

The Unicode® Standard

Version 14.0 – Core Specification

To learn about the latest version of the Unicode Standard, see <https://www.unicode.org/versions/latest/>.

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed with initial capital letters or in all capitals.

Unicode and the Unicode Logo are registered trademarks of Unicode, Inc., in the United States and other countries.

The authors and publisher have taken care in the preparation of this specification, but make no expressed or implied warranty of any kind and assume no responsibility for errors or omissions. No liability is assumed for incidental or consequential damages in connection with or arising out of the use of the information or programs contained herein.

The *Unicode Character Database* and other files are provided as-is by Unicode, Inc. No claims are made as to fitness for any particular purpose. No warranties of any kind are expressed or implied. The recipient agrees to determine applicability of information provided.

© 2021 Unicode, Inc.

All rights reserved. This publication is protected by copyright, and permission must be obtained from the publisher prior to any prohibited reproduction. For information regarding permissions, inquire at <https://www.unicode.org/reporting.html>. For information about the Unicode terms of use, please see <https://www.unicode.org/copyright.html>.

The Unicode Standard / the Unicode Consortium; edited by the Unicode Consortium. — Version 14.0.

Includes index.

ISBN 978-1-936213-29-0 (<https://www.unicode.org/versions/Unicode14.0.0/>)

1. Unicode (Computer character set) I. Unicode Consortium.

QA268.U545 2021

ISBN 978-1-936213-29-0

Published in Mountain View, CA

September 2021

Contents

Preface	xxi
Why Unicode?	xxi
Organization of This Standard	xxi
The Unicode Character Database	xxii
Unicode Code Charts	xxiii
Unicode Standard Annexes	xxiii
Unicode Technical Standards and Unicode Technical Reports	xxiv
Updates and Errata	xxv
Acknowledgements	xxv
1 Introduction	1
1.1 Coverage	3
Standards Coverage	3
New Characters	3
1.2 Design Goals	4
1.3 Text Handling	6
Characters and Glyphs	6
Text Elements	6
2 General Structure	9
2.1 Architectural Context	10
Basic Text Processes	10
Text Elements, Characters, and Text Processes	10
Text Processes and Encoding	11
2.2 Unicode Design Principles	14
Universality	14
Efficiency	15
Characters, Not Glyphs	15
Semantics	18
Plain Text	18
Logical Order	19
Unification	21
Dynamic Composition	23
Stability	23
Convertibility	24
2.3 Compatibility Characters	25
Compatibility Variants	26
Compatibility Decomposable Characters	26
2.4 Code Points and Characters	29
Types of Code Points	30

2.5	Encoding Forms	33
	UTF-32	35
	UTF-16	36
	UTF-8	37
2.6	Encoding Schemes	39
2.7	Unicode Strings	42
2.8	Unicode Allocation	43
	Planes	43
	Allocation Areas and Blocks	44
	Assignment of Code Points	45
2.9	Details of Allocation	47
	Plane 0 (BMP)	48
	Plane 1 (SMP)	50
	Plane 2 (SIP)	51
	Plane 3 (TIP)	51
	Other Planes	51
2.10	Writing Direction	52
2.11	Combining Characters	54
	Sequence of Base Characters and Diacritics	55
	Multiple Combining Characters	56
	Ligated Multiple Base Characters	59
	Exhibiting Nonspacing Marks in Isolation	59
	“Characters” and Grapheme Clusters	60
2.12	Equivalent Sequences	61
	Normalization	61
	Decompositions	62
	Non-decomposition of Certain Diacritics	64
2.13	Special Characters	66
	Special Noncharacter Code Points	66
	Byte Order Mark (BOM)	66
	Layout and Format Control Characters	67
	The Replacement Character	67
	Control Codes	67
2.14	Conforming to the Unicode Standard	68
	Characteristics of Conformant Implementations	68
	Unacceptable Behavior	69
	Acceptable Behavior	69
	Supported Subsets	70
3	Conformance	71
3.1	Versions of the Unicode Standard	72
	Stability	72
	Version Numbering	73
	Errata and Corrigenda	74

	References to the Unicode Standard	74
	Precision in Version Citation	75
	References to Unicode Character Properties	75
	References to Unicode Algorithms	76
3.2	Conformance Requirements	77
	Code Points Unassigned to Abstract Characters	77
	Interpretation	78
	Modification	79
	Character Encoding Forms	80
	Character Encoding Schemes	81
	Bidirectional Text	82
	Normalization Forms	82
	Normative References	82
	Unicode Algorithms	82
	Default Casing Algorithms	83
	Unicode Standard Annexes	83
3.3	Semantics	85
	Definitions	85
	Character Identity and Semantics	85
3.4	Characters and Encoding	88
3.5	Properties	93
	Types of Properties	93
	Property Values	94
	Default Property Values	95
	Classification of Properties by Their Values	96
	Property Status	97
	Context Dependence	100
	Stability of Properties	100
	Simple and Derived Properties	102
	Property Aliases	102
	Private Use	103
3.6	Combination	104
	Combining Character Sequences	104
	Grapheme Clusters	107
	Application of Combining Marks	108
3.7	Decomposition	114
	Compatibility Decomposition	114
	Canonical Decomposition	115
3.8	Surrogates	117
3.9	Unicode Encoding Forms	118
	UTF-32	122
	UTF-16	123
	UTF-8	123

	Encoding Form Conversion	125
	Constraints on Conversion Processes	125
	U+FFFD Substitution of Maximal Subparts	126
3.10	Unicode Encoding Schemes	129
3.11	Normalization Forms	133
	Normalization Stability	133
	Combining Classes	134
	Specification of Unicode Normalization Forms	135
	Starters	135
	Canonical Ordering Algorithm	136
	Canonical Composition Algorithm	137
	Definition of Normalization Forms	139
3.12	Conjoining Jamo Behavior	141
	Definitions	141
	Hangul Syllable Decomposition	143
	Hangul Syllable Composition	145
	Hangul Syllable Name Generation	146
	Sample Code for Hangul Algorithms	147
3.13	Default Case Algorithms	151
	Definitions	151
	Default Case Conversion	153
	Default Case Folding	154
	Default Case Detection	155
	Default Caseless Matching	156
4	Character Properties	159
4.1	Unicode Character Database	161
4.2	Case	164
	Definitions of Case and Casing	164
	Case Mapping	166
4.3	Combining Classes	168
	Reordrant, Split, and Subjoined Combining Marks	168
4.4	Directionality	171
4.5	General Category	172
4.6	Numeric Value	175
	Ideographic Numeric Values	176
4.7	Bidi Mirrored	178
4.8	Name	180
	Unicode Name Property	183
	Code Point Labels	186
	Use of Character Names in APIs and User Interfaces	186
4.9	Unicode 1.0 Names	188
4.10	Letters, Alphabetic, and Ideographic	189

4.11	Properties for Text Boundaries	190
4.12	Characters with Unusual Properties	191
5	Implementation Guidelines	195
5.1	Data Structures for Character Conversion	196
	Issues	196
	Multistage Tables	196
5.2	Programming Languages and Data Types	199
	Unicode Data Types for C	199
5.3	Unknown and Missing Characters	201
5.4	Handling Surrogate Pairs in UTF-16	203
5.5	Handling Numbers	205
5.6	Normalization	206
5.7	Compression	208
5.8	Newline Guidelines	209
	Definitions	209
	Line Separator and Paragraph Separator	210
	Recommendations	211
5.9	Regular Expressions	214
5.10	Language Information in Plain Text	215
	Requirements for Language Tagging	215
	Language Tags and Han Unification	215
5.11	Editing and Selection	217
	Consistent Text Elements	217
5.12	Strategies for Handling Nonspacing Marks	219
	Keyboard Input	220
	Truncation	220
5.13	Rendering Nonspacing Marks	222
	Canonical Equivalence	225
	Positioning Methods	226
5.14	Locating Text Element Boundaries	228
5.15	Identifiers	229
5.16	Sorting and Searching	230
	Culturally Expected Sorting and Searching	230
	Language-Insensitive Sorting	230
	Searching	231
	Sublinear Searching	232
5.17	Binary Order	233
	UTF-8 in UTF-16 Order	233
	UTF-16 in UTF-8 Order	234

5.18	Case Mappings	236
	Titlecasing	236
	Complications for Case Mapping	237
	Reversibility	239
	Caseless Matching	240
	Normalization and Casing	242
5.19	Mapping Compatibility Variants	243
5.20	Unicode Security	245
5.21	Ignoring Characters in Processing	248
	Characters Ignored in Text Segmentation	248
	Characters Ignored in Line Breaking	249
	Characters Ignored in Cursive Joining	249
	Characters Ignored in Identifiers	249
	Characters Ignored in Searching and Sorting	250
	Characters Ignored for Display	250
5.22	U+FFFD Substitution in Conversion	255
6	Writing Systems and Punctuation	257
6.1	Writing Systems	258
6.2	General Punctuation	263
	Blocks Devoted to Punctuation	264
	Format Control Characters	265
	Space Characters	266
	Dashes and Hyphens	267
	Paired Punctuation	269
	Language-Based Usage of Quotation Marks	270
	Apostrophes	274
	Other Punctuation	275
	Archaic Punctuation and Editorial Marks	280
	Indic Punctuation	282
	CJK Punctuation	284
	Unknown or Unavailable Ideographs	286
	CJK Compatibility Forms	287
7	Europe-I	289
	Modern and Liturgical Scripts	
7.1	Latin	291
	Letters of Basic Latin: U+0041–U+007A	295
	Letters of the Latin-1 Supplement: U+00C0–U+00FF	295
	Latin Extended-A: U+0100–U+017F	295
	Latin Extended-B: U+0180–U+024F	296
	IPA Extensions: U+0250–U+02AF	298
	Phonetic Extensions: U+1D00–U+1DBF	300
	Latin Extended Additional: U+1E00–U+1EFF	301
	Latin Extended-C: U+2C60–U+2C7F	301

	Latin Extended-D: U+A720–U+A7FF	302
	Latin Extended-E: U+AB30–U+AB6F	303
	Latin Extended-F: U+10780–U+107BF	304
	Latin Ligatures: U+FB00–U+FB06	304
7.2	Greek	305
	Greek: U+0370–U+03FF	305
	Greek Extended: U+1F00–U+1FFF	309
	Ancient Greek Numbers: U+10140–U+1018F	310
7.3	Coptic	312
7.4	Cyrillic	315
	Cyrillic: U+0400–U+04FF	315
	Cyrillic Supplement: U+0500–U+052F	317
	Cyrillic Extended-A: U+2DE0–U+2DFF	317
	Cyrillic Extended-B: U+A640–U+A69F	318
	Cyrillic Extended-C: U+1C80–U+1C8F	318
7.5	Glagolitic	320
	Glagolitic: U+2C00–U+2C5F	320
	Glagolitic Supplement: U+1E000–U+1E02F	320
7.6	Armenian	321
7.7	Georgian	323
	Georgian: U+10A0–U+10FF	323
	Georgian Extended: U+1C90–U+1CBF	323
	Georgian Supplement: U+2D00–U+2D2F	323
7.8	Modifier Letters	325
	Spacing Modifier Letters: U+02B0–U+02FF	326
	Modifier Tone Letters: U+A700–U+A71F	328
7.9	Combining Marks	329
	Combining Diacritical Marks: U+0300–U+036F	334
	Combining Diacritical Marks Extended: U+1AB0–U+1AFF	335
	Combining Diacritical Marks Supplement: U+1DC0–U+1DFF	336
	Combining Diacritical Marks for Symbols: U+20D0–U+20FF	336
	Combining Half Marks: U+FE20–U+FE2F	337
	Combining Marks in Other Blocks	338
8	Europe-II	341
	Ancient and Other Scripts	
8.1	Linear A	343
8.2	Linear B	344
	Linear B Syllabary: U+10000–U+1007F	344
	Linear B Ideograms: U+10080–U+100FF	344
	Aegean Numbers: U+10100–U+1013F	344
8.3	Cypriot Syllabary	346
8.4	Cypro-Minoan	347

8.5	Ancient Anatolian Alphabets	348
	Lycian: U+10280–U+1029F	348
	Carian: U+102A0–U+102DF	348
	Lydian: U+10920–U+1093F	348
8.6	Old Italic	350
8.7	Runic	353
8.8	Old Hungarian	356
8.9	Gothic	357
8.10	Elbasan	358
8.11	Caucasian Albanian	359
8.12	Vithkuqi	360
8.13	Old Permic	361
8.14	Ogham	362
8.15	Shavian	363
9	Middle East-I	365
	Modern and Liturgical Scripts	
9.1	Hebrew	367
	Hebrew: U+0590–U+05FF	367
	Alphabetic Presentation Forms: U+FB1D–U+FB4F	371
9.2	Arabic	373
	Arabic: U+0600–U+06FF	373
	Arabic Cursive Joining	381
	Arabic Ligatures	384
	Arabic Joining Groups	385
	Combining Hamza	392
	Other Letters for Extended Arabic	394
	Arabic Letters in Other Languages	395
	Arabic Supplement: U+0750–U+077F	395
	Arabic Extended-A: U+08A0–U+08FF	395
	Arabic Presentation Forms-A: U+FB50–U+FDFF	396
	Arabic Presentation Forms-B: U+FE70–U+FEFF	397
9.3	Syriac	399
	Syriac: U+0700–U+074F	399
	Syriac Shaping	403
	Syriac Supplement: U+0860–U+086F	408
9.4	Samaritan	409
9.5	Mandaic	411
9.6	Yezidi	414
10	Middle East-II	415
	Ancient Scripts	
10.1	Old North Arabian	417

10.2	Old South Arabian	418
10.3	Phoenician	420
10.4	Imperial Aramaic	422
10.5	Manichaean	424
10.6	Pahlavi and Parthian	428
	Inscriptional Parthian: U+10B40–U+10B5F	428
	Inscriptional Pahlavi: U+10B60–U+10B7F	428
	Psalter Pahlavi: U+10B80–U+10BAF	429
10.7	Avestan	430
10.8	Chorasmian	432
10.9	Elymaic	433
10.10	Nabataean	434
10.11	Palmyrene	435
10.12	Hatran	436
11	Cuneiform and Hieroglyphs	437
11.1	Sumero-Akkadian	438
	Cuneiform: U+12000–U+123FF	438
	Cuneiform Numbers and Punctuation: U+12400–U+1247F	441
	Early Dynastic Cuneiform: U+12480–U+1254F	441
11.2	Ugaritic	442
11.3	Old Persian	443
11.4	Egyptian Hieroglyphs	444
	Egyptian Hieroglyphs: U+13000–U+1342F	444
	Egyptian Hieroglyph Format Controls: U+13430–U+1343F	446
11.5	Meroitic	451
11.6	Anatolian Hieroglyphs	453
12	South and Central Asia-I	455
	Official Scripts of India	
12.1	Devanagari	457
	Devanagari: U+0900–U+097F	457
	Principles of the Devanagari Script	458
	Rendering Devanagari	467
	Devanagari Digits, Punctuation, and Symbols	477
	Extensions in the Main Devanagari Block	477
	Devanagari Extended: U+A8E0–U+A8FF	479
	Vedic Extensions: U+1CD0–U+1CFF	481
12.2	Bengali (Bangla)	483
12.3	Gurmukhi	490
12.4	Gujarati	495
12.5	Oriya (Odia)	497

12.6	Tamil	501
	Tamil: U+0B80–U+0BFF	501
	Tamil Vowels	502
	Tamil Ligatures	504
	Tamil Supplement: U+11FC0–U+11FFF	508
	Tamil Named Character Sequences	508
12.7	Telugu	511
12.8	Kannada	514
	Kannada: U+0C80–U+0CFF	514
	Principles of the Kannada Script	514
	Rendering Kannada	516
12.9	Malayalam	518
	Malayalam: U+0D00–U+0D7F	518
	Malayalam Orthographic Reform	519
	Rendering Malayalam	520
	Malayalam Numbers and Punctuation	525
13	South and Central Asia-II	527
	Other Modern Scripts	
13.1	Thaana	529
13.2	Sinhala	531
	Sinhala: U+0D80–U+0DFF	531
	Sinhala Archaic Numbers: U+111E0–U+111FF	534
13.3	Newa	535
13.4	Tibetan	538
13.5	Mongolian	549
	Mongolian: U+1800–U+18AF	549
	Mongolian Supplement: U+11660–U+1167F	558
13.6	Limbu	559
13.7	Meetei Mayek	563
	Meetei Mayek: U+ABC0–U+ABFF	563
	Meetei Mayek Extensions: U+AAE0–U+AAF6	564
13.8	Mro	565
13.9	Warang Citi	566
13.10	Ol Chiki	567
13.11	Chakma	569
13.12	Lepcha	570
13.13	Saurashtra	573
13.14	Masaram Gondi	574
13.15	Gunjala Gondi	576
13.16	Wancho	578

13.17	Toto	579
13.18	Tangsa	580
14	South and Central Asia-III	581
	Ancient Scripts	
14.1	Brahmi	583
14.2	Kharoshthi	587
	Kharoshthi: U+10A00–U+10A5F	587
	Rendering Kharoshthi	589
14.3	Bhaiksuki	593
14.4	Phags-pa	595
14.5	Marchen	602
14.6	Zanabazar Square	603
14.7	Soyombo	606
14.8	Old Turkic	608
14.9	Old Sogdian	609
14.10	Sogdian	610
14.11	Old Uyghur	611
15	South and Central Asia-IV	613
	Other Historic Scripts	
15.1	Syloti Nagri	616
15.2	Kaithi	618
15.3	Sharada	621
15.4	Takri	623
15.5	Siddham	625
15.6	Mahajani	627
15.7	Khojki	629
15.8	Khudawadi	631
15.9	Multani	633
15.10	Tirhuta	634
15.11	Modi	637
15.12	Nandinagari	640
	Nandinagari: U+119A0–U+119FF	640
15.13	Grantha	642
	Grantha: U+11300–U+1137F	642
	Rendering Grantha	642
15.14	Dives Akuru	646
15.15	Ahom	648
15.16	Sora Sompeng	650
15.17	Dogra	651

16 Southeast Asia	653
16.1 Thai	655
16.2 Lao	659
16.3 Myanmar	662
Myanmar: U+1000–U+109F	662
Myanmar Extended-A: U+AA60–U+AA7F	666
Khamti Shan	666
Aiton and Phake	668
Myanmar Extended-B: U+A9E0–U+A9FF	668
16.4 Khmer	669
Khmer: U+1780–U+17FF	669
Principles of the Khmer Script	669
Khmer Symbols: U+19E0–U+19FF	680
16.5 Tai Le	681
16.6 New Tai Lue	683
16.7 Tai Tham	686
16.8 Tai Viet	689
16.9 Kayah Li	692
16.10 Cham	693
16.11 Pahawh Hmong	695
16.12 Nyiakeng Puachue Hmong	697
16.13 Pau Cin Hau	699
16.14 Hanifi Rohingya	700
17 Indonesia and Oceania	701
17.1 Philippine Scripts	702
Tagalog: U+1700–U+171F	702
Hanunóo: U+1720–U+173F	702
Buhid: U+1740–U+175F	702
Tagbanwa: U+1760–U+177F	702
Principles of the Philippine Scripts	702
17.2 Buginese	705
17.3 Balinese	707
17.4 Javanese	713
17.5 Rejang	717
17.6 Batak	718
17.7 Sundanese	720
Sundanese: U+1B80–U+1BBF	720
Sundanese Supplement: U+1CC0–U+1CCF	721
17.8 Makasar	722

18 East Asia	725
18.1 Han	728
CJK Unified Ideographs	728
Blocks Containing Han Ideographs	729
General Characteristics of Han Ideographs	732
Principles of Han Unification	736
Unification Rules	737
Abstract Shape	738
Han Ideograph Arrangement	740
Radical-Stroke Indices	741
Mappings for Han Ideographs	742
CJK Compatibility Ideographs: U+F900–U+FAFF	743
CJK Compatibility Supplement: U+2F800–U+2FA1D	744
Kanbun: U+3190–U+319F	744
Symbols Derived from Han Ideographs	744
CJK and Kangxi Radicals: U+2E80–U+2FD5	745
CJK Additions from HKSCS and GB 18030	746
CJK Strokes: U+31C0–U+31EF	746
Ideographic Symbols and Punctuation: U+16FE0–U+16FFF	747
18.2 Ideographic Description Characters	748
18.3 Bopomofo	752
18.4 Hiragana and Katakana	755
Hiragana: U+3040–U+309F	755
Katakana: U+30A0–U+30FF	755
Katakana Phonetic Extensions: U+31F0–U+31FF	756
Small Kana Extension: U+1B130–U+1B16F	756
Kana Supplement: U+1B000–U+1B0FF	756
Kana Extended-A: U+1B100–U+1B12F	756
Kana Extended-B: U+AFF0–U+1AFFF	758
18.5 Halfwidth and Fullwidth Forms	761
18.6 Hangul	762
Hangul Jamo: U+1100–U+11FF	762
Hangul Jamo Extended-A: U+A960–U+A97F	763
Hangul Jamo Extended-B: U+D7B0–U+D7FF	763
Hangul Compatibility Jamo: U+3130–U+318F	763
Hangul Syllables: U+AC00–U+D7A3	764
18.7 Yi	766
18.8 Nüshu	769
18.9 Lisu	770
18.10 Miao	773

18.11 Tangut	775
Tangut: U+17000–U+187FF	775
Tangut Supplement: U+18D00–U+18D8F	775
Tangut Components: U+18800–U+18AFF	776
18.12 Khitan Small Script	778
19 Africa	781
19.1 Ethiopic	782
Ethiopic: U+1200–U+137F	782
Ethiopic Extensions	785
19.2 Osmanya	786
19.3 Tifinagh	787
19.4 N’Ko	790
19.5 Vai	795
19.6 Bamum	797
Bamum: U+A6A0–U+A6FF	797
Bamum Supplement: U+16800–U+16A3F	797
19.7 Bassa Vah	799
19.8 Mende Kikakui	800
19.9 Adlam	802
19.10 Medefaidrin	804
20 Americas	805
20.1 Cherokee	806
20.2 Canadian Aboriginal Syllabics	808
Unified Canadian Aboriginal Syllabics: U+1400–U+167F	808
Unified Canadian Aboriginal Syllabics Extended: U+18B0–U+18FF	809
Unified Canadian Aboriginal Syllabics Extended-A: U+11AB0–U+11ABF	809
20.3 Osage	810
20.4 Deseret	811
21 Notational Systems	815
21.1 Braille	816
21.2 Western Musical Symbols	818
21.3 Byzantine Musical Symbols	824
21.4 Znamenny Musical Notation	825
21.5 Ancient Greek Musical Notation	826
21.6 Duployan	829
Duployan: U+1BC00–U+1BC9F	829
Shorthand Format Controls: U+1BCA0–U+1BCAF	830
21.7 Sutton SignWriting	831
Sutton SignWriting: U+1D800–U+1DAAF	831

22 Symbols	833
22.1 Currency Symbols	835
Currency Symbols: U+20A0–U+20CF	835
22.2 Letterlike Symbols	839
Letterlike Symbols: U+2100–U+214F	839
Mathematical Alphanumeric Symbols: U+1D400–U+1D7FF	840
Mathematical Alphabets	841
Fonts Used for Mathematical Alphabets	844
Arabic Mathematical Alphabetic Symbols: U+1EE00–U+1EEFF	845
22.3 Numerals	847
Decimal Digits	847
Other Digits	849
Non-Decimal Radix Systems	852
Acrophonic Systems and Other Letter-based Numbers	853
Coptic Epact Numbers: U+102E0–U+102FF	854
Rumi Numeral Symbols: U+10E60–U+10E7E	855
Siyaq Numerical Notation Systems	855
CJK Numerals	857
Fractions	858
Common Indic Number Forms: U+A830–U+A83F	859
22.4 Superscript and Subscript Symbols	860
Superscripts and Subscripts: U+2070–U+209F	860
22.5 Mathematical Symbols	862
Mathematical Operators: U+2200–U+22FF	863
Supplements to Mathematical Symbols and Arrows	866
Supplemental Mathematical Operators: U+2A00–U+2AFF	866
Miscellaneous Mathematical Symbols-A: U+27C0–U+27EF	866
Miscellaneous Mathematical Symbols-B: U+2980–U+29FF	867
Miscellaneous Symbols and Arrows: U+2B00–U+2B7F	868
Arrows: U+2190–U+21FF	868
Supplemental Arrows	869
Standardized Variants of Mathematical Symbols	869
22.6 Invisible Mathematical Operators	870
22.7 Technical Symbols	871
Control Pictures: U+2400–U+243F	871
Miscellaneous Technical: U+2300–U+23FF	871
Optical Character Recognition: U+2440–U+245F	874
Symbols for Legacy Computing: U+1FB00–U+1FBFF	875
22.8 Geometrical Symbols	876
Box Drawing and Block Elements	876
Geometric Shapes: U+25A0–U+25FF	877
Geometric Shapes Extended: U+1F780–U+1F7FF	878

22.9	Miscellaneous Symbols	880
	Miscellaneous Symbols and Pictographs	882
	Emoticons: U+1F600–U+1F64F	885
	Transport and Map Symbols: U+1F680–U+1F6FF	885
	Dingbats: U+2700–U+27BF	885
	Ornamental Dingbats: U+1F650–U+1F67F	886
	Alchemical Symbols: U+1F700–U+1F77F	887
	Mahjong Tiles: U+1F000–U+1F02F	887
	Domino Tiles: U+1F030–U+1F09F	888
	Playing Cards: U+1F0A0–U+1F0FF	888
	Chess Symbols: U+1FA00–U+1FA6F	889
	Yijing Hexagram Symbols: U+4DC0–U+4DFF	890
	Tai Xuan Jing Symbols: U+1D300–U+1D356	890
	Ancient Symbols: U+10190–U+101CF	891
	Phaistos Disc Symbols: U+101D0–U+101FF	891
22.10	Enclosed and Square	893
	Enclosed Alphanumerics: U+2460–U+24FF	895
	Enclosed CJK Letters and Months: U+3200–U+32FF	895
	CJK Compatibility: U+3300–U+33FF	896
	Enclosed Alphanumeric Supplement: U+1F100–U+1F1FF	896
	Enclosed Ideographic Supplement: U+1F200–U+1F2FF	897
23	Special Areas and Format Characters	899
23.1	Control Codes	900
	Representing Control Sequences	900
	Specification of Control Code Semantics	901
23.2	Layout Controls	903
	Line and Word Breaking	903
	Cursive Connection and Ligatures	905
	Prepended Concatenation Marks	909
	Combining Grapheme Joiner	910
	Bidirectional Ordering Controls	912
	Stateful Format Controls	913
23.3	Deprecated Format Characters	915
23.4	Variation Selectors	917
23.5	Private-Use Characters	920
	Private Use Area: U+E000–U+F8FF	921
	Supplementary Private Use Areas	922
23.6	Surrogates Area	923
23.7	Noncharacters	924

23.8	Specials	926
	Byte Order Mark (BOM): U+FEFF	926
	Specials: U+FFF0–U+FFF8	928
	Annotation Characters: U+FFF9–U+FFFB	928
	Replacement Characters: U+FFFC–U+FFFD	930
23.9	Tag Characters	931
	Tag Characters: U+E000–U+E007F	931
	Deprecated Use for Language Tagging	931
	Syntax for Embedding Tags	931
	Working with Language Tags	933
	Unicode Conformance Issues	935
	Formal Tag Syntax	935
24	About the Code Charts	937
24.1	Character Names List	938
	Images in the Code Charts and Character Lists	938
	Special Characters and Code Points	940
	Character Names	942
	Informative Aliases	942
	Normative Aliases	943
	Cross References	944
	Information About Languages	945
	Case Mappings	946
	Decompositions	946
	Standardized Variation Sequences	947
	Positional Forms	949
	Block Headers	949
	Subheads	950
24.2	CJK and Other Ideographs	951
	CJK Unified Ideographs	951
	Compatibility Ideographs	953
	Tangut Ideographs	953
24.3	Hangul Syllables	955
A	Notational Conventions	957
	Code Points	957
	Character Names	957
	Character Blocks	958
	Sequences	958
	Rendering	958
	Properties and Property Values	959
	Miscellaneous	959
	Extended BNF	959
	Operators	961

B	Unicode Publications and Resources	963
B.1	The Unicode Consortium	964
	The Unicode Technical Committee	964
	Other Activities	964
B.2	Unicode Publications	965
B.3	Other Unicode Online Resources	966
	Unicode Online Resources	966
	How to Contact the Unicode Consortium	968
C	Relationship to ISO/IEC 10646	969
C.1	History	970
C.2	Encoding Forms in ISO/IEC 10646	978
	Zero Extending	978
C.3	UTF-8 and UTF-16	979
	UTF-8	979
	UTF-16	979
C.4	Synchronization of the Standards	980
C.5	Identification of Features for Unicode	981
C.6	Character Names	982
C.7	Character Functional Specifications	983
D	Version History of the Standard	985
E	Han Unification History	987
E.1	Development of the URO	988
E.2	Continuing Research on Ideographs	990
	Ideographic Rapporteur Group	990
	Ideographic Research Group	991
E.3	CJK Sources	992
F	Documentation of CJK Strokes	993
I	Index	1001