RFC 9233
Internationalized Domain Names for Applications 2008 (IDNA2008) and Unicode 12.0.0

Abstract

This document describes the changes between Unicode 6.0.0 and Unicode 12.0.0 in the context of the current version of Internationalized Domain Names for Applications 2008 (IDNA2008). Some additions and changes have been made in the Unicode Standard that affect the values produced by the algorithm IDNA2008 specifies. IDNA2008 allows adding exceptions to the algorithm for backward compatibility; however, this document does not add any such exceptions. This document provides the necessary tables to IANA to make its database consistent with Unicode 12.0.0.

To improve understanding, this document describes systems that are being used as alternatives to those that conform to IDNA2008.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 7841.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at https://www.rfc-editor.org/info/rfc9233.

Copyright Notice

Table of Contents

1. Introduction

The current version of Internationalized Domain Names for Applications (IDNA) was initiated in 2008, and despite not being completed until 2010, is widely known as "IDNA2008". It is specified in the series of documents listed in Section 2.1. The IDNA2008 standard includes an algorithm by which a derived property value is calculated based on the properties defined in the Unicode Standard.

The derived property values that can be calculated are defined in RFC 5892 [RFC5892]. Below is a summary to aid in the reading of this document. For definition of the terms, please see RFC 5892 [RFC5892].

PROTOCOL VALID: Those that are allowed to be used in IDNs. Code points with this property value are permitted for general use in IDNs. However, the fact that a label consists only of code points with this property value does not imply that the label can be used in DNS. The abbreviated term PVALID is used to refer to this value.

CONTEXTUAL RULE REQUIRED: Some characteristics of the character, such as it being invisible in certain contexts or problematic in others, require that it not be used in labels unless specific other characters or properties are present. The abbreviated term CONTEXT is used to refer to this value. As explained in RFC 5892 [RFC5892], CONTEXT is in turn divided into CONTEXTJ and CONTEXTO.

DISALLOWED: Those that should clearly not be included in IDNs. Code points with this property value are not permitted in IDNs.

UNASSIGNED: Those code points that are not designated (i.e., are unassigned) in the Unicode Standard.

When the Unicode Standard is updated, new code points are assigned and already assigned code points can have their property values changed.

- Assigning code points can create problems if the newly assigned code points are compositions of existing code points and the normalization relationships associated with those code points should have been changed because of that.
- Changing properties for already assigned code points can create problems if the property change results in changes to the derived property value. A previously allowed code point whose derived property value is PVALID may now be prohibited if its derived property value changes to DISALLOWED. The problem can also happen the other way around: a code point that was not allowed (and thus was prohibited) can suddenly be allowed.

- Problems can also be created if the properties assigned to those code points are inconsistent with IDNA2008 assumptions about how properties are assigned and/or about how code points with those properties are used or behave.

There were three incompatible changes in the Unicode Standard between Unicode 5.2.0 [Unicode-5.2.0] and Unicode 6.0.0 [Unicode-6.0.0]; they are described in RFC 6452 [RFC6452]. The code points U+0CF1 and U+0CF2 had a derived property value change from DISALLOWED to PVALID, and the code point U+19DA had a change in derived property value from PVALID to DISALLOWED. These changes where examined in great detail, but the IETF concluded that these changes to the Unicode Standard did not warrant an update to RFC 5892 [RFC5892].

As described in Section 3, more incompatible changes have been made to code points between Unicode 6.0.0 and Unicode 12.0.0 [Unicode-12.0.0]; however, the changes in the derived property values do not result in exceptions (as defined in Section 2.6 of RFC 5892 [RFC5892]) that would require an update to the "IDNA Contextual Rules" registry (which would also be considered an update to RFC 5892 [RFC5892]).

Further, in 2015, the Internet Architecture Board (IAB) issued a statement [IAB2005-1] that advised the community to avoid using any of the potentially problematic code points and asked the IETF to resolve the issues related to the code point ARABIC LETTER BEH WITH HAMZA ABOVE (U+08A1) that was introduced in Unicode 7.0.0 [Unicode-7.0.0]. In February of that year, the statement was revised [IAB2005-2] to focus on the latter request. More details about the problem of code point sequences not normalizing as one might expect appear in a draft that was part of the discussion [IDNA7].

The result of the work in the IETF was that no exception was added to RFC 5892 [RFC5892]; however, it should be noted that the review of the issues around U+08A1 indicated that this code point is not an isolated case and that a number of long-standing PVALID code points may have similar issues. While the affected code points remain PVALID in this document, identification of the problem resulted in a clarification of the review process for new Unicode versions. That clarification, which reinforces the original review plan to capture issues like these, was published as RFC 8753 [RFC8753]. Any review of Unicode versions after 12.0.0 should be made according to RFC 8753 [RFC8753]; an objective of this document is to ensure that a proper review of such versions after version 12.0.0 can be made.

2. Background

2.1. IDNA2008 Documents

IDNA2008 consists of the following documents. The documents in the set have informal names.

- "Internationalized Domain Names for Applications (IDNA): Definitions and Document Framework" [RFC5890], informally called "Defs" or "Definitions", contains definitions and other material that are needed for understanding other documents in the set.
- "Internationalized Domain Names in Applications (IDNA): Protocol" [RFC5891], informally called "Protocol", describes the core IDNA2008 protocol and its operations. It needs to be

interpreted in combination with the Bidi document (described below). RFC 5891 [RFC5891] obsoletes RFC 3491 [RFC3491] and, in particular, the use of the tables to which RFC 3491 [RFC3491] refers.

- "The Unicode Code Points and Internationalized Domain Names for Applications (IDNA)" [RFC5892], informally called "Tables", lists the categories and rules that identify the code points allowed in a label written in native character form (called a "U-label"), and is based on Unicode 5.2.0 [Unicode-5.2.0] code point assignments and additional rules unique to IDNA2008. The Unicode-based rules in RFC 5892 are expected to be stable across Unicode updates and hence independent of Unicode versions.

- "Right-to-Left Scripts for Internationalized Domain Names for Applications (IDNA)" [RFC5893], informally called "Bidi", specifies special rules for labels that contain characters that are written from right to left.

- "Internationalized Domain Names for Applications (IDNA): Background, Explanation, and Rationale" [RFC5894], informally called "Rationale", provides an overview of the protocol and associated tables, and gives explanatory material and some rationale for the decisions that led to IDNA2008. It also contains advice for DNS registry operators and others who use Internationalized Domain Names (IDNs).

- "Mapping Characters for Internationalized Domain Names in Applications (IDNA) 2008" [RFC5895], informally called "Mapping", discusses the issue of mapping characters into other characters and provides guidance for doing so when that is appropriate. RFC 5895 provides advice only and is not a required part of IDNA.

2.2. Additional Important IDNA2008-Related Documents

There are other documents important for the understanding and functioning of IDNA2008, for example this.

- "The Unicode Code Points and Internationalized Domain Names for Applications (IDNA) - Unicode 6.0" [RFC6452] describes some changes made to Unicode 6.0.0 [Unicode-6.0.0] that resulted in derived property value changes for the code points U+0CF1, U+0CF2, and U+19DA. U+0CF1 and U+0CF2 changed from DISALLOWED to PVALID, while U+19DA changed from PVALID to DISALLOWED. The IETF concluded that no update to RFC 5892 [RFC5892] was needed based on the changes made in Unicode 6.0.0 [Unicode-6.0.0]. As a result, the derived property value remained aligned with the Unicode Standard. Specifically, no exception was added.

2.3. Deployment

There are many variations on the general IDNA model in use in the various parts of the community. The following lists some of the strategies that implementations that claim to be IDNA compliant are known to use, but it should be noted the list is not complete:

- IDNA2003 as specified in RFC 3490 [RFC3490] and RFC 3491 [RFC3491]. Those specifications are dependent on case folding, Normalization Form KC (NFKC), and on tables that specify for each code point whether it is allowed to be used or not, with a distinction made between use

for "stored strings" and "query strings". The tables themselves are dependent on Unicode 3.2 [Unicode-3.2.0].

- A number of variations on IDNA2003, sometimes presented as "updated IDNA2003" or the like, which follow the principles of IDNA2003 as understood by the implementers but that use tables that represent how the implementers believe Stringprep [RFC3454] and Nameprep [RFC3491] would have evolved had the IETF not moved in the direction of IDNA2008 instead.

- A mix between IDNA2003 and IDNA2008 where code points assigned to Unicode after Unicode 3.2.0 [Unicode-3.2.0] have derived property value calculated according to the algorithm specified in IDNA2008.

- A mix between IDNA2003 and IDNA2008 according to the Unicode Technical Standard #46 [UTS-46]. Because that document specifies different profiles, there are several variations that leave users with no guarantee that two applications claiming conformance to UTS#46 will interoperate well with each other much less with conforming IDNA2008 implementations. UTS#46 is ultimately based on a normative table very much like the one used by Stringprep [RFC3454] but updated for each new version of Unicode.

- The (normative) IDNA2008 algorithm applied to whatever version of Unicode Standard exists in the operating system and/or libraries used, independent of whatever version of tables appears in the (non-normative) IANA database.

In practice, the Unicode Consortium creates a maximum set of code points by assigning code points in the Unicode Standard. The IDNA2008 rules use the Unicode Standard to create a further subset of code points and context that are permitted in DNS labels associated with its PVALID and CONTEXT (CONTEXTJ or CONTEXTO) derived property values. DNS registries and other organizations that deal with IDNs are supposed to create their own subsets from IDNA2008 for use by those registries and organizations.

This progressive subsetting and narrowing of the repertoire of code points that can be used in labels is an implementation of the principles of being conservative when deciding what code points to include in such a subset. SAC-084 [SAC-084] and RFC 6912 [RFC6912] recommend to DNS registries and other organizations to be conservative when creating their subsets and to use the principle of creating subsets by inclusion.

See also Security Considerations (Section 7) in this document.

3. Notable Changes between Unicode 6.0.0 and 12.0.0

Among the changes between the Unicode versions, most code points that change derived property value change from UNASSIGNED to PVALID or from UNASSIGNED to DISALLOWED. The interesting changes in derived property values include other changes. All changes between the major versions of Unicode can be found in Appendix A (6.0.0-7.0.0), Appendix B (7.0.0-8.0.0), Appendix C (8.0.0-9.0.0), Appendix D (9.0.0-10.0.0), Appendix E (10.0.0-11.0.0), and Appendix F (11.0.0-12.0.0).

3.1. Changes between Unicode 6.0.0 and 7.0.0

Change in number of characters in each category:

- PVALID changed from 97418 to 99867 (+2449)
- UNASSIGNED changed from 865081 to 861509 (-3572)
- CONTEXTJ did not change, at 2
- CONTEXTO did not change, at 25
- DISALLOWED changed from 151586 to 152709 (+1123)
- TOTAL did not change, at 1114112

There are no changes made to Unicode between version 6.0.0 and 7.0.0 that impact IDNA2008 calculation of the derived property values.

The code points U+17B4 KHMER VOWEL INHERENT AQ and U+17B5 KHMER VOWEL INHERENT AA both changed the General Category from Cf (Format) to Mn (Nonspacing_Mark), but that did not impact the calculation of the derived property value which stayed at DISALLOWED.

The character ARABIC LETTER BEH WITH HAMZA ABOVE (U+08A1) was introduced in Unicode 7.0.0. This was discussed extensively in the IETF and also by the IAB in their statement [IAB2005-1] requesting the IETF to investigate the issue. Specifically, the IAB stated:

> On the same precautionary principle, the IAB recommends that the Internationalized Domain Names for Applications (IDNA) Parameters registry <https://www.iana.org/assignments/idna-tables/> not be updated to Unicode 7.0.0 until the IETF has consensus on a solution to this problem.

The discussion in the IETF concluded that although it is possible to create "the same" character in multiple ways, the issue with U+08A1 is not unique. The character U+08A1 (ARABIC LETTER BEH WITH HAMZA ABOVE) can be represented with the sequence ARABIC LETTER BEH (U+0628) and ARABIC HAMZA ABOVE (U+0654). This is identical to LATIN SMALL LETTER O WITH STROKE (U+00F8), which can be represented with the sequence LATIN SMALL LETTER O (U+006F) followed by COMBINING SHORT SOLIDUS OVERLAY (U+0337).

Although the discussion about this specific code point resulted in acceptance of the derived property value of PVALID, the underlying problem with combining sequences is not understood fully. Therefore, it cannot be claimed that this case can be extrapolated to other situations and other code points.

3.2. Changes between Unicode 7.0.0 and 10.0.0

Change in number of characters in each category:

- Code points that changed derived property value: 0

- PVALID changed from 99867 to 122411 (+22544)
- UNASSIGNED changed from 861509 to 837775 (-23734)
- CONTEXTJ did not change, at 2
- CONTEXTO did not change, at 25
- DISALLOWED changed from 152709 to 153899 (+1190)
- TOTAL did not change, at 1114112

There are no changes made to Unicode between version 7.0.0 and 10.0.0 that impact IDNA2008 calculation of the derived property values.

3.3. Changes between Unicode 10.0.0 and 11.0.0

Change in number of characters in each category:

- Code points that changed derived property value: 1
- PVALID changed from 122411 to 122734 (+323)
- UNASSIGNED changed from 837775 to 837091 (-684)
- CONTEXTJ did not change, at 2
- CONTEXTO did not change, at 25
- DISALLOWED changed from 153899 to 154260 (+361)
- TOTAL did not change, at 1114112
- Georgian letters in the ranges U+10D0..U+10FA and U+10FD..U+10FF had their General Category changed from Lo (Other_Letter) to Ll (Lowercase_Letter) to reflect their status as the lowercase of new Georgian case pairs. Case mappings were also added.
- SHARADA SANDHI MARK (U+111C9) General Category was changed from Po (Other_Punctuation) to Mn (Nonspacing_Mark), and the Bidi property was changed from L (Left to Right) to NSM (Nonspacing Mark).
- The properties for ZANABAZAR SQUARE VOWEL SIGN AI (U+11A07) and ZANABAZAR SQUARE VOWEL SIGN AU (U+11A08) were corrected from Mc to Mn.
- SPHERICAL ANGLE OPENING UP (U+29A1) was changed to Bidi Mirrored to No.

These changes to the Unicode Standard have the following implications for these code points:

- The newly assigned 684 characters are assigned a derived property value as of a result of applying the IDNA2008 algorithm.
- The Georgian letters in the ranges U+10D0..U+10FA and U+10FD..U+10FF existed before IDNA2008 was created. Applying the IDNA2008 algorithm to the code points assigned the derived property value PVALID, and that value is unchanged even if the underlying Unicode properties have changed. The newly encoded Mtavruli letters have General Category Lu (Uppercase_Letter) and are therefore DISALLOWED.
- The U+111C9 SHARADA SANDHI MARK was added to Unicode 8.0.0 [Unicode-8.0.0]. Applying the IDNA2008 algorithm to the code point assigned the derived property value DISALLOWED. The changes in the underlying properties in Unicode 11.0.0 [Unicode-11.0.0] caused the derived property value to change to PVALID.

- The characters ZANABAZAR SQUARE VOWEL SIGN AI (U+11A07) and ZANABAZAR SQUARE VOWEL SIGN AU (U+11A08) were added to Unicode 10.0.0 [Unicode-10.0.0]. Applying the IDNA2008 algorithm to the code points assigned the derived property value PVALID, and that value is unchanged even if the underlying Unicode properties have changed.
- SPHERICAL ANGLE OPENING UP (U+29A1) existed before IDNA2008 was created. Applying the IDNA2008 algorithm to the code point assigned the derived property value DISALLOWED, and that value is unchanged even if the underlying Unicode properties have changed.

3.4. Changes between Unicode 11.0.0 and 12.0.0

Change in number of characters in each category:

- Code points that changed derived property value: 0
- PVALID changed from 122734 to 123006 (+272)
- UNASSIGNED changed from 837091 to 836537 (-554)
- CONTEXTJ did not change, at 2
- CONTEXTO did not change, at 25
- DISALLOWED changed from 154260 to 154542 (+282)
- TOTAL did not change, at 1114112

4. U+111C9 SHARADA SANDHI MARK

As one can see in Section 3, an incompatible property change was made between Unicode 6.0.0 and 12.0.0, affecting the code point U+111C9. Its derived property value thus changed from DISALLOWED to PVALID. In situations like these, IDNA2008 allows for addition of rules to RFC 5892 [RFC5892], Section 2.7. If the code point is accepted, it might still be rejected if validated by software based on versions of Unicode older than 12.0.0. As the character is rarely used outside the group of Sharada specialists but is used in some records for indicating sandhi breaks, the conclusion was that it could either be added as an exception or allowed to change its property value. As including an exception would require implementation changes to deployments of IDNA20008, the IETF has decided not to add a BackwardCompatible rule to IDNA2008 (i.e., Section 2.7 of RFC 5892 [RFC5892]) for this code point. This also ensures all sandhi marks are treated equally.

5. Conclusion

As described in Sections 3 and 4, changes have been made to Unicode between version 6.0.0 and 12.0.0. Some changes to specific characters changed their derived property value, whereas other changes did not. Given the deployment considerations described in Section 2.3 and changes in the Unicode Standard described in Sections 3 and 4, including implications to normalization, the conclusion is not to add any exception rules to IDNA2008.

This document addresses only changes to Unicode between version 6.0.0 and version 12.0.0. Changes in future Unicode versions might result in the conclusion that exception rules need to be added to IDNA2008 after the review process explained in RFC 8753 [RFC8753]. Separately from any changes in Unicode, the IETF might conclude that updates to RFC 5892 [RFC5892] or other IDNA2008 documents might become necessary; such updates might include changes to the algorithm specified in IDNA2008 as well as additional rules, categories, or other forms of tuning, like the clarifications in RFC 8753 [RFC8753].

6. IANA Considerations

IANA updated the "IDNA Rules and Derived Property Values" [IANA-IDNA] registry after the expert reviewer validated that the derived property values were calculated correctly.

7. Security Considerations

This document makes recommendations regarding the use of the IDNA2008 algorithm for calculation of derived property values, based on Unicode version 12.0.0. This recommendation does not say anything about what recommendations to make for future versions of the Unicode Standard.

Not following these recommendations can lead to various security issues. Specifically, allowing confusable characters may lead to various phishing attacks, as described in the Security Consideration Sections in the documents listed in Section 2.1.

8. References

8.1. Normative References

[RFC3491]   Hoffman, P. and M. Blanchet, "Nameprep: A Stringprep Profile for Internationalized Domain Names (IDN)", RFC 3491, DOI 10.17487/RFC3491, March 2003, <https://www.rfc-editor.org/info/rfc3491>.

[RFC5890]   Klensin, J., "Internationalized Domain Names for Applications (IDNA): Definitions and Document Framework", RFC 5890, DOI 10.17487/RFC5890, August 2010, <https://www.rfc-editor.org/info/rfc5890>.

[RFC5891]   Klensin, J., "Internationalized Domain Names in Applications (IDNA): Protocol", RFC 5891, DOI 10.17487/RFC5891, August 2010, <https://www.rfc-editor.org/info/rfc5891>.

[RFC5892]   Faltstrom, P., Ed., "The Unicode Code Points and Internationalized Domain Names for Applications (IDNA)", RFC 5892, DOI 10.17487/RFC5892, August 2010, <https://www.rfc-editor.org/info/rfc5892>.

[RFC5893]   Alvestrand, H., Ed. and C. Karp, "Right-to-Left Scripts for Internationalized Domain Names for Applications (IDNA)", RFC 5893, DOI 10.17487/RFC5893, August 2010, <https://www.rfc-editor.org/info/rfc5893>.

[RFC6452]   Faltstrom, P., Ed. and P. Hoffman, Ed., "The Unicode Code Points and Internationalized Domain Names for Applications (IDNA) - Unicode 6.0", RFC 6452, DOI 10.17487/RFC6452, November 2011, <https://www.rfc-editor.org/info/rfc6452>.

8.2. Informative References

[IAB2005-1]   Internet Architecture Board, "IAB Statement on Identifiers and Unicode 7.0.0", 27 January 2015, <https://www.iab.org/documents/correspondence-reports-documents/2015-2/iab-statement-on-identifiers-and-unicode-7-0-0/archive/>.

[IAB2005-2]   Internet Architecture Board, "IAB Statement on Identifiers and Unicode 7.0.0", 11 February 2015, <https://www.iab.org/documents/correspondence-reports-documents/2015-2/iab-statement-on-identifiers-and-unicode-7-0-0/>.

[IANA-IDNA]   IANA, "IDNA Rules and Derived Property Values", February 2022, <https://www.iana.org/assignments/idna-tables-12.0.0/>.

[IDNA7]   Klensin, J. C. and P. Faltstrom, "IDNA Update for Unicode 7.0 and Later Versions", Work in Progress, Internet-Draft, draft-klensin-idna-5892upd-unicode70-05, 8 October 2017, <https://datatracker.ietf.org/doc/html/draft-klensin-idna-5892upd-unicode70-05>.

[RFC3454]   Hoffman, P. and M. Blanchet, "Preparation of Internationalized Strings ("stringprep")", RFC 3454, DOI 10.17487/RFC3454, December 2002, <https://www.rfc-editor.org/info/rfc3454>.

[RFC3490]   Faltstrom, P., Hoffman, P., and A. Costello, "Internationalizing Domain Names in Applications (IDNA)", RFC 3490, DOI 10.17487/RFC3490, March 2003, <https://www.rfc-editor.org/info/rfc3490>.

[RFC5894]   Klensin, J., "Internationalized Domain Names for Applications (IDNA): Background, Explanation, and Rationale", RFC 5894, DOI 10.17487/RFC5894, August 2010, <https://www.rfc-editor.org/info/rfc5894>.

[RFC5895]   Resnick, P. and P. Hoffman, "Mapping Characters for Internationalized Domain Names in Applications (IDNA) 2008", RFC 5895, DOI 10.17487/RFC5895, September 2010, <https://www.rfc-editor.org/info/rfc5895>.

[RFC6912]   Sullivan, A., Thaler, D., Klensin, J., and O. Kolkman, "Principles for Unicode Code Point Inclusion in Labels in the DNS", RFC 6912, DOI 10.17487/RFC6912, April 2013, <https://www.rfc-editor.org/info/rfc6912>.

[RFC8753]   Klensin, J. and P. Fältström, "Internationalized Domain Names for Applications (IDNA) Review for New Unicode Versions", RFC 8753, DOI 10.17487/RFC8753, April 2020, <https://www.rfc-editor.org/info/rfc8753>.

[SAC-084]   The Security and Stability Advisory Committee, "SAC084", SSAC Comments on
              Guidelines for the Extended Process Similarity Review Panel for the IDN ccTLD
              Fast Track Process, August 2016, <https://www.icann.org/en/system/files/files/
              sac-084-en.pdf>.

[Unicode-3.2.0]   The Unicode Consortium, "The Unicode Standard, Version 3.2.0", Mountain
              View: The Unicode Consortium, ISBN 0-201-61633-5, March 2002, <https://
              www.unicode.org/versions/Unicode3.2.0/>.

[Unicode-5.2.0]   The Unicode Consortium, "The Unicode Standard, Version 5.2.0", Mountain
              View: The Unicode Consortium, ISBN 978-1-936213-00-9, October 2009, <https://
              www.unicode.org/versions/Unicode5.2.0/>.

[Unicode-6.0.0]   The Unicode Consortium, "The Unicode Standard, Version 6.0.0", Mountain
              View: The Unicode Consortium, ISBN 978-1-936213-01-6, October 2011, <https://
              www.unicode.org/versions/Unicode6.0.0/>.

[Unicode-7.0.0]   The Unicode Consortium, "The Unicode Standard, Version 7.0.0", Mountain
              View: The Unicode Consortium, ISBN 978-1-936213-09-2, June 2014, <https://
              www.unicode.org/versions/Unicode7.0.0/>.

[Unicode-8.0.0]   The Unicode Consortium, "The Unicode Standard, Version 8.0.0", Mountain
              View: The Unicode Consortium, ISBN 978-1-936213-10-8, June 2015, <https://
              www.unicode.org/versions/Unicode8.0.0/>.

[Unicode-10.0.0]   The Unicode Consortium, "The Unicode Standard, Version 10.0.0", Mountain
              View: The Unicode Consortium, ISBN 978-1-936213-16-0, June 2017, <https://
              www.unicode.org/versions/Unicode10.0.0/>.

[Unicode-11.0.0]   The Unicode Consortium, "The Unicode Standard, Version 11.0.0", Mountain
              View: The Unicode Consortium, ISBN 978-1-936213-19-1, June 2018, <https://
              www.unicode.org/versions/Unicode11.0.0/>.

[Unicode-12.0.0]   The Unicode Consortium, "The Unicode Standard, Version 12.0.0", Mountain
              View: The Unicode Consortium, ISBN 978-1-936213-22-1, March 2019, <https://
              www.unicode.org/versions/Unicode12.0.0/>.

[UTS-46]   The Unicode Consortium, "Unicode Technical Standard #46, Version 12.0.0",
              UNICODE IDNA COMPATIBILITY PROCESSING, March 2019, <https://
              www.unicode.org/reports/tr46/tr46-23.html>.

Appendix A.   Changes from Unicode 6.0.0 to Unicode 7.0.0

Changes from derived property value UNASSIGNED to either PVALID or DISALLOWED.

```
037F        ; DISALLOWED # GREEK CAPITAL LETTER YOT
0528        ; DISALLOWED # CYRILLIC CAPITAL LETTER EN WITH LEFT HOOK
0529        ; PVALID     # CYRILLIC SMALL LETTER EN WITH LEFT HOOK
052A        ; DISALLOWED # CYRILLIC CAPITAL LETTER DZZHE
052B        ; PVALID     # CYRILLIC SMALL LETTER DZZHE
052C        ; DISALLOWED # CYRILLIC CAPITAL LETTER DCHE
052D        ; PVALID     # CYRILLIC SMALL LETTER DCHE
052E        ; DISALLOWED # CYRILLIC CAPITAL LETTER EL WITH DESCENDER
052F        ; PVALID     # CYRILLIC SMALL LETTER EL WITH DESCENDER
058D..058F  ; DISALLOWED # RIGHT-FACING ARMENIAN ETERNITY SIGN..ARMENIAN
0604..0605  ; DISALLOWED # ARABIC SIGN SAMVAT..ARABIC NUMBER MARK ABOVE
061C        ; DISALLOWED # ARABIC LETTER MARK
08A0..08B2  ; PVALID     # ARABIC LETTER BEH WITH SMALL V BELOW..ARABIC
08E4..08FF  ; PVALID     # ARABIC CURLY FATHA..ARABIC MARK SIDEWAYS NOON
0978        ; PVALID     # DEVANAGARI LETTER MARWARI DDA
0980        ; PVALID     # BENGALI ANJI
0AF0        ; DISALLOWED # GUJARATI ABBREVIATION SIGN
0C00        ; PVALID     # TELUGU SIGN COMBINING CANDRABINDU ABOVE
0C34        ; PVALID     # TELUGU LETTER LLLA
0C81        ; PVALID     # KANNADA SIGN CANDRABINDU
0D01        ; PVALID     # MALAYALAM SIGN CANDRABINDU
0DE6..0DEF  ; PVALID     # SINHALA LITH DIGIT ZERO..SINHALA LITH DIGIT N
0EDE..0EDF  ; PVALID     # LAO LETTER KHMU GO..LAO LETTER KHMU NYO
10C7        ; DISALLOWED # GEORGIAN CAPITAL LETTER YN
10CD        ; DISALLOWED # GEORGIAN CAPITAL LETTER AEN
10FD..10FF  ; PVALID     # GEORGIAN LETTER AEN..GEORGIAN LETTER LABIAL S
16F1..16F8  ; PVALID     # RUNIC LETTER K..RUNIC LETTER FRANKS CASKET AE
17B4..17B5  ; DISALLOWED # KHMER VOWEL INHERENT AQ..KHMER VOWEL INHERENT
191D..191E  ; PVALID     # LIMBU LETTER GYAN..LIMBU LETTER TRA
1AB0..1ABD  ; PVALID     # COMBINING DOUBLED CIRCUMFLEX ACCENT..COMBININ
1ABE        ; DISALLOWED # COMBINING PARENTHESES OVERLAY
1BAB..1BAD  ; PVALID     # SUNDANESE SIGN VIRAMA..SUNDANESE CONSONANT SI
1BBA..1BBF  ; PVALID     # SUNDANESE AVAGRAHA..SUNDANESE LETTER FINAL M
1CC0..1CC7  ; DISALLOWED # SUNDANESE PUNCTUATION BINDU SURYA..SUNDANESE
1CF3..1CF6  ; PVALID     # VEDIC SIGN ROTATED ARDHAVISARGA..VEDIC SIGN U
1CF8..1CF9  ; PVALID     # VEDIC TONE RING ABOVE..VEDIC TONE DOUBLE RING
1DE7..1DF5  ; PVALID     # COMBINING LATIN SMALL LETTER ALPHA..COMBINING
2066..2069  ; DISALLOWED # LEFT-TO-RIGHT ISOLATE..POP DIRECTIONAL ISOLAT
20BA..20BD  ; DISALLOWED # TURKISH LIRA SIGN..RUBLE SIGN
23F4..23FA  ; DISALLOWED # BLACK MEDIUM LEFT-POINTING TRIANGLE..BLACK CI
2700        ; DISALLOWED # BLACK SAFETY SCISSORS
27CB        ; DISALLOWED # MATHEMATICAL RISING DIAGONAL
27CD        ; DISALLOWED # MATHEMATICAL FALLING DIAGONAL
2B4D..2B4F  ; DISALLOWED # DOWNWARDS TRIANGLE-HEADED ZIGZAG ARROW..SHORT
2B5A..2B73  ; DISALLOWED # SLANTED NORTH ARROW WITH HOOKED HEAD..DOWNWAR
2B76..2B95  ; DISALLOWED # NORTH WEST TRIANGLE-HEADED ARROW TO BAR..RIGH
2B98..2BB9  ; DISALLOWED # THREE-D TOP-LIGHTED LEFTWARDS EQUILATERAL ARR
2BBD..2BC8  ; DISALLOWED # BALLOT BOX WITH LIGHT X..BLACK MEDIUM RIGHT-P
2BCA..2BD1  ; DISALLOWED # TOP HALF BLACK CIRCLE..UNCERTAINTY SIGN
2CF2        ; DISALLOWED # COPTIC CAPITAL LETTER BOHAIRIC KHEI
2CF3        ; PVALID     # COPTIC SMALL LETTER BOHAIRIC KHEI
2D27        ; PVALID     # GEORGIAN SMALL LETTER YN
2D2D        ; PVALID     # GEORGIAN SMALL LETTER AEN
2D66..2D67  ; PVALID     # TIFINAGH LETTER YE..TIFINAGH LETTER YO
2E32..2E42  ; DISALLOWED # TURNED COMMA..DOUBLE LOW-REVERSED-9 QUOTATION
9FCC        ; PVALID     # <CJK Ideograph>
A674..A67B  ; PVALID     # COMBINING CYRILLIC LETTER UKRAINIAN IE..COMBI
```

```
    A698        ; DISALLOWED # CYRILLIC CAPITAL LETTER DOUBLE O
    A699        ; PVALID     # CYRILLIC SMALL LETTER DOUBLE O
    A69A        ; DISALLOWED # CYRILLIC CAPITAL LETTER CROSSED O
    A69B        ; PVALID     # CYRILLIC SMALL LETTER CROSSED O
    A69C..A69D  ; DISALLOWED # MODIFIER LETTER CYRILLIC HARD SIGN..MODIFIER
    A69F        ; PVALID     # COMBINING CYRILLIC LETTER IOTIFIED E
    A792        ; DISALLOWED # LATIN CAPITAL LETTER C WITH BAR
    A793..A795  ; PVALID     # LATIN SMALL LETTER C WITH BAR..LATIN SMALL LE
    A796        ; DISALLOWED # LATIN CAPITAL LETTER B WITH FLOURISH
    A797        ; PVALID     # LATIN SMALL LETTER B WITH FLOURISH
    A798        ; DISALLOWED # LATIN CAPITAL LETTER F WITH STROKE
    A799        ; PVALID     # LATIN SMALL LETTER F WITH STROKE
    A79A        ; DISALLOWED # LATIN CAPITAL LETTER VOLAPUK AE
    A79B        ; PVALID     # LATIN SMALL LETTER VOLAPUK AE
    A79C        ; DISALLOWED # LATIN CAPITAL LETTER VOLAPUK OE
    A79D        ; PVALID     # LATIN SMALL LETTER VOLAPUK OE
    A79E        ; DISALLOWED # LATIN CAPITAL LETTER VOLAPUK UE
    A79F        ; PVALID     # LATIN SMALL LETTER VOLAPUK UE
    A7AA..A7AD  ; DISALLOWED # LATIN CAPITAL LETTER H WITH HOOK..LATIN CAPIT
    A7B0..A7B1  ; DISALLOWED # LATIN CAPITAL LETTER TURNED K..LATIN CAPITAL
    A7F7        ; PVALID     # LATIN EPIGRAPHIC LETTER SIDEWAYS I
    A7F8..A7F9  ; DISALLOWED # MODIFIER LETTER CAPITAL H WITH STROKE..MODIFI
    A9E0..A9FE  ; PVALID     # MYANMAR LETTER SHAN GHA..MYANMAR LETTER TAI L
    AA7C..AA7F  ; PVALID     # MYANMAR SIGN TAI LAING TONE-2..MYANMAR LETTER
    AAE0..AAEF  ; PVALID     # MEETEI MAYEK LETTER E..MEETEI MAYEK VOWEL SIG
    AAF0..AAF1  ; DISALLOWED # MEETEI MAYEK CHEIKHAN..MEETEI MAYEK AHANG KHU
    AAF2..AAF6  ; PVALID     # MEETEI MAYEK ANJI..MEETEI MAYEK VIRAMA
    AB30..AB5A  ; PVALID     # LATIN SMALL LETTER BARRED ALPHA..LATIN SMALL
    AB5B..AB5F  ; DISALLOWED # MODIFIER BREVE WITH INVERTED BREVE..MODIFIER
    AB64..AB65  ; PVALID     # LATIN SMALL LETTER INVERTED ALPHA..GREEK LETT
    FA2E..FA2F  ; DISALLOWED # CJK COMPATIBILITY IDEOGRAPH-FA2E..CJK COMPATI
    FE27..FE2D  ; PVALID     # COMBINING LIGATURE LEFT HALF BELOW..COMBINING
    1018B..1018C; DISALLOWED # GREEK ONE QUARTER SIGN..GREEK SINUSOID SIGN
    101A0       ; DISALLOWED # GREEK SYMBOL TAU RHO
    102E0       ; PVALID     # COPTIC EPACT THOUSANDS MARK
    102E1..102FB; DISALLOWED # COPTIC EPACT DIGIT ONE..COPTIC EPACT NUMBER N
    1031F       ; PVALID     # OLD ITALIC LETTER ESS
    10350..1037A; PVALID     # OLD PERMIC LETTER AN..COMBINING OLD PERMIC LE
    10500..10527; PVALID     # ELBASAN LETTER A..ELBASAN LETTER KHE
    10530..10563; PVALID     # CAUCASIAN ALBANIAN LETTER ALT..CAUCASIAN ALBA
    1056F       ; DISALLOWED # CAUCASIAN ALBANIAN CITATION MARK
    10600..10736; PVALID     # LINEAR A SIGN AB001..LINEAR A SIGN A664
    10740..10755; PVALID     # LINEAR A SIGN A701 A..LINEAR A SIGN A732 JE
    10760..10767; PVALID     # LINEAR A SIGN A800..LINEAR A SIGN A807
    10860..10876; PVALID     # PALMYRENE LETTER ALEPH..PALMYRENE LETTER TAW
    10877..1087F; DISALLOWED # PALMYRENE LEFT-POINTING FLEURON..PALMYRENE NU
    10880..1089E; PVALID     # NABATAEAN LETTER FINAL ALEPH..NABATAEAN LETTE
    108A7..108AF; DISALLOWED # NABATAEAN NUMBER ONE..NABATAEAN NUMBER ONE HU
    10980..109B7; PVALID     # MEROITIC HIEROGLYPHIC LETTER A..MEROITIC CURS
    109BE..109BF; PVALID     # MEROITIC CURSIVE LOGOGRAM RMT..MEROITIC CURSI
    10A80..10A9C; PVALID     # OLD NORTH ARABIAN LETTER HEH..OLD NORTH ARABI
    10A9D..10A9F; DISALLOWED # OLD NORTH ARABIAN NUMBER ONE..OLD NORTH ARABI
    10AC0..10AC7; PVALID     # MANICHAEAN LETTER ALEPH..MANICHAEAN LETTER WA
    10AC8       ; DISALLOWED # MANICHAEAN SIGN UD
    10AC9..10AE6; PVALID     # MANICHAEAN LETTER ZAYIN..MANICHAEAN ABBREVIAT
    10AEB..10AF6; DISALLOWED # MANICHAEAN NUMBER ONE..MANICHAEAN PUNCTUATION
    10B80..10B91; PVALID     # PSALTER PAHLAVI LETTER ALEPH..PSALTER PAHLAVI
    10B99..10B9C; DISALLOWED # PSALTER PAHLAVI SECTION MARK..PSALTER PAHLAVI
```

```
10BA9..10BAF; DISALLOWED # PSALTER PAHLAVI NUMBER ONE..PSALTER PAHLAVI N
1107F       ; PVALID     # BRAHMI NUMBER JOINER
110D0..110E8; PVALID     # SORA SOMPENG LETTER SAH..SORA SOMPENG LETTER
110F0..110F9; PVALID     # SORA SOMPENG DIGIT ZERO..SORA SOMPENG DIGIT N
11100..11134; PVALID     # CHAKMA SIGN CANDRABINDU..CHAKMA MAAYYAA
11136..1113F; PVALID     # CHAKMA DIGIT ZERO..CHAKMA DIGIT NINE
11140..11143; DISALLOWED # CHAKMA SECTION MARK..CHAKMA QUESTION MARK
11150..11173; PVALID     # MAHAJANI LETTER A..MAHAJANI SIGN NUKTA
11174..11175; DISALLOWED # MAHAJANI ABBREVIATION SIGN..MAHAJANI SECTION
11176       ; PVALID     # MAHAJANI LIGATURE SHRI
11180..111C4; PVALID     # SHARADA SIGN CANDRABINDU..SHARADA OM
111C5..111C8; DISALLOWED # SHARADA DANDA..SHARADA SEPARATOR
111CD       ; DISALLOWED # SHARADA SUTRA MARK
111D0..111DA; PVALID     # SHARADA DIGIT ZERO..SHARADA EKAM
111E1..111F4; DISALLOWED # SINHALA ARCHAIC DIGIT ONE..SINHALA ARCHAIC NU
11200..11211; PVALID     # KHOJKI LETTER A..KHOJKI LETTER JJA
11213..11237; PVALID     # KHOJKI LETTER NYA..KHOJKI SIGN SHADDA
11238..1123D; DISALLOWED # KHOJKI DANDA..KHOJKI ABBREVIATION SIGN
112B0..112EA; PVALID     # KHUDAWADI LETTER A..KHUDAWADI SIGN VIRAMA
112F0..112F9; PVALID     # KHUDAWADI DIGIT ZERO..KHUDAWADI DIGIT NINE
11301..11303; PVALID     # GRANTHA SIGN CANDRABINDU..GRANTHA SIGN VISARG
11305..1130C; PVALID     # GRANTHA LETTER A..GRANTHA LETTER VOCALIC L
1130F..11310; PVALID     # GRANTHA LETTER EE..GRANTHA LETTER AI
11313..11328; PVALID     # GRANTHA LETTER OO..GRANTHA LETTER NA
1132A..11330; PVALID     # GRANTHA LETTER PA..GRANTHA LETTER RA
11332..11333; PVALID     # GRANTHA LETTER LA..GRANTHA LETTER LLA
11335..11339; PVALID     # GRANTHA LETTER VA..GRANTHA LETTER HA
1133C..11344; PVALID     # GRANTHA SIGN NUKTA..GRANTHA VOWEL SIGN VOCALI
11347..11348; PVALID     # GRANTHA VOWEL SIGN EE..GRANTHA VOWEL SIGN AI
1134B..1134D; PVALID     # GRANTHA VOWEL SIGN OO..GRANTHA SIGN VIRAMA
11357       ; PVALID     # GRANTHA AU LENGTH MARK
1135D..11363; PVALID     # GRANTHA SIGN PLUTA..GRANTHA VOWEL SIGN VOCALI
11366..1136C; PVALID     # COMBINING GRANTHA DIGIT ZERO..COMBINING GRANT
11370..11374; PVALID     # COMBINING GRANTHA LETTER A..COMBINING GRANTHA
11480..114C5; PVALID     # TIRHUTA ANJI..TIRHUTA GVANG
114C6       ; DISALLOWED # TIRHUTA ABBREVIATION SIGN
114C7       ; PVALID     # TIRHUTA OM
114D0..114D9; PVALID     # TIRHUTA DIGIT ZERO..TIRHUTA DIGIT NINE
11580..115B5; PVALID     # SIDDHAM LETTER A..SIDDHAM VOWEL SIGN VOCALIC
115B8..115C0; PVALID     # SIDDHAM VOWEL SIGN E..SIDDHAM SIGN NUKTA
115C1..115C9; DISALLOWED # SIDDHAM SIGN SIDDHAM..SIDDHAM END OF TEXT MAR
11600..11640; PVALID     # MODI LETTER A..MODI SIGN ARDHACANDRA
11641..11643; DISALLOWED # MODI DANDA..MODI ABBREVIATION SIGN
11644       ; PVALID     # MODI SIGN HUVA
11650..11659; PVALID     # MODI DIGIT ZERO..MODI DIGIT NINE
11680..116B7; PVALID     # TAKRI LETTER A..TAKRI SIGN NUKTA
116C0..116C9; PVALID     # TAKRI DIGIT ZERO..TAKRI DIGIT NINE
118A0..118BF; DISALLOWED # WARANG CITI CAPITAL LETTER NGAA..WARANG CITI
118C0..118E9; PVALID     # WARANG CITI SMALL LETTER NGAA..WARANG CITI DI
118EA..118F2; DISALLOWED # WARANG CITI NUMBER TEN..WARANG CITI NUMBER NI
118FF       ; PVALID     # WARANG CITI OM
11AC0..11AF8; PVALID     # PAU CIN HAU LETTER PA..PAU CIN HAU GLOTTAL ST
1236F..12398; PVALID     # CUNEIFORM SIGN KAP ELAMITE..CUNEIFORM SIGN UM
12463..1246E; DISALLOWED # CUNEIFORM NUMERIC SIGN ONE QUARTER GUR..CUNEI
12474       ; DISALLOWED # CUNEIFORM PUNCTUATION SIGN DIAGONAL QUADCOLON
16A40..16A5E; PVALID     # MRO LETTER TA..MRO LETTER TEK
16A60..16A69; PVALID     # MRO DIGIT ZERO..MRO DIGIT NINE
16A6E..16A6F; DISALLOWED # MRO DANDA..MRO DOUBLE DANDA
```

```
  16AD0..16AED; PVALID     # BASSA VAH LETTER ENNI..BASSA VAH LETTER I
  16AF0..16AF4; PVALID     # BASSA VAH COMBINING HIGH TONE..BASSA VAH COMB
  16AF5       ; DISALLOWED # BASSA VAH FULL STOP
  16B00..16B36; PVALID     # PAHAWH HMONG VOWEL KEEB..PAHAWH HMONG MARK CI
  16B37..16B3F; DISALLOWED # PAHAWH HMONG SIGN VOS THOM..PAHAWH HMONG SIGN
  16B40..16B43; PVALID     # PAHAWH HMONG SIGN VOS SEEV..PAHAWH HMONG SIGN
  16B44..16B45; DISALLOWED # PAHAWH HMONG SIGN XAUS..PAHAWH HMONG SIGN CIM
  16B50..16B59; PVALID     # PAHAWH HMONG DIGIT ZERO..PAHAWH HMONG DIGIT N
  16B5B..16B61; DISALLOWED # PAHAWH HMONG NUMBER TENS..PAHAWH HMONG NUMBER
  16B63..16B77; PVALID     # PAHAWH HMONG SIGN VOS LUB..PAHAWH HMONG SIGN
  16B7D..16B8F; PVALID     # PAHAWH HMONG CLAN SIGN TSHEEJ..PAHAWH HMONG C
  16F00..16F44; PVALID     # MIAO LETTER PA..MIAO LETTER HHA
  16F50..16F7E; PVALID     # MIAO LETTER NASALIZATION..MIAO VOWEL SIGN NG
  16F8F..16F9F; PVALID     # MIAO TONE RIGHT..MIAO LETTER REFORMED TONE-8
  1BC00..1BC6A; PVALID     # DUPLOYAN LETTER H..DUPLOYAN LETTER VOCALIC M
  1BC70..1BC7C; PVALID     # DUPLOYAN AFFIX LEFT HORIZONTAL SECANT..DUPLOY
  1BC80..1BC88; PVALID     # DUPLOYAN AFFIX HIGH ACUTE..DUPLOYAN AFFIX HIG
  1BC90..1BC99; PVALID     # DUPLOYAN AFFIX LOW ACUTE..DUPLOYAN AFFIX LOW
  1BC9C       ; DISALLOWED # DUPLOYAN SIGN O WITH CROSS
  1BC9D..1BC9E; PVALID     # DUPLOYAN THICK LETTER SELECTOR..DUPLOYAN DOUB
  1BC9F..1BCA3; DISALLOWED # DUPLOYAN PUNCTUATION CHINOOK FULL STOP..SHORT
  1E800..1E8C4; PVALID     # MENDE KIKAKUI SYLLABLE M001 KI..MENDE KIKAKUI
  1E8C7..1E8CF; DISALLOWED # MENDE KIKAKUI DIGIT ONE..MENDE KIKAKUI DIGIT
  1E8D0..1E8D6; PVALID     # MENDE KIKAKUI COMBINING NUMBER TEENS..MENDE K
  1EE00..1EE03; DISALLOWED # ARABIC MATHEMATICAL ALEF..ARABIC MATHEMATICAL
  1EE05..1EE1F; DISALLOWED # ARABIC MATHEMATICAL WAW..ARABIC MATHEMATICAL
  1EE21..1EE22; DISALLOWED # ARABIC MATHEMATICAL INITIAL BEH..ARABIC MATHE
  1EE24       ; DISALLOWED # ARABIC MATHEMATICAL INITIAL HEH
  1EE27       ; DISALLOWED # ARABIC MATHEMATICAL INITIAL HAH
  1EE29..1EE32; DISALLOWED # ARABIC MATHEMATICAL INITIAL YEH..ARABIC MATHE
  1EE34..1EE37; DISALLOWED # ARABIC MATHEMATICAL INITIAL SHEEN..ARABIC MAT
  1EE39       ; DISALLOWED # ARABIC MATHEMATICAL INITIAL DAD
  1EE3B       ; DISALLOWED # ARABIC MATHEMATICAL INITIAL GHAIN
  1EE42       ; DISALLOWED # ARABIC MATHEMATICAL TAILED JEEM
  1EE47       ; DISALLOWED # ARABIC MATHEMATICAL TAILED HAH
  1EE49       ; DISALLOWED # ARABIC MATHEMATICAL TAILED YEH
  1EE4B       ; DISALLOWED # ARABIC MATHEMATICAL TAILED LAM
  1EE4D..1EE4F; DISALLOWED # ARABIC MATHEMATICAL TAILED NOON..ARABIC MATHE
  1EE51..1EE52; DISALLOWED # ARABIC MATHEMATICAL TAILED SAD..ARABIC MATHEM
  1EE54       ; DISALLOWED # ARABIC MATHEMATICAL TAILED SHEEN
  1EE57       ; DISALLOWED # ARABIC MATHEMATICAL TAILED KHAH
  1EE59       ; DISALLOWED # ARABIC MATHEMATICAL TAILED DAD
  1EE5B       ; DISALLOWED # ARABIC MATHEMATICAL TAILED GHAIN
  1EE5D       ; DISALLOWED # ARABIC MATHEMATICAL TAILED DOTLESS NOON
  1EE5F       ; DISALLOWED # ARABIC MATHEMATICAL TAILED DOTLESS QAF
  1EE61..1EE62; DISALLOWED # ARABIC MATHEMATICAL STRETCHED BEH..ARABIC MAT
  1EE64       ; DISALLOWED # ARABIC MATHEMATICAL STRETCHED HEH
  1EE67..1EE6A; DISALLOWED # ARABIC MATHEMATICAL STRETCHED HAH..ARABIC MAT
  1EE6C..1EE72; DISALLOWED # ARABIC MATHEMATICAL STRETCHED MEEM..ARABIC MA
  1EE74..1EE77; DISALLOWED # ARABIC MATHEMATICAL STRETCHED SHEEN..ARABIC M
  1EE79..1EE7C; DISALLOWED # ARABIC MATHEMATICAL STRETCHED DAD..ARABIC MAT
  1EE7E       ; DISALLOWED # ARABIC MATHEMATICAL STRETCHED DOTLESS FEH
  1EE80..1EE89; DISALLOWED # ARABIC MATHEMATICAL LOOPED ALEF..ARABIC MATHE
  1EE8B..1EE9B; DISALLOWED # ARABIC MATHEMATICAL LOOPED LAM..ARABIC MATHEM
  1EEA1..1EEA3; DISALLOWED # ARABIC MATHEMATICAL DOUBLE-STRUCK BEH..ARABIC
  1EEA5..1EEA9; DISALLOWED # ARABIC MATHEMATICAL DOUBLE-STRUCK WAW..ARABIC
  1EEAB..1EEBB; DISALLOWED # ARABIC MATHEMATICAL DOUBLE-STRUCK LAM..ARABIC
  1EEF0..1EEF1; DISALLOWED # ARABIC MATHEMATICAL OPERATOR MEEM WITH HAH WI
```

```
    1F0BF      ; DISALLOWED # PLAYING CARD RED JOKER
    1F0E0..1F0F5; DISALLOWED # PLAYING CARD FOOL..PLAYING CARD TRUMP-21
    1F10B..1F10C; DISALLOWED # DINGBAT CIRCLED SANS-SERIF DIGIT ZERO..DINGBA
    1F16A..1F16B; DISALLOWED # RAISED MC SIGN..RAISED MD SIGN
    1F321..1F32C; DISALLOWED # THERMOMETER..WIND BLOWING FACE
    1F336      ; DISALLOWED # HOT PEPPER
    1F37D      ; DISALLOWED # FORK AND KNIFE WITH PLATE
    1F394..1F39F; DISALLOWED # HEART WITH TIP ON THE LEFT..ADMISSION TICKETS
    1F3C5      ; DISALLOWED # SPORTS MEDAL
    1F3CB..1F3CE; DISALLOWED # WEIGHT LIFTER..RACING CAR
    1F3D4..1F3DF; DISALLOWED # SNOW CAPPED MOUNTAIN..STADIUM
    1F3F1..1F3F7; DISALLOWED # WHITE PENNANT..LABEL
    1F43F      ; DISALLOWED # CHIPMUNK
    1F441      ; DISALLOWED # EYE
    1F4F8      ; DISALLOWED # CAMERA WITH FLASH
    1F4FD..1F4FE; DISALLOWED # FILM PROJECTOR..PORTABLE STEREO
    1F53E..1F54A; DISALLOWED # LOWER RIGHT SHADOWED WHITE CIRCLE..DOVE OF PE
    1F568..1F579; DISALLOWED # RIGHT SPEAKER..JOYSTICK
    1F57B..1F5A3; DISALLOWED # LEFT HAND TELEPHONE RECEIVER..BLACK DOWN POIN
    1F5A5..1F5FA; DISALLOWED # DESKTOP COMPUTER..WORLD MAP
    1F600      ; DISALLOWED # GRINNING FACE
    1F611      ; DISALLOWED # EXPRESSIONLESS FACE
    1F615      ; DISALLOWED # CONFUSED FACE
    1F617      ; DISALLOWED # KISSING FACE
    1F619      ; DISALLOWED # KISSING FACE WITH SMILING EYES
    1F61B      ; DISALLOWED # FACE WITH STUCK-OUT TONGUE
    1F61F      ; DISALLOWED # WORRIED FACE
    1F626..1F627; DISALLOWED # FROWNING FACE WITH OPEN MOUTH..ANGUISHED FACE
    1F62C      ; DISALLOWED # GRIMACING FACE
    1F62E..1F62F; DISALLOWED # FACE WITH OPEN MOUTH..HUSHED FACE
    1F634      ; DISALLOWED # SLEEPING FACE
    1F641..1F642; DISALLOWED # SLIGHTLY FROWNING FACE..SLIGHTLY SMILING FACE
    1F650..1F67F; DISALLOWED # NORTH WEST POINTING LEAF..REVERSE CHECKER BOA
    1F6C6..1F6CF; DISALLOWED # TRIANGLE WITH ROUNDED CORNERS..BED
    1F6E0..1F6EC; DISALLOWED # HAMMER AND WRENCH..AIRPLANE ARRIVING
    1F6F0..1F6F3; DISALLOWED # SATELLITE..PASSENGER SHIP
    1F780..1F7D4; DISALLOWED # BLACK LEFT-POINTING ISOSCELES RIGHT TRIANGLE.
    1F800..1F80B; DISALLOWED # LEFTWARDS ARROW WITH SMALL TRIANGLE ARROWHEAD
    1F810..1F847; DISALLOWED # LEFTWARDS ARROW WITH SMALL EQUILATERAL ARROWH
    1F850..1F859; DISALLOWED # LEFTWARDS SANS-SERIF ARROW..UP DOWN SANS-SERI
    1F860..1F887; DISALLOWED # WIDE-HEADED LEFTWARDS LIGHT BARB ARROW..WIDE-
    1F890..1F8AD; DISALLOWED # LEFTWARDS TRIANGLE ARROWHEAD..WHITE ARROW SHA
```

Appendix B.   Changes from Unicode 7.0.0 to Unicode 8.0.0

Changes from derived property value UNASSIGNED to either PVALID or DISALLOWED.

```
08B3..08B4  ; PVALID     # ARABIC LETTER AIN WITH THREE DOTS BELOW..ARAB
08E3        ; PVALID     # ARABIC TURNED DAMMA BELOW
0AF9        ; PVALID     # GUJARATI LETTER ZHA
0C5A        ; PVALID     # TELUGU LETTER RRRA
0D5F        ; PVALID     # MALAYALAM LETTER ARCHAIC II
13F5        ; PVALID     # CHEROKEE LETTER MV
13F8..13FD  ; DISALLOWED # CHEROKEE SMALL LETTER YE..CHEROKEE SMALL LETT
20BE        ; DISALLOWED # LARI SIGN
218A..218B  ; DISALLOWED # TURNED DIGIT TWO..TURNED DIGIT THREE
2BEC..2BEF  ; DISALLOWED # LEFTWARDS TWO-HEADED ARROW WITH TRIANGLE ARRO
9FCD..9FD5  ; PVALID     # <CJK Ideograph>..<CJK Ideograph>
A69E        ; PVALID     # COMBINING CYRILLIC LETTER EF
A78F        ; PVALID     # LATIN LETTER SINOLOGICAL DOT
A7B2..A7B4  ; DISALLOWED # LATIN CAPITAL LETTER J WITH CROSSED-TAIL..LAT
A7B5        ; PVALID     # LATIN SMALL LETTER BETA
A7B6        ; DISALLOWED # LATIN CAPITAL LETTER OMEGA
A7B7        ; PVALID     # LATIN SMALL LETTER OMEGA
A8FC        ; DISALLOWED # DEVANAGARI SIGN SIDDHAM
A8FD        ; PVALID     # DEVANAGARI JAIN OM
AB60..AB63  ; PVALID     # LATIN SMALL LETTER SAKHA YAT..LATIN SMALL LET
AB70..ABBF  ; DISALLOWED # CHEROKEE SMALL LETTER A..CHEROKEE SMALL LETTE
FE2E..FE2F  ; PVALID     # COMBINING CYRILLIC TITLO LEFT HALF..COMBINING
108E0..108F2; PVALID     # HATRAN LETTER ALEPH..HATRAN LETTER QOPH
108F4..108F5; PVALID     # HATRAN LETTER SHIN..HATRAN LETTER TAW
108FB..108FF; DISALLOWED # HATRAN NUMBER ONE..HATRAN NUMBER ONE HUNDRED
109BC..109BD; DISALLOWED # MEROITIC CURSIVE FRACTION ELEVEN TWELFTHS..ME
109C0..109CF; DISALLOWED # MEROITIC CURSIVE NUMBER ONE..MEROITIC CURSIVE
109D2..109FF; DISALLOWED # MEROITIC CURSIVE NUMBER ONE HUNDRED..MEROITIC
10C80..10CB2; DISALLOWED # OLD HUNGARIAN CAPITAL LETTER A..OLD HUNGARIAN
10CC0..10CF2; PVALID     # OLD HUNGARIAN SMALL LETTER A..OLD HUNGARIAN S
10CFA..10CFF; DISALLOWED # OLD HUNGARIAN NUMBER ONE..OLD HUNGARIAN NUMBE
111C9       ; DISALLOWED # SHARADA SANDHI MARK
111CA..111CC; PVALID     # SHARADA SIGN NUKTA..SHARADA EXTRA SHORT VOWEL
111DB       ; DISALLOWED # SHARADA SIGN SIDDHAM
111DC       ; PVALID     # SHARADA HEADSTROKE
111DD..111DF; DISALLOWED # SHARADA CONTINUATION SIGN..SHARADA SECTION MA
11280..11286; PVALID     # MULTANI LETTER A..MULTANI LETTER GA
11288       ; PVALID     # MULTANI LETTER GHA
1128A..1128D; PVALID     # MULTANI LETTER CA..MULTANI LETTER JJA
1128F..1129D; PVALID     # MULTANI LETTER NYA..MULTANI LETTER BA
1129F..112A8; PVALID     # MULTANI LETTER BHA..MULTANI LETTER RHA
112A9       ; DISALLOWED # MULTANI SECTION MARK
11300       ; PVALID     # GRANTHA SIGN COMBINING ANUSVARA ABOVE
11350       ; PVALID     # GRANTHA OM
115CA..115D7; DISALLOWED # SIDDHAM SECTION MARK WITH TRIDENT AND U-SHAPE
115D8..115DD; PVALID     # SIDDHAM LETTER THREE-CIRCLE ALTERNATE I..SIDD
11700..11719; PVALID     # AHOM LETTER KA..AHOM LETTER JHA
1171D..1172B; PVALID     # AHOM CONSONANT SIGN MEDIAL LA..AHOM SIGN KILL
11730..11739; PVALID     # AHOM DIGIT ZERO..AHOM DIGIT NINE
1173A..1173F; DISALLOWED # AHOM NUMBER TEN..AHOM SYMBOL VI
12399       ; PVALID     # CUNEIFORM SIGN U U
12480..12543; PVALID     # CUNEIFORM SIGN AB TIMES NUN TENU..CUNEIFORM S
14400..14646; PVALID     # ANATOLIAN HIEROGLYPH A001..ANATOLIAN HIEROGLY
1D1DE..1D1E8; DISALLOWED # MUSICAL SYMBOL KIEVAN C CLEF..MUSICAL SYMBOL
1D800..1D9FF; DISALLOWED # SIGNWRITING HAND-FIST INDEX..SIGNWRITING HEAD
1DA00..1DA36; PVALID     # SIGNWRITING HEAD RIM..SIGNWRITING AIR SUCKING
1DA37..1DA3A; DISALLOWED # SIGNWRITING AIR BLOW SMALL ROTATIONS..SIGNWRI
```

```
1DA3B..1DA6C; PVALID     # SIGNWRITING MOUTH CLOSED NEUTRAL..SIGNWRITING
1DA6D..1DA74; DISALLOWED # SIGNWRITING SHOULDER HIP SPINE..SIGNWRITING T
1DA75       ; PVALID     # SIGNWRITING UPPER BODY TILTING FROM HIP JOINT
1DA76..1DA83; DISALLOWED # SIGNWRITING LIMB COMBINATION..SIGNWRITING LOC
1DA84       ; PVALID     # SIGNWRITING LOCATION HEAD NECK
1DA85..1DA8B; DISALLOWED # SIGNWRITING LOCATION TORSO..SIGNWRITING PAREN
1DA9B..1DA9F; PVALID     # SIGNWRITING FILL MODIFIER-2..SIGNWRITING FILL
1DAA1..1DAAF; PVALID     # SIGNWRITING ROTATION MODIFIER-2..SIGNWRITING
1F32D..1F32F; DISALLOWED # HOT DOG..BURRITO
1F37E..1F37F; DISALLOWED # BOTTLE WITH POPPING CORK..POPCORN
1F3CF..1F3D3; DISALLOWED # CRICKET BAT AND BALL..TABLE TENNIS PADDLE AND
1F3F8..1F3FF; DISALLOWED # BADMINTON RACQUET AND SHUTTLECOCK..EMOJI MODI
1F4FF       ; DISALLOWED # PRAYER BEADS
1F54B..1F54F; DISALLOWED # KAABA..BOWL OF HYGIEIA
1F643..1F644; DISALLOWED # UPSIDE-DOWN FACE..FACE WITH ROLLING EYES
1F6D0       ; DISALLOWED # PLACE OF WORSHIP
1F910..1F918; DISALLOWED # ZIPPER-MOUTH FACE..SIGN OF THE HORNS
1F980..1F984; DISALLOWED # CRAB..UNICORN FACE
1F9C0       ; DISALLOWED # CHEESE WEDGE
2B820..2CEA1; PVALID     # <CJK Ideograph Extension E>..<CJK Ideograph E
```

Appendix C. Changes from Unicode 8.0.0 to Unicode 9.0.0

Changes from derived property value UNASSIGNED to either PVALID or DISALLOWED.

```
  08B6..08BD  ; PVALID     # ARABIC LETTER BEH WITH SMALL MEEM ABOVE..ARAB
  08D4..08E1  ; PVALID     # ARABIC SMALL HIGH WORD AR-RUB..ARABIC SMALL H
  08E2        ; DISALLOWED # ARABIC DISPUTED END OF AYAH
  0C80        ; PVALID     # KANNADA SIGN SPACING CANDRABINDU
  0D4F        ; DISALLOWED # MALAYALAM SIGN PARA
  0D54..0D56  ; PVALID     # MALAYALAM LETTER CHILLU M..MALAYALAM LETTER C
  0D58..0D5E  ; DISALLOWED # MALAYALAM FRACTION ONE ONE-HUNDRED-AND-SIXTIE
  0D76..0D78  ; DISALLOWED # MALAYALAM FRACTION ONE SIXTEENTH..MALAYALAM F
  1C80..1C88  ; DISALLOWED # CYRILLIC SMALL LETTER ROUNDED VE..CYRILLIC SM
  1DFB        ; PVALID     # COMBINING DELETION MARK
  23FB..23FE  ; DISALLOWED # POWER SYMBOL..POWER SLEEP SYMBOL
  2E43..2E44  ; DISALLOWED # DASH WITH LEFT UPTURN..DOUBLE SUSPENSION MARK
  A7AE        ; DISALLOWED # LATIN CAPITAL LETTER SMALL CAPITAL I
  A8C5        ; PVALID     # SAURASHTRA SIGN CANDRABINDU
  1018D..1018E; DISALLOWED # GREEK INDICTION SIGN..NOMISMA SIGN
  104B0..104D3; DISALLOWED # OSAGE CAPITAL LETTER A..OSAGE CAPITAL LETTER
  104D8..104FB; PVALID     # OSAGE SMALL LETTER A..OSAGE SMALL LETTER ZHA
  1123E       ; PVALID     # KHOJKI SIGN SUKUN
  11400..1144A; PVALID     # NEWA LETTER A..NEWA SIDDHI
  1144B..1144F; DISALLOWED # NEWA DANDA..NEWA ABBREVIATION SIGN
  11450..11459; PVALID     # NEWA DIGIT ZERO..NEWA DIGIT NINE
  1145B       ; DISALLOWED # NEWA PLACEHOLDER MARK
  1145D       ; DISALLOWED # NEWA INSERTION SIGN
  11660..1166C; DISALLOWED # MONGOLIAN BIRGA WITH ORNAMENT..MONGOLIAN TURN
  11C00..11C08; PVALID     # BHAIKSUKI LETTER A..BHAIKSUKI LETTER VOCALIC
  11C0A..11C36; PVALID     # BHAIKSUKI LETTER E..BHAIKSUKI VOWEL SIGN VOCA
  11C38..11C40; PVALID     # BHAIKSUKI VOWEL SIGN E..BHAIKSUKI SIGN AVAGRA
  11C41..11C45; DISALLOWED # BHAIKSUKI DANDA..BHAIKSUKI GAP FILLER-2
  11C50..11C59; PVALID     # BHAIKSUKI DIGIT ZERO..BHAIKSUKI DIGIT NINE
  11C5A..11C6C; DISALLOWED # BHAIKSUKI NUMBER ONE..BHAIKSUKI HUNDREDS UNIT
  11C70..11C71; DISALLOWED # MARCHEN HEAD MARK..MARCHEN MARK SHAD
  11C72..11C8F; PVALID     # MARCHEN LETTER KA..MARCHEN LETTER A
  11C92..11CA7; PVALID     # MARCHEN SUBJOINED LETTER KA..MARCHEN SUBJOINE
  11CA9..11CB6; PVALID     # MARCHEN SUBJOINED LETTER YA..MARCHEN SIGN CAN
  16FE0       ; PVALID     # TANGUT ITERATION MARK
  17000..187EC; PVALID     # <Tangut Ideograph>..<Tangut Ideograph>
  18800..18AF2; PVALID     # TANGUT COMPONENT-001..TANGUT COMPONENT-755
  1E000..1E006; PVALID     # COMBINING GLAGOLITIC LETTER AZU..COMBINING GL
  1E008..1E018; PVALID     # COMBINING GLAGOLITIC LETTER ZEMLJA..COMBINING
  1E01B..1E021; PVALID     # COMBINING GLAGOLITIC LETTER SHTA..COMBINING G
  1E023..1E024; PVALID     # COMBINING GLAGOLITIC LETTER YU..COMBINING GLA
  1E026..1E02A; PVALID     # COMBINING GLAGOLITIC LETTER YO..COMBINING GLA
  1E900..1E921; DISALLOWED # ADLAM CAPITAL LETTER ALIF..ADLAM CAPITAL LETT
  1E922..1E94A; PVALID     # ADLAM SMALL LETTER ALIF..ADLAM NUKTA
  1E950..1E959; PVALID     # ADLAM DIGIT ZERO..ADLAM DIGIT NINE
  1E95E..1E95F; DISALLOWED # ADLAM INITIAL EXCLAMATION MARK..ADLAM INITIAL
  1F19B..1F1AC; DISALLOWED # SQUARED THREE D..SQUARED VOD
  1F23B       ; DISALLOWED # SQUARED CJK UNIFIED IDEOGRAPH-914D
  1F57A       ; DISALLOWED # MAN DANCING
  1F5A4       ; DISALLOWED # BLACK HEART
  1F6D1..1F6D2; DISALLOWED # OCTAGONAL SIGN..SHOPPING TROLLEY
  1F6F4..1F6F6; DISALLOWED # SCOOTER..CANOE
  1F919..1F91E; DISALLOWED # CALL ME HAND..HAND WITH INDEX AND MIDDLE FING
  1F920..1F927; DISALLOWED # FACE WITH COWBOY HAT..SNEEZING FACE
  1F930       ; DISALLOWED # PREGNANT WOMAN
  1F933..1F93E; DISALLOWED # SELFIE..HANDBALL
  1F940..1F94B; DISALLOWED # WILTED FLOWER..MARTIAL ARTS UNIFORM
```

```
1F950..1F95E; DISALLOWED # CROISSANT..PANCAKES
1F985..1F991; DISALLOWED # EAGLE..SQUID
```

Appendix D.   Changes from Unicode 9.0.0 to Unicode 10.0.0

Changes from derived property value UNASSIGNED to either PVALID or DISALLOWED.

```
0860..086A  ; PVALID     # SYRIAC LETTER MALAYALAM NGA..SYRIAC LETTER MA
09FC        ; PVALID     # BENGALI LETTER VEDIC ANUSVARA
09FD        ; DISALLOWED # BENGALI ABBREVIATION SIGN
0AFA..0AFF  ; PVALID     # GUJARATI SIGN SUKUN..GUJARATI SIGN TWO-CIRCLE
0D00        ; PVALID     # MALAYALAM SIGN COMBINING ANUSVARA ABOVE
0D3B..0D3C  ; PVALID     # MALAYALAM SIGN VERTICAL BAR VIRAMA..MALAYALAM
1CF7        ; PVALID     # VEDIC SIGN ATIKRAMA
1DF6..1DF9  ; PVALID     # COMBINING KAVYKA ABOVE RIGHT..COMBINING WIDE
20BF        ; DISALLOWED # BITCOIN SIGN
23FF        ; DISALLOWED # OBSERVER EYE SYMBOL
2BD2        ; DISALLOWED # GROUP MARK
2E45..2E49  ; DISALLOWED # INVERTED LOW KAVYKA..DOUBLE STACKED COMMA
312E        ; PVALID     # BOPOMOFO LETTER O WITH DOT ABOVE
9FD6..9FEA  ; PVALID     # <CJK Ideograph>..<CJK Ideograph>
1032D..1032F; PVALID     # OLD ITALIC LETTER YE..OLD ITALIC LETTER SOUTH
11A00..11A3E; PVALID     # ZANABAZAR SQUARE LETTER A..ZANABAZAR SQUARE C
11A3F..11A46; DISALLOWED # ZANABAZAR SQUARE INITIAL HEAD MARK..ZANABAZAR
11A47       ; PVALID     # ZANABAZAR SQUARE SUBJOINER
11A50..11A83; PVALID     # SOYOMBO LETTER A..SOYOMBO LETTER KSSA
11A86..11A99; PVALID     # SOYOMBO CLUSTER-INITIAL LETTER RA..SOYOMBO SU
11A9A..11A9C; DISALLOWED # SOYOMBO MARK TSHEG..SOYOMBO MARK DOUBLE SHAD
11A9E..11AA2; DISALLOWED # SOYOMBO HEAD MARK WITH MOON AND SUN AND TRIPL
11D00..11D06; PVALID     # MASARAM GONDI LETTER A..MASARAM GONDI LETTER
11D08..11D09; PVALID     # MASARAM GONDI LETTER AI..MASARAM GONDI LETTER
11D0B..11D36; PVALID     # MASARAM GONDI LETTER AU..MASARAM GONDI VOWEL
11D3A       ; PVALID     # MASARAM GONDI VOWEL SIGN E
11D3C..11D3D; PVALID     # MASARAM GONDI VOWEL SIGN AI..MASARAM GONDI VO
11D3F..11D47; PVALID     # MASARAM GONDI VOWEL SIGN AU..MASARAM GONDI RA
11D50..11D59; PVALID     # MASARAM GONDI DIGIT ZERO..MASARAM GONDI DIGIT
16FE1       ; PVALID     # NUSHU ITERATION MARK
1B002..1B11E; PVALID     # HENTAIGANA LETTER A-1..HENTAIGANA LETTER N-MU
1B170..1B2FB; PVALID     # NUSHU CHARACTER-1B170..NUSHU CHARACTER-1B2FB
1F260..1F265; DISALLOWED # ROUNDED SYMBOL FOR FU..ROUNDED SYMBOL FOR CAI
1F6D3..1F6D4; DISALLOWED # STUPA..PAGODA
1F6F7..1F6F8; DISALLOWED # SLED..FLYING SAUCER
1F900..1F90B; DISALLOWED # CIRCLED CROSS FORMEE WITH FOUR DOTS..DOWNWARD
1F91F       ; DISALLOWED # I LOVE YOU HAND SIGN
1F928..1F92F; DISALLOWED # FACE WITH ONE EYEBROW RAISED..SHOCKED FACE WI
1F931..1F932; DISALLOWED # BREAST-FEEDING..PALMS UP TOGETHER
1F94C       ; DISALLOWED # CURLING STONE
1F95F..1F96B; DISALLOWED # DUMPLING..CANNED FOOD
1F992..1F997; DISALLOWED # GIRAFFE FACE..CRICKET
1F9D0..1F9E6; DISALLOWED # FACE WITH MONOCLE..SOCKS
2CEB0..2EBE0; PVALID     # <CJK Ideograph Extension F>..<CJK Ideograph E
```

Appendix E.   Changes from Unicode 10.0.0 to Unicode 11.0.0

Changes from derived property value DISALLOWED to PVALID.

```
111C9        ; PVALID      # SHARADA SANDHI MARK
```

Changes from derived property value UNASSIGNED to either PVALID or DISALLOWED.

```
   0560        ; PVALID      # ARMENIAN SMALL LETTER TURNED AYB
   0588        ; PVALID      # ARMENIAN SMALL LETTER YI WITH STROKE
   05EF        ; PVALID      # HEBREW YOD TRIANGLE
   07FD        ; PVALID      # NKO DANTAYALAN
   07FE..07FF  ; DISALLOWED  # NKO DOROME SIGN..NKO TAMAN SIGN
   08D3        ; PVALID      # ARABIC SMALL LOW WAW
   09FE        ; PVALID      # BENGALI SANDHI MARK
   0A76        ; DISALLOWED  # GURMUKHI ABBREVIATION SIGN
   0C04        ; PVALID      # TELUGU SIGN COMBINING ANUSVARA ABOVE
   0C84        ; DISALLOWED  # KANNADA SIGN SIDDHAM
   1878        ; PVALID      # MONGOLIAN LETTER CHA WITH TWO DOTS
   1C90..1CBA  ; DISALLOWED  # GEORGIAN MTAVRULI CAPITAL LETTER AN..GEORGIAN
   1CBD..1CBF  ; DISALLOWED  # GEORGIAN MTAVRULI CAPITAL LETTER AEN..GEORGIA
   2BBA..2BBC  ; DISALLOWED  # OVERLAPPING WHITE SQUARES..OVERLAPPING BLACK
   2BD3..2BEB  ; DISALLOWED  # PLUTO FORM TWO..STAR WITH RIGHT HALF BLACK
   2BF0..2BFE  ; DISALLOWED  # ERIS FORM ONE..REVERSED RIGHT ANGLE
   2E4A..2E4E  ; DISALLOWED  # DOTTED SOLIDUS..PUNCTUS ELEVATUS MARK
   312F        ; PVALID      # BOPOMOFO LETTER NN
   9FEB..9FEF  ; PVALID      # <CJK Ideograph>..<CJK Ideograph>
   A7AF        ; PVALID      # LATIN LETTER SMALL CAPITAL Q
   A7B8        ; DISALLOWED  # LATIN CAPITAL LETTER U WITH STROKE
   A7B9        ; PVALID      # LATIN SMALL LETTER U WITH STROKE
   A8FE..A8FF  ; PVALID      # DEVANAGARI LETTER AY..DEVANAGARI VOWEL SIGN A
   10A34..10A35; PVALID      # KHAROSHTHI LETTER TTTA..KHAROSHTHI LETTER VHA
   10A48       ; DISALLOWED  # KHAROSHTHI FRACTION ONE HALF
   10D00..10D27; PVALID      # HANIFI ROHINGYA LETTER A..HANIFI ROHINGYA SIG
   10D30..10D39; PVALID      # HANIFI ROHINGYA DIGIT ZERO..HANIFI ROHINGYA D
   10F00..10F1C; PVALID      # OLD SOGDIAN LETTER ALEPH..OLD SOGDIAN LETTER
   10F1D..10F26; DISALLOWED  # OLD SOGDIAN NUMBER ONE..OLD SOGDIAN FRACTION
   10F27       ; PVALID      # OLD SOGDIAN LIGATURE AYIN-DALETH
   10F30..10F50; PVALID      # SOGDIAN LETTER ALEPH..SOGDIAN COMBINING STROK
   10F51..10F59; DISALLOWED  # SOGDIAN NUMBER ONE..SOGDIAN PUNCTUATION HALF
   110CD       ; DISALLOWED  # KAITHI NUMBER SIGN ABOVE
   11144..11146; PVALID      # CHAKMA LETTER LHAA..CHAKMA VOWEL SIGN EI
   1133B       ; PVALID      # COMBINING BINDU BELOW
   1145E       ; PVALID      # NEWA SANDHI MARK
   1171A       ; PVALID      # AHOM LETTER ALTERNATE BA
   11800..1183A; PVALID      # DOGRA LETTER A..DOGRA SIGN NUKTA
   1183B       ; DISALLOWED  # DOGRA ABBREVIATION SIGN
   11A9D       ; PVALID      # SOYOMBO MARK PLUTA
   11D60..11D65; PVALID      # GUNJALA GONDI LETTER A..GUNJALA GONDI LETTER
   11D67..11D68; PVALID      # GUNJALA GONDI LETTER EE..GUNJALA GONDI LETTER
   11D6A..11D8E; PVALID      # GUNJALA GONDI LETTER OO..GUNJALA GONDI VOWEL
   11D90..11D91; PVALID      # GUNJALA GONDI VOWEL SIGN EE..GUNJALA GONDI VO
   11D93..11D98; PVALID      # GUNJALA GONDI VOWEL SIGN OO..GUNJALA GONDI OM
   11DA0..11DA9; PVALID      # GUNJALA GONDI DIGIT ZERO..GUNJALA GONDI DIGIT
   11EE0..11EF6; PVALID      # MAKASAR LETTER KA..MAKASAR VOWEL SIGN O
   11EF7..11EF8; DISALLOWED  # MAKASAR PASSIMBANG..MAKASAR END OF SECTION
   16E40..16E5F; DISALLOWED  # MEDEFAIDRIN CAPITAL LETTER M..MEDEFAIDRIN CAP
   16E60..16E7F; PVALID      # MEDEFAIDRIN SMALL LETTER M..MEDEFAIDRIN SMALL
   16E80..16E9A; DISALLOWED  # MEDEFAIDRIN DIGIT ZERO..MEDEFAIDRIN EXCLAMATI
   187ED..187F1; PVALID      # <Tangut Ideograph>..<Tangut Ideograph>
   1D2E0..1D2F3; DISALLOWED  # MAYAN NUMERAL ZERO..MAYAN NUMERAL NINETEEN
   1D372..1D378; DISALLOWED  # IDEOGRAPHIC TALLY MARK ONE..TALLY MARK FIVE
   1EC71..1ECB4; DISALLOWED  # INDIC SIYAQ NUMBER ONE..INDIC SIYAQ ALTERNATE
   1F12F       ; DISALLOWED  # COPYLEFT SYMBOL
   1F6F9       ; DISALLOWED  # SKATEBOARD
```

```
1F7D5..1F7D8; DISALLOWED # CIRCLED TRIANGLE..NEGATIVE CIRCLED SQUARE
1F94D..1F94F; DISALLOWED # LACROSSE STICK AND BALL..FLYING DISC
1F96C..1F970; DISALLOWED # LEAFY GREEN..SMILING FACE WITH SMILING EYES A
1F973..1F976; DISALLOWED # FACE WITH PARTY HORN AND PARTY HAT..FREEZING
1F97A       ; DISALLOWED # FACE WITH PLEADING EYES
1F97C..1F97F; DISALLOWED # LAB COAT..FLAT SHOE
1F998..1F9A2; DISALLOWED # KANGAROO..SWAN
1F9B0..1F9B9; DISALLOWED # EMOJI COMPONENT RED HAIR..SUPERVILLAIN
1F9C1..1F9C2; DISALLOWED # CUPCAKE..SALT SHAKER
1F9E7..1F9FF; DISALLOWED # RED GIFT ENVELOPE..NAZAR AMULET
1FA60..1FA6D; DISALLOWED # XIANGQI RED GENERAL..XIANGQI BLACK SOLDIER
```

Appendix F.   Changes from Unicode 11.0.0 to Unicode 12.0.0

Changes from derived property value UNASSIGNED to either PVALID or DISALLOWED.

```
0C77         ; DISALLOWED # TELUGU SIGN SIDDHAM
0E86         ; PVALID     # LAO LETTER PALI GHA
0E89         ; PVALID     # LAO LETTER PALI CHA
0E8C         ; PVALID     # LAO LETTER PALI JHA
0E8E..0E93   ; PVALID     # LAO LETTER PALI NYA..LAO LETTER PALI NNA
0E98         ; PVALID     # LAO LETTER PALI DHA
0EA0         ; PVALID     # LAO LETTER PALI BHA
0EA8..0EA9   ; PVALID     # LAO LETTER SANSKRIT SHA..LAO LETTER SANSKRIT
0EAC         ; PVALID     # LAO LETTER PALI LLA
0EBA         ; PVALID     # LAO SIGN PALI VIRAMA
1CFA         ; PVALID     # VEDIC SIGN DOUBLE ANUSVARA ANTARGOMUKHA
2BC9         ; DISALLOWED # NEPTUNE FORM TWO
2BFF         ; DISALLOWED # HELLSCHREIBER PAUSE SYMBOL
2E4F         ; DISALLOWED # CORNISH VERSE DIVIDER
A7BA         ; DISALLOWED # LATIN CAPITAL LETTER GLOTTAL A
A7BB         ; PVALID     # LATIN SMALL LETTER GLOTTAL A
A7BC         ; DISALLOWED # LATIN CAPITAL LETTER GLOTTAL I
A7BD         ; PVALID     # LATIN SMALL LETTER GLOTTAL I
A7BE         ; DISALLOWED # LATIN CAPITAL LETTER GLOTTAL U
A7BF         ; PVALID     # LATIN SMALL LETTER GLOTTAL U
A7C2         ; DISALLOWED # LATIN CAPITAL LETTER ANGLICANA W
A7C3         ; PVALID     # LATIN SMALL LETTER ANGLICANA W
A7C4..A7C6   ; DISALLOWED # LATIN CAPITAL LETTER C WITH PALATAL HOOK..LAT
AB66..AB67   ; PVALID     # LATIN SMALL LETTER DZ DIGRAPH WITH RETROFLEX
10FE0..10FF6; PVALID      # ELYMAIC LETTER ALEPH..ELYMAIC LIGATURE ZAYIN-
1145F        ; PVALID     # NEWA LETTER VEDIC ANUSVARA
116B8        ; PVALID     # TAKRI LETTER ARCHAIC KHA
119A0..119A7; PVALID      # NANDINAGARI LETTER A..NANDINAGARI LETTER VOCA
119AA..119D7; PVALID      # NANDINAGARI LETTER E..NANDINAGARI VOWEL SIGN
119DA..119E1; PVALID      # NANDINAGARI VOWEL SIGN E..NANDINAGARI SIGN AV
119E2        ; DISALLOWED # NANDINAGARI SIGN SIDDHAM
119E3..119E4; PVALID      # NANDINAGARI HEADSTROKE..NANDINAGARI VOWEL SIG
11A84..11A85; PVALID      # SOYOMBO SIGN JIHVAMULIYA..SOYOMBO SIGN UPADHM
11FC0..11FF1; DISALLOWED # TAMIL FRACTION ONE THREE-HUNDRED-AND-TWENTIET
11FFF        ; DISALLOWED # TAMIL PUNCTUATION END OF TEXT
13430..13438; DISALLOWED # EGYPTIAN HIEROGLYPH VERTICAL JOINER..EGYPTIAN
16F45..16F4A; PVALID      # MIAO LETTER BRI..MIAO LETTER RTE
16F4F        ; PVALID     # MIAO SIGN CONSONANT MODIFIER BAR
16F7F..16F87; PVALID      # MIAO VOWEL SIGN UOG..MIAO VOWEL SIGN UI
16FE2        ; DISALLOWED # OLD CHINESE HOOK MARK
16FE3        ; PVALID     # OLD CHINESE ITERATION MARK
187F2..187F7; PVALID      # <Tangut Ideograph>..<Tangut Ideograph>
1B150..1B152; PVALID      # HIRAGANA LETTER SMALL WI..HIRAGANA LETTER SMA
1B164..1B167; PVALID      # KATAKANA LETTER SMALL WI..KATAKANA LETTER SMA
1E100..1E12C; PVALID      # NYIAKENG PUACHUE HMONG LETTER MA..NYIAKENG PU
1E130..1E13D; PVALID      # NYIAKENG PUACHUE HMONG TONE-B..NYIAKENG PUACH
1E140..1E149; PVALID      # NYIAKENG PUACHUE HMONG DIGIT ZERO..NYIAKENG P
1E14E        ; PVALID     # NYIAKENG PUACHUE HMONG LOGOGRAM NYAJ
1E14F        ; DISALLOWED # NYIAKENG PUACHUE HMONG CIRCLED CA
1E2C0..1E2F9; PVALID      # WANCHO LETTER AA..WANCHO DIGIT NINE
1E2FF        ; DISALLOWED # WANCHO NGUN SIGN
1E94B        ; PVALID     # ADLAM NASALIZATION MARK
1ED01..1ED3D; DISALLOWED # OTTOMAN SIYAQ NUMBER ONE..OTTOMAN SIYAQ FRACT
1F16C        ; DISALLOWED # RAISED MR SIGN
1F6D5        ; DISALLOWED # HINDU TEMPLE
1F6FA        ; DISALLOWED # AUTO RICKSHAW
1F7E0..1F7EB; DISALLOWED # LARGE ORANGE CIRCLE..LARGE BROWN SQUARE
```

```
1F90D..1F90F; DISALLOWED # WHITE HEART..PINCHING HAND
1F93F      ; DISALLOWED # DIVING MASK
1F971      ; DISALLOWED # YAWNING FACE
1F97B      ; DISALLOWED # SARI
1F9A5..1F9AA; DISALLOWED # SLOTH..OYSTER
1F9AE..1F9AF; DISALLOWED # GUIDE DOG..PROBING CANE
1F9BA..1F9BF; DISALLOWED # SAFETY VEST..MECHANICAL LEG
1F9C3..1F9CA; DISALLOWED # BEVERAGE BOX..ICE CUBE
1F9CD..1F9CF; DISALLOWED # STANDING PERSON..DEAF PERSON
1FA00..1FA53; DISALLOWED # NEUTRAL CHESS KING..BLACK CHESS KNIGHT-BISHOP
1FA70..1FA73; DISALLOWED # BALLET SHOES..SHORTS
1FA78..1FA7A; DISALLOWED # DROP OF BLOOD..STETHOSCOPE
1FA80..1FA82; DISALLOWED # YO-YO..PARACHUTE
1FA90..1FA95; DISALLOWED # RINGED PLANET..BANJO
```

Acknowledgments

Author's Address

Patrik Fältström
Netnod
Email: paf@netnod.se