2D7	B2DA	B2DC	B2DF	B2E1	B2E7	B2E9	B2EA	B2F1	B2FE	B302
48C :	B303	B305	B306	B309	B30A	B30B	B30C	B30D	B30E	B30F	B312	B316	B317	B318	B31A	B31B
48D :	B31E	B31F	B321	B322	B323	B325	B326	B328	B329	B32A	B32B	B32E	B330	B332	B333	B334
48E :	B335	B336	B337	B339	B33A	B33B	B33D	B33E	B33F	B340	B341	B342	B343	B344	B345	B346
48F :	B347	B348	B349	B34A	B34B	B34C	B34E	B34F	B350	B351	B352	B353	B357	B35A	B35D	B360

Table Q.1 (continued)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
490 :	B361	B362	B363	B36C	B372	B373	B375	B376	B379	B37A	B37B	B37C	B37D	B37E	B37F	B382
491 :	B387	B388	B389	B38B	B38E	B391	B392	B395	B396	B397	B399	B39A	B39B	B39E	B3A2	B3A3
492 :	B3A4	B3A5	B3A6	B3A7	B3AA	B3AB	B3AD	B3AE	B3AF	B3B1	B3B2	B3B3	B3B4	B3B5	B3B6	B3B7
493 :	B3BA	B3BC	B3BE	B3BF	B3C0	B3C1	B3C2	B3C3	B3C9	B3CA	B3CD	B3D1	B3D2	B3D6	B3D8	B3E2
494 :	B3E3	B3E5	B3E6	B3E7	B3E9	B3EA	B3EB	B3EC	B3ED	B3EE	B3EF	B3F2	B3F6	B3F7	B3F8	B3F9
495 :	B3FA	B3FB	B3FD	B3FE	B3FF	B401	B402	B405	B406	B407	B408	B409	B40A	B40B	B40E	B411
496 :	B412	B413	B414	B415	B416	B417	B41A	B41B	B41D	B41E	B421	B422	B423	B425	B426	B427
497 :	B42A	B42E	B42F	B430	B431	B432	B433	B436	B437	B439	B43A	B43D	B43E	B43F	B440	B441
498 :	B442	B443	B446	B448	B44A	B44B	B44C	B44D	B44E	B452	B453	B455	B456	B45C	B45D	B45E
499 :	B45F	B462	B464	B466	B467	B468	B469	B46B	B46E	B46F	B471	B472	B475	B476	B477	B478
49A :	B479	B47A	B47B	B47E	B482	B483	B484	B485	B486	B487	B48A	B48B	B48D	B48E	B491	B492
49B :	B493	B494	B495	B496	B497	B49A	B49E	B49F	B4A0	B4A1	B4A2	B4A3	B4A6	B4A7	B4A9	B4AA
49C :	B4AD	B4AE	B4AF	B4B0	B4B1	B4B2	B4B3	B4B6	B4BA	B4BB	B4BC	B4BD	B4BE	B4BF	B4C2	B4C3
49D :	B4C5	B4C6	B4C7	B4C9	B4CA	B4CB	B4CC	B4CD	B4CE	B4CF	B4D2	B4D4	B4D6	B4D7	B4D8	B4D9
49E :	B4DA	B4DB	B4DE	B4DF	B4E1	B4E2	B4E9	B4EA	B4EB	B4EE	B4F0	B4F2	B4F3	B4F4	B4F5	B4F6
49F :	B4F7	B4FA	B4FB	B4FD	B4FE	B501	B502	B503	B504	B505	B506	B507	B50A	B50C	B50E	B50F
4A0 :	B510	B511	B512	B513	B516	B517	B519	B51A	B51D	B51E	B51F	B520	B521	B522	B523	B526
4A1 :	B52C	B533	B535	B536	B53C	B53D	B53E	B542	B546	B547	B548	B549	B54A	B54F	B551	B552
4A2 :	B555	B556	B557	B558	B559	B55A	B55B	B55E	B562	B563	B564	B565	B566	B56A	B56B	B56D
4A3 :	B56E	B56F	B570	B571	B572	B573	B574	B575	B576	B577	B578	B579	B57A	B57B	B57C	B57E
4A4 :	B57F	B580	B581	B582	B583	B585	B586	B587	B589	B58A	B58B	B58C	B58D	B58E	B58F	B590
4A5 :	B591	B592	B593	B594	B595	B596	B597	B598	B599	B59A	B59B	B59C	B59D	B59E	B59F	B5A2
4A6 :	B5A3	B5A5	B5A6	B5A9	B5AC	B5AD	B5AE	B5B2	B5B6	B5B7	B5B8	B5B9	B5BA	B5BE	B5BF	B5C1
4A7 :	B5C2	B5C5	B5C6	B5C7	B5C8	B5C9	B5CA	B5CB	B5CE	B5D2	B5D3	B5D4	B5D5	B5D6	B5D7	B5DA
4A8 :	B5DB	B5DD	B5DE	B5E0	B5E1	B5E2	B5E3	B5E4	B5E5	B5E6	B5E7	B5EA	B5EE	B5EF	B5F0	B5F1
4A9 :	B5F2	B5F3	B5F5	B5F6	B5F7	B5F9	B5FA	B5FB	B5FC	B5FD	B5FE	B5FF	B600	B601	B602	B603
4AA :	B604	B606	B607	B608	B609	B60A	B60B	B60C	B60D	B60E	B60F	B613	B615	B616	B61B	B61C
4AB :	B61D	B61E	B622	B624	B626	B627	B628	B629	B62A	B62B	B62E	B62F	B631	B632	B633	B635
4AC :	B636	B637	B638	B639	B63A	B63B	B63C	B63D	B63E	B63F	B640	B642	B643	B644	B645	B646
4AD :	B647	B64A	B64B	B64D	B64E	B651	B652	B653	B654	B655	B656	B657	B65A	B65D	B65E	B65F
4AE :	B660	B661	B662	B663	B666	B667	B669	B66A	B66D	B66E	B66F	B670	B671	B672	B673	B676
4AF :	B67A	B67B	B67C	B67D	B67E	B67F	B682	B683	B684	B685	B686	B687	B688	B689	B68A	B68B
4B0 :	B68C	B68D	B68E	B68F	B690	B691	B692	B693	B694	B695	B696	B697	B698	B699	B69A	B69B
4B1 :	B69E	B69F	B6A1	B6A2	B6A5	B6A8	B6A9	B6AA	B6AE	B6B0	B6B2	B6B3	B6B4	B6B6	B6B7	B6B9
4B2 :	B6BA	B6BB	B6BD	B6BE	B6C0	B6C1	B6C2	B6C3	B6C4	B6C5	B6C6	B6C7	B6C8	B6C9	B6CA	B6CC
4B3 :	B6CD	B6CE	B6CF	B6D0	B6D1	B6D2	B6D3	B6D5	B6D6	B6D7	B6D9	B6DA	B6DD	B6DE	B6DF	B6E0
4B4 :	B6E1	B6E2	B6E3	B6E6	B6E7	B6EA	B6EB	B6EC	B6ED	B6EE	B6EF	B6F1	B6F2	B6F3	B6F5	B6F6
4B5 :	B6F9	B6FA	B6FB	B6FC	B6FD	B6FE	B6FF	B702	B704	B706	B707	B708	B709	B70A	B70B	B70E
4B6 :	B70F	B710	B711	B712	B713	B715	B716	B717	B718	B719	B71A	B71B	B71D	B71E	B71F	B720
4B7 :	B722	B723	B724	B725	B726	B727	B72A	B72B	B72D	B72E	B731	B734	B735	B736	B73A	B73C
4B8 :	B73E	B73F	B740	B741	B742	B743	B745	B746	B747	B749	B74A	B74B	B74D	B74E	B74F	B750
4B9 :	B751	B752	B753	B756	B757	B758	B75A	B75B	B75C	B75D	B75E	B75F	B762	B763	B765	B766
4BA :	B769	B76A	B76B	B76C	B76D	B76E	B76F	B772	B774	B776	B777	B778	B779	B77A	B77E	B77F
4BB :	B781	B782	B785	B786	B787	B789	B78A	B78B	B78E	B79A	B79B	B79D	B79E	B7A1	B7A2	B7A3
4BC :	B7A4	B7A5	B7A6	B7A7	B7AA	B7AE	B7AF	B7B3	B7B6	B7B7	B7B9	B7BA	B7BD	B7BE	B7BF	B7C0
4BD :	B7C1	B7C2	B7C3	B7C6	B7C8	B7CA	B7CB	B7CC	B7CD	B7CE	B7CF	B7D1	B7D2	B7D3	B7D4	B7D5
4BE :	B7D6	B7D7	B7D8	B7D9	B7DA	B7DB	B7DC	B7DD	B7DE	B7DF	B7E0	B7E1	B7E2	B7E4	B7E5	B7E6
4BF :	B7E7	B7E8	B7E9	B7EA	B7EB	B7EE	B7EF	B7F1	B7F5	B7F6	B7F7	B7F8	B7F9	B7FA	B7FB	B803

Table Q.1 (concluded)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
4C0 :	B805	B80A	B80B	B80D	B80E	B811	B812	B813	B814	B815	B816	B817	B81A	B81E	B81F	B820
4C1 :	B826	B827	B829	B82A	B82D	B82E	B82F	B831	B832	B833	B836	B83A	B83B	B83D	B83F	B842
4C2 :	B843	B845	B846	B849	B84A	B84B	B84C	B84D	B84E	B84F	B852	B854	B856	B857	B858	B859
4C3 :	B85A	B85B	B85E	B85F	B861	B862	B865	B866	B867	B869	B86A	B86E	B870	B872	B873	B875
4C4 :	B87A	B87B	B87D	B87E	B87F	B881	B882	B883	B884	B885	B886	B887	B88A	B88E	B88F	B890
4C5 :	B891	B892	B893	B895	B896	B897	B899	B89A	B89D	B89E	B89F	B8A0	B8A1	B8A2	B8A3	B8A4
4C6 :	B8A5	B8A6	B8A9	B8AA	B8AB	B8AC	B8AD	B8AE	B8AF	B8B2	B8B3	B8B6	B8B9	B8BA	B8BB	B8BC
4C7 :	B8BD	B8BE	B8BF	B8C2	B8C6	B8C7	B8C8	B8C9	B8CA	B8CB	B8CE	B8CF	B8D1	B8D2	B8D5	B8D6
4C8 :	B8D7	B8D8	B8D9	B8DA	B8DB	B8DE	B8E0	B8E2	B8E3	B8E4	B8E5	B8E6	B8E7	B8EA	B8EB	B8ED
4C9 :	B8EE	B8F1	B8F2	B8F4	B8F5	B8F6	B8F7	B8FA	B8FC	B8FE	B8FF	B901	B903	B906	B907	B909
4CA :	B90A	B90D	B90E	B90F	B910	B911	B912	B913	B916	B91A	B91B	B91C	B91D	B91E	B91F	B922
4CB :	B923	B925	B926	B927	B929	B92A	B92B	B92C	B92D	B92E	B92F	B932	B936	B937	B938	B939
4CC :	B93A	B93B	B93E	B93F	B941	B942	B945	B946	B947	B948	B949	B94A	B94B	B94E	B952	B953
4CD :	B954	B955	B956	B957	B95A	B95B	B95D	B95E	B961	B962	B963	B964	B965	B966	B967	B96A
4CE :	B96C	B96E	B96F	B970	B971	B972	B973	B976	B977	B979	B97A	B97E	B97F	B981	B982	B983
4CF :	B986	B988	B98C	B992	B993	B995	B996	B997	B999	B99A	B99B	B99C	B99D	B99F	B9A2	B9A4
4D0 :	B9A6	B9A7	B9A8	B9A9	B9AA	B9AB	B9AE	B9AF	B9B1	B9B2	B9B5	B9B6	B9B7	B9B8	B9B9	B9BA
4D1 :	B9BB	B9C2	B9C3	B9C5	B9C7	B9CB	B9CD	B9D3	B9D5	B9D6	B9D7	B9DA	B9E6	B9E7	B9E9	B9EA
4D2 :	B9EE	B9EF	B9F0	B9F1	B9F2	B9F3	B9F6	B9FC	B9FF	BA02	BA03	BA05	BA06	BA07	BA09	BA0A
4D3 :	BA0B	BA0C	BA0D	BA0E	BA0F	BA12	BA14	BA16	BA17	BA19	BA1A	BA1B	BA1D	BA1E	BA1F	BA20
4D4 :	BA21	BA22	BA23	BA24	BA25	BA26	BA27	BA28	BA29	BA2A	BA2B	BA2C	BA2D	BA2E	BA2F	BA30
4D5 :	BA31	BA32	BA33	BA34	BA35	BA36	BA37	BA3A	BA3D	BA3E	BA43	BA44	BA45	BA46	BA47	BA4A
4D6 :	BA50	BA51	BA52	BA56	BA57	BA59	BA5A	BA5D	BA5E	BA5F	BA61	BA62	BA63	BA66	BA6C	BA6E
4D7 :	BA6F	BA72	BA73	BA75	BA76	BA79	BA7B	BA7C	BA7D	BA7E	BA7F	BA82	BA86	BA88	BA8A	BA8B
4D8 :	BA8E	BA8F	BA91	BA92	BA95	BA96	BA97	BA98	BA99	BA9A	BA9B	BA9E	BAA0	BAA2	BAA4	BAA7
4D9 :	BAAA	BAAD	BAAE	BAB3	BAB5	BAB6	BAB7	BABA	BABC	BABE	BAC0	BAC1	BAC2	BAC6	BAC7	BAC9
4DA :	BACA	BACD	BACE	BACF	BAD0	BAD1	BAD2	BAD3	BAD6	BADA	BADB	BADC	BADD	BADE	BADF	BAE1
4DB :	BAE2	BAE3	BAE5	BAE6	BAE7	BAE9	BAEA	BAEB	BAEC	BAED	BAEE	BAEF	BAF0	BAF2	BAF3	BAF5
4DC :	BAF6	BAF7	BAF8	BAF9	BAFA	BAFB	BAFE	BAFF	BB01	BB02	BB05	BB06	BB07	BB08	BB09	BB0A
4DD :	BB0B	BB0E	BB10	BB12	BB13	BB14	BB15	BB16	BB17	BB1A	BB1B	BB1D	BB1E	BB21	BB22	BB23
4DE :	BB24	BB25	BB26	BB27	BB2A	BB2C	BB2E	BB2F	BB30	BB31	BB32	BB33	BB37	BB39	BB3F	BB41
4DF :	BB42	BB43	BB46	BB48	BB4A	BB4C	BB4E	BB52	BB53	BB55	BB56	BB59	BB5A	BB5B	BB5C	BB5D

Annex R
(informative)

Procedure for the unification and arrangement of CJK Ideographs

The graphic character collections of CJK unified ideographs in ISO/IEC 10646-1 are specified in clause 27. They contain almost 27,500 ideographs, and are derived from over 66,000 ideographs which are found in various different national and regional standards for coded character sets (the "source codes").

This Annex describes how the ideographs in this standard are derived from the source codes by applying a set of unification procedures. It also describes how the ideographs in this standard are arranged in the sequence of consecutive code positions to which they are assigned.

The source code standards are shown in clause 27 in five groups according to their origins. The groups are identified as the G-, T-, J-, K- and V-sources.

For the purposes of ISO/IEC 10646-1 a unification process is applied to the ideographic characters taken from the codes in the source groups. In this process single ideographs from two or more of the source groups are associated together, and a single code position is assigned to them in this standard. The associations are made according to a set of procedures that are described below. Ideographs that are thus associated are described here as “unified”.

NOTE - The unification process does not apply to the following collections of ideographic characters in the Basic multilingual Plane:
- CJK RADICALS SUPPLEMENT (2E80 - 2EFF)
- KANGXI RADICALS (2F00 - 2FDF)
- CJK COMPATIBILITY IDEOGRAPHS (F900 - FAFF with the exception of FA1F and FA23).

R.1. Unification procedure

R.1.1 Scope of unification

Ideographs that are unrelated in historical derivation (non-cognate characters) have not been unified.

Example: 士, 土

NOTE - The difference of shape between the two ideographs in the above example is in the length of the lower horizontal line. This is considered an actual difference of shape. Furthermore these ideographs have different meanings. The meaning of the first is "Soldier" and of the second is "Soil or Earth".

An association between ideographs from different sources is made here if their shapes are sufficiently similar, according to the following system of classification.

R.1.2 Two level classification

A two-level system of classification is used to differentiate (a) between abstract shapes and (b) between actual shapes determined by particular typefaces. Variant forms of an ideograph, which can not be unified, are identified based on the difference between their abstract shapes.

R.1.3 Procedure

A unification procedure is used to determine whether two ideographs have the same abstract shape or different ones. The unification procedure has two stages, applied in the following order:

a) Analysis of component structure;

b) Analysis of component features;

R.1.3.1 Analysis of component structure

In the first stage of the procedure the component structure of each ideograph is examined. A component of an ideograph is a geometrical combination of primitive elements. Alternative ideographs can be configured from the same set of components. Components can be combined to create a new component with a more complicated structure. An ideograph, therefore, can be defined as a component tree, where the top node is the ideograph itself, and the bottom nodes are the primitive elements. This is shown in Figure R.1.

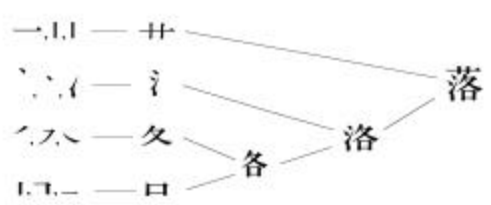

Figure R.1 - Component structure

R.1.3.2 Analysis of component features

In the second stage of the procedure, the components located at corresponding nodes of two

ideographs are compared, starting from the most superior node, as shown in Figure R.2.

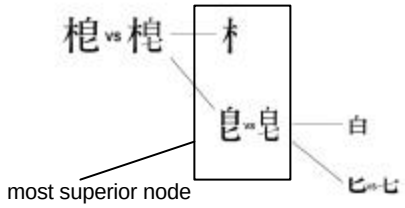

Figure R.2 - The most superior node of a component

The following features of each ideograph to be compared are examined:

a : the number of components,

b : the relative position of the components in each complete ideograph,

c : the structure of corresponding components.

If one or more of the features (a to c above) are different between the ideographs in the comparison, the ideographs are considered to have different abstract shapes and are therefore not unified.

If all of the features (a to c above) are the same between the ideographs, the ideographs are considered to have the same abstract shape and are therefore unified.

R.1.4 Examples of differences of abstract shapes

To illustrate rules derived from a: to c: in R.1.3.2, some typical examples of ideographs that are not unified, owing to differences of abstract shapes, are shown below.

R.1.4.1 Different number of components

The examples below illustrate rule a: since the two ideographs in each pair have different numbers of components.

崖•厓, 肱•厷, 降•夅

R.1.4.2 Different relative positions of components

The examples below illustrate rule b:. Although the two ideographs in each pair have the same number of components, the relative positions of the components are different.

峰•峯, 荊•荆

R.1.4.3 Different structure of a corresponding component

The examples below illustrate rule c:. The structure of one (or more) corresponding components within the two ideographs in each pair is different.

拡•擴, 策•箠, 学•斈, 圣•巠, 僉•僉, 区•區, 夾•夾, 単•單, 雇•雇, 戔•戔, 賛•贊, 襄•襄, 菲•菲, 間•閒, 朶•朵, 雋•隽, 恒•恆, 奐•奐, 𠂉•入, 𡗜•宗, 𠬝•叉

R.1.5 Differences of actual shapes

To illustrate the classification described in R.1.2, some typical examples of ideographs that are unified are shown below. The two or three ideographs in each group below have different actual shapes, but they are considered to have the same abstract shape, and are therefore unified.

辶•辶•辵, 示•示•礻, 旦•旦•𦣞, 飠•食•飠, 黄•黄, 盈•盈, 曷•曷, 包•包, 青•青, 每•每, 冊•冊, 爭•争, 𥝢•𥝢•𥝢, 彔•彔, 步•步, 者•者, 臭•臭, 幷•并, 骨•骨, 呂•吕, 直•直, 県•県, 吴•吳•吳, 眞•真•真, 爲•為, 単•单, 曾•曾•曾, 成•成, 專•専, 内•内, 晉•晋, 龜•龜, 艹•艹

The differences are further classified according to the following examples.

a) Differences in rotated strokes/dots

半•半, 勺•勺, 羽•羽•羽, 酋•酋, 兼•兼, 益•益

b) Differences in overshoot at the stroke initiation and/or termination

身•身, 雪•雪, 拐•拐, 不•不, 非•非, 周•周, 告•告

c) Differences in contact of strokes

奥•奥, 酉•酉, 児•児, 査•査, 奔•奔

d) Differences in protrusion at the folded corner of strokes

巨•巨

e) Differences in bent strokes

西•西

f) Differences in folding back at the stroke termination

朱•朱

g) Differences in accent at the stroke initiation

父•父, 丈•丈, 廴•廴

h) Differences in "rooftop" modification

八•八, 穴•穴

j) Combinations of the above differences

刃•刃•刃

These differences in actual shapes of a unified ideograph are presented in the corresponding source columns for each code position entry in the code table in clause 27 of this International Standard.

R.1.6 Source separation rule

To preserve data integrity through multiple stages of code conversion (commonly known as “round-trip integrity”), any ideographs that are separately encoded in any one of the source standards listed below have not been unified.

G-source: GB2312-80, GB12345-90, GB7589-87*, GB7590-87*, GB8565-88*, General Purpose Hanzi List for Modern Chinese Language*

T-source: TCA-CNS 11643-1986/1st plane, TCA-CNS 11643-1986/2nd plane, TCA-CNS 11643-1986/14th plane*

J-source: JIS X 0208-1990, JIS X 0212-1990

K-source: KS C 5601-1989, KS C 5657-1991

(A " * " after the reference number of a standard indicates that some of the ideographs included in that standard are not introduced into the unified collection.)

However, some ideographs encoded in two standards belonging to the same source group (e.g. GB2312-80 and GB12345-90) have been unified during the process of collecting ideographs from the source group.

R.2. Arrangement procedure

R.2.1 Scope of arrangement

The arrangement of the CJK UNIFIED IDEOGRAPHS in the code table of clause 27 of this International Standard is based on the filing order of ideographs in the following dictionaries.

Priority	Dictionary		Edition
1	Kangxi Dictionary	康熙字典	Beijing 7th edition
2	Daikanwa Jiten	大漢和辞典	9th edition
3	Hanyu Dazidian	汉语大字典	1st edition
4	Daejaweon	大字源	1st edition

The dictionaries are used according to the priority order given in the table above. Priority 1 is highest. If an ideograph is found in one dictionary, the dictionaries of lower priority are not examined.

R.2.2 Procedure

R.2.2.1 Ideographs found in the dictionaries

a) If an ideograph is found in the Kangxi Dictionary, it is positioned in the code table in accordance with the Kangxi Dictionary order.

b) If an ideograph is not found in the Kangxi Dictionary but is found in the Daikanwa Jiten, it is given a position at the end of the radical-stroke group under which is indexed the nearest preceding Daikanwa Jiten character that also appears in the Kangxi dictionary.

c) If an ideograph is found in neither the Kangxi nor the Daikanwa, the Hanyu Dazidian and the Daejaweon dictionaries are referred to with a similar procedure.

R.2.2.2 Ideographs not found in the dictionaries

If an ideograph is not found in any of the four dictionaries, it is given a position at the end of the

radical-stroke group (after the characters that are present in the dictionaries) and it is indexed under the same radical-stroke count.

R.3. Source code separation examples

The pairs (or triplets) of ideographs shown below are exceptions to the unification rules described in clause R.1 of this Annex. They are not unified because of the source code separation rule described in clause R.1.6.

NOTES

1. The particular source code group (or groups) that causes the source code separation rule to apply is indicated by the letter (G, J, K, or T) that appears to the right of each pair (or triplet) of ideographs. The source code groups that correspond to these letters are identified at the beginning of this Annex.

2. The ideograph pairs are listed below in ascending order by the code position of the first ideograph of each pair. The sequence progresses downwards in the left column as far as each marker (v------v), and then continues downwards in the adjoining right column, starting at the previous marker.

丟	丟	T	兗	兗	T
4E1F	4E22		5156	5157	
么	幺	GT	冊	冊	TJ
4E48	5E7A		518A	518C	
争	爭	GTJ	凈	淨	G
4E89	722D		51C0	51C8	
仞	刃	J	凡	凢	T
4EDE	4EED		51E2	51E3	
併	併	T	刃	刄	TJ
4F75	5002		5203	5204	
侶	侶	T	刊	刋	TJ
4FA3	4FB6		520A	520B	
俣	俣	TJK	刪	刪	T
4FC1	4FE3		5220	522A	
俞	兪	T	別	別	T
4FDE	516A		5225	522B	
俱	俱	T	券	券	TJ
4FF1	5036		5238	52B5	
値	值	T	剎	剎	T
5024	503C		5239	524E	
偷	偷	T	剏	剏	T
5077	5078		524F	5259	
偽	僞	TJ	剝	剥	T
507D	50DE		525D	5265	
兌	兑	T	劒	劔	J
514C	5151		5292	5294	
兎	兔	TJ	勻	匀	T
514E	5154		52FB	5300	
v----------			----------v		
单	单	T	堅	堅	T
5355	5358		5848	588D	
即	卽	TK	塡	填	TJ
5373	537D		5861	586B	
卷	卷	TJ	增	增	T
5377	5DFB		5897	589E	
叁	参	GT	壮	壯	GTJ
53C1	53C2		58EE	58EF	
參	叅	T	壽	壽	T
53C3	53C4		58FD	5900	
吕	呂	T	夐	夐	T
5415	5442		5910	657B	
吞	呑	T	本	本	GTJ
541E	5451		5932	672C	
吳	吴	吳 TJ	奥	奧	J
5433	5434	5449	5965	5967	
吶	呐	T	奬	奬	奬 TJ
5436	5450		5968	596C	734E
告	告	T	妆	妝	GT
543F	544A		5986	599D	

唧唧	T	妍妍	T	專專	J	彝彝	T
5527 559E		598D 59F8		5C02 5C08		5F5D 5F5E	
喻喻	T	姍姍	T	将將	GTJ	彥彦	T
55A9 55BB		59CD 59D7		5C06 5C07		5F65 5F66	
噓噓	T	姬姬	GT	尔尔	T	德德	T
5618 5653		59EB 59EC		5C13 5C14		5FB3 5FB7	
噫噫	GTJ	娛娛娛	T	尚尚	T	徵徵	T
568F 5694		5A1B 5A2F 5A31		5C19 5C1A		5FB4 5FB5	
国国	T	婕婕	T	尪尪	T	恵惠	TJ
56EF 56FD		5A55 5AAB		5C2A 5C2B		6075 60E0	
圈圈	TJ	媮媮	T	尷尷	T	悅悦	T
5708 570F		5A7E 5AAE		5C36 5C37		6085 60A6	
圓圓	T	媼媼	TK	屏屏	T	悞悞	T
570E 5713		5AAA 5ABC		5C4F 5C5B		609E 60AE	
圖圖	T	媯嫣	T	峥峥	GT	悳悳	T
5716 5717		5AAF 5B00		5CE5 5D22		60B3 60EA	
垈垈	T	嫦嫦	T	巔巔	T	慍慍	T
5759 5DE0		5B0E 5B14		5DD3 5DD4		6120 614D	
埒埒	J	嬤嬤	GT	帡帡	T	愼慎	TJ
57D2 57D3		5B24 5B37		5E21 5E32		613C 614E	
V----------		----------V		带帶	TJ	戩戩	GT
孿孿	T	弹弹	T	5E2F 5E36		6229 622C	
5B73 5B76		5F39 5F3E		并并	T	戲戲	T
宮宮	T	彐彑	TJ	5E76 5E77		622F 6231	
5BAB 5BAE		5F50 5F51		廏廏	T	戶户戶	T
寛寛	T	彔录	T	5EC4 5ECF		6236 6237 6238	
5BDB 5BEC		5F54 5F55		弑弑	T	戾戾	T
寧寧	T	彙彙	T	5F11 5F12		623B 623E	
5BDC 5BE7		5F59 5F5A		強强	T	抛抛	T
寢寢	GTJ	彝彝	J	5F37 5F3A		629B 62CB	
5BDD 5BE2		5F5B 5F5C		V----------		----------V	

拔拔	TJ	榆榆	T	曾曾	J	沒沒	TJ
629C 62D4		6961 6986		66FD 66FE		6C92 6CA1	
挩挩	T	概概	T	枴枴	T	浄淨	TJ
6329 635D		6982 69EA		67B4 67FA		6D44 6DE8	
插插插	TJ	榲榲	T	查查	T	涉涉	T
633F 63D2 63F7		6985 69B2		67E5 67FB		6D89 6E09	
捏揑	TJ	樧樧	T	柵柵	T	涗涗	T
634F 63D1		699D 6A27		67F5 6805		6D97 6D9A	
搜搜	TJ	槇槙	J	梲梲	T	淚淚	T
635C 641C		69C7 69D9		68B2 68C1		6D99 6DDA	
揭揭	T	樣樣	TJ	V----------V			
63B2 63ED		69D8 6A23		淥淥	T	眾衆	TJK
揺搖揺	TJ	横横	T	6DE5 6E0C		773E 8846	
63FA 6416 6447		6A2A 6A6B		清清	T	研研	T
揾揾	T	步步	T	6DF8 6E05		7814 784F	
63FE 6435		6B65 6B69		渴渴	T	祿禄	TJ
撃撃	TJ	歳歳	T	6E07 6E34		797F 7984	
6483 64CA		6B72 6B73		温温	T	禿禿	T
教教	T	歿歿	T	6E29 6EAB		79BF 79C3	
654E 6559		6B7F 6B81		渦渦	T	稅稅	T
敓敓	T	殻殻	GTJ	6E88 6F59		7A05 7A0E	
6553 655A		6BBB 6BBC		漑漑	T	穂穂	TJ
既既	T	毀毀	T	6E89 6F11		7A42 7A57	
65E2 65E3		6BC0 6BC1		滾滾	T	箏箏	GJ
昂昂	T	毎毎	T	6EDA 6EFE		7B5D 7B8F	
6602 663B		6BCE 6BCF		潛潛	GTJK	篊篊	T
晩晩	T	氲氲	T	6F5B 6FF3		7BB3 7C08	
665A 6669		6C32 6C33		瀨瀬	T	簒簒	T
暨暨	T	汚汚	T	7028 702C		7BE1 7C12	
66A8 66C1		6C5A 6C61		為爲	GTJ	粤粤	T
				70BA 7232		7CA4 7CB5	

712D 7162	榮榮 GTJK	7D55 7D76	絕絶 T
7155 7199	熙熙 J	7DA0 7DD1	綠緑 T
7174 7185	熅熅 T	7DD2 7DD6	緒緒 T
72B6 72C0	狀狀 GT	7DE3 7E01	緣縁 T
7464 7476	瑤瑤 TJ	7DFC 7E15	緼緼 T
74F6 7501	瓶瓶 T	7E48 7E66	繩繩 T
7522 7523	產産 T	7FAE 7FB9	羹羹 TJ
7E9 7626	瘦瘦 J	7FF6 7FFA	翱翱 T
76A1 76A5	皖皖 T	80FC 8141	胼胼 T
771E 771F	眞真 TJ	812B 8131	脫脫 T
817D 8183	膃膃 T	8B20 8B21	謠謠 J
8203 8204	舄舄 GT	8C5C 8C63	豜豜 T
820D 820E	舍舍 TJ	8D70 8D71	走走 TJ
8216 8217	舖舖 J	8EFF 8F27	輧輧 T
8358 838A	莊莊 TJ	8F1C 8F3A	輜輜 J

83D1 8458	菑菑 TJ	8F3C 8F40	輻輻 T
8480 8495	葢葢 T	8FBE 8FD6	达达 T
848B 8523	蔣蔣 GJ	8FF8 902C	迸迸 TJ
848D 853F	蔿蔿 T	9059 9065	遙遥 J
8570 8580	蘊蘊 T	90A2 90C9	邢邢 T
85AB 85B0	薰薰 T	90CE 90DE	郎郎 T
85F4 860A	蘊蘊 T	90F7 9109 9115	鄉鄉鄉 T
865A 865B	虛虛 T	9196 919E	醞醞 T
86FB 8715	蛻蛻 T	91A4 91AC	醬醬 J
885B 885E	衛衛 TJK	9203 9292	鈃鈃 T
886E 889E	袞袞 TK	92B3 92ED	銳銳 T
88C5 88DD	裝裝 GJK	9304 9332	錄録 T
8A2E 8A7D	訝訝 T	932C 934A	鍊鍊 TK
8AAA 8AAC	說説 T	93AD 93AE	鎭鎮 TJ
8ACC 8AEB	諫諫 TJ	95B1 95B2	閱閱 T

隉 隉	G	高 高	T	冲 沖	R.1.4.3	朓 朓	non cognate
9667 9689		9AD8 9AD9		51B2 6C96		6713 8101	
靑 青	T	髮 髮	TJ	决 決	R.1.4.3	朘 朘	non cognate
9751 9752		9AEA 9AEE		51B3 6C7A		6718 8127	
靜 靜	GTJ	鬪 鬪	T	况 況	R.1.4.3	朣 朣	non cognate
9759 975C		9B2C 9B2D		51B5 6CC1		6723 81A7	
靭 靭	J	鰛 鰛	TJ	垛 垛	R.1.4.3	朵 朵	R.1.4.3
976D 9771		9C1B 9C2E		579B 579C		6735 6736	
頹 頹	T	鳳 鳳	T	孽 孽	R.1.4.2	灩 灩	R.1.4.3
9839 983D		9CEF 9CF3		5B7C 5B7D		7054 7067	
顏 顏	TJ	鶇 鶇	J	寶 寶	R.1.4.3	稻 稻	R.1.4.3
984F 9854		9D87 9DAB		5BF3 5BF6		7A32 7A3B	
顚 顚	J	鷆 鷆	J	廳 廳	R.1.4.1	翺 翺	R.1.4.3
985A 985B		9DC6 9DCF		5EF0 5EF3		7FF1 7FF6	
飲 飲	J	麪 麪	T	懷 懷	R.1.4.1	耇 耇 耇	R.1.4.3
98EE 98F2		9EAA 9EAB		61D0 61F7		8007 8008 8009	
餅 餅	TJ	麼 麼	T	燬 燬	R.1.4.3	聽 聽 聽	R.1.4.1
9905 9920		9EBC 9EBD		6560 656A		8074 807C 807D	
駄 駄	TJK	黃 黃	T	盼 盼	non cognate	荆 荊	R.1.4.2
99B1 99C4		9EC3 9EC4		670C 80A6		8346 834A	
駢 駢	TK	黑 黑	T	朏 朏	non cognate	躲 躲	R.1.4.3
99E2 9A08		9ED1 9ED2		670F 80D0		8EB1 8EB2	
骫 骫	T						
9AA9 9AAB							

In accordance with the unification procedures described in R.1 of this Annex the pairs (or triplets) of ideographs shown below are not unified. The reason for non-unification is indicated by the reference which appears to the right of each pair (or triplet). For “non-cognate” see R.1.1

NOTE - The reason for non-unification in these examples is different from the source code separation rule described in clause R.1.6.

胄 胄	non cognate	朐 朐	non cognate
5191 80C4		6710 80CA	