

Revised proposal to encode Tamil fractions and symbols

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§1. Background

This document replaces my previous document L2/12-231, which proposed 62 characters for encoding in the Tamil block and a new Tamil Supplement block. Now 55 characters are proposed, as per the recommendations of the prelim review committee L2/13-028 §17 (p 8) which were later approved at the UTC meeting last month. The changes are:

1. The following characters with identical glyphic form were proposed to be disunified based on difference in GC. Since this is found insufficient grounds for the same, they are now unified:

Glyph	Existing character	Proposed character
𑌒	0BAA LETTER PA Lo	11FC8 FRACTION ONE-TWENTIETH No
𑌖	0BB5 LETTER VA Lo	11FCF FRACTION ONE-QUARTER No
𑌞	0B99 LETTER NGA Lo	11FDA SIGN KURUNI So
𑌜	0BA4 LETTER TA Lo	11FDD SIGN TUUNI So
𑌛	0BB3 LETTER LLA Lo	11FDE SIGN KALAM So
𑌟	-	- { 11FD1 FRACTION THREE-QUARTERS No 11FD6 SIGN UZHAKKU So

2. The gaps resulting from the unification of these six pairs are fixed and annotations are added to the unified characters to explain the additional usage.
3. Since it is found desirable to have more evidence for the proposed 0BFB TAMIL RINGGIT SIGN, it is withdrawn from this proposal and may be separately proposed.
4. In fixing this gap, TAMIL CURRENT SIGN has been moved to 0BDF and TAMIL TRADITIONAL NUMBER/CREDIT SIGNS have been moved to 0BFB and 0BFC closer to their counterparts at 0BFA/0BF7. TAMIL PUNCTUATION END OF TEXT has been moved to 11FFF.
5. The informative aliases for TAMIL SPENT SIGN and TAMIL TOTAL SIGN (now at 0BFE and 0BFF) are slightly changed, and the two glyph changes (originally requested in L2/12-106 §2; see also L2/12-231 §5.3) are effected.

Note that this revised document only provides the bare minimum technical material for the proposal. Detailed discussion may be found in the previous proposal L2/12-231.

Since the UnicodeData.txt and NamesList.txt updates are non-trivial, I include them as text file attachments to this PDF for convenience of the editors.

§2. On the font for the code charts

I would also like to repeat my request in L2/12-231 §9.5 (p 62) to use the Lohit Tamil font which is freely publicly available under the Open Font Licence for the official code charts of the Tamil and Tamil Supplement blocks. This font is of good aesthetic quality, and my newly designed glyphs are based on the existing Tamil glyphs in it. While the official homepage of this font is <https://fedorahosted.org/lohit/>, the download available from there does not yet contain these glyphs as they are not encoded as yet. A derivative version available from <http://pravins.fedorapeople.org/tamil-fraction-symbol-proposal-fonts/> contains my new glyphs, and these will be added to the upstream font pending Unicode publication of these characters (see https://bugzilla.redhat.com/show_bug.cgi?id=839303).

§3. Unicode Character Properties etc

(These may also be found as attachments to this PDF.)

§3.1. Additions to UnicodeData.txt

```
0BDF;TAMIL CURRENT SIGN;So;0;ON;;;;;N;;;;;
0BFB;TAMIL TRADITIONAL NUMBER SIGN;So;0;ON;;;;;N;;;;;
0BFC;TAMIL TRADITIONAL CREDIT SIGN;So;0;ON;;;;;N;;;;;
0BFD;TAMIL AND ODD SIGN;So;0;ON;;;;;N;;;;;
0BFE;TAMIL SPENT SIGN;So;0;ON;;;;;N;;;;;
0BFF;TAMIL TOTAL SIGN;So;0;ON;;;;;N;;;;;

11FC0;TAMIL FRACTION ONE THREE-HUNDRED-AND-TWENTIETH;No;0;L;;;1/320;N;;;;;
11FC1;TAMIL FRACTION ONE ONE-HUNDRED-AND-SIXTIETH;No;0;L;;;1/160;N;;;;;
11FC2;TAMIL FRACTION ONE EIGHTIETH;No;0;L;;;1/80;N;;;;;
11FC3;TAMIL FRACTION ONE SIXTY-FOURTH;No;0;L;;;1/64;N;;;;;
11FC4;TAMIL FRACTION ONE FORTIETH;No;0;L;;;1/40;N;;;;;
11FC5;TAMIL FRACTION ONE THIRTY-SECOND;No;0;L;;;1/32;N;;;;;
11FC6;TAMIL FRACTION THREE EIGHTIETHS;No;0;L;;;3/80;N;;;;;
11FC7;TAMIL FRACTION THREE SIXTY-FOURTHS;No;0;L;;;3/64;N;;;;;
11FC8;TAMIL FRACTION ONE SIXTEENTH;No;0;L;;;1/16;N;;;;;
11FC9;TAMIL FRACTION ONE TENTH;No;0;L;;;1/10;N;;;;;
11FCA;TAMIL FRACTION ONE EIGHTH;No;0;L;;;1/8;N;;;;;
11FCB;TAMIL FRACTION THREE TWENTIETHS;No;0;L;;;3/20;N;;;;;
11FCC;TAMIL FRACTION THREE SIXTEENTHS;No;0;L;;;3/16;N;;;;;
11FCD;TAMIL FRACTION ONE FIFTH;No;0;L;;;1/5;N;;;;;
11FCE;TAMIL FRACTION ONE HALF;No;0;L;;;1/2;N;;;;;
11FCF;TAMIL FRACTION THREE QUARTERS;No;0;L;;;3/4;N;;;;;
11FD0;TAMIL FRACTION DOWNSCALING FACTOR KIIZH;No;0;L;;;1/320;N;;;;;
11FD1;TAMIL SIGN NEL;So;0;ON;;;;;N;;;;;
11FD2;TAMIL SIGN SUVADU;So;0;ON;;;;;N;;;;;
11FD3;TAMIL SIGN AAZHAAKKU;So;0;ON;;;;;N;;;;;
11FD4;TAMIL SIGN URI;So;0;ON;;;;;N;;;;;
11FD5;TAMIL SIGN MUUVUZHAKKU;So;0;ON;;;;;N;;;;;
```

11FD6;TAMIL SIGN PADAKKU;So;0;ON;;;;;N;;;;;
 11FD7;TAMIL SIGN MUKKURUNI;So;0;ON;;;;;N;;;;;
 11FD8;TAMIL SIGN PAISAA;Sc;0;ET;;;;;N;;;;;
 11FD9;TAMIL SIGN ANAA;Sc;0;ET;;;;;N;;;;;
 11FDA;TAMIL SIGN KAASU;Sc;0;ET;;;;;N;;;;;
 11FDB;TAMIL SIGN PANAM;Sc;0;ET;;;;;N;;;;;
 11FDC;TAMIL SIGN PON;Sc;0;ET;;;;;N;;;;;
 11FDD;TAMIL SIGN VARAAGAN;Sc;0;ET;;;;;N;;;;;
 11FDE;TAMIL SIGN BAARAM;So;0;ON;;;;;N;;;;;
 11FDF;TAMIL SIGN GEJAM;So;0;ON;;;;;N;;;;;
 11FE0;TAMIL SIGN KUZHI;So;0;ON;;;;;N;;;;;
 11FE1;TAMIL SIGN VELLI;So;0;ON;;;;;N;;;;;
 11FE2;TAMIL WET CULTIVATION SIGN;So;0;ON;;;;;N;;;;;
 11FE3;TAMIL DRY CULTIVATION SIGN;So;0;ON;;;;;N;;;;;
 11FE4;TAMIL LAND SIGN;So;0;ON;;;;;N;;;;;
 11FE5;TAMIL SALT PAN SIGN;So;0;ON;;;;;N;;;;;
 11FE6;TAMIL CHARGE SIGN;So;0;ON;;;;;N;;;;;
 11FE7;TAMIL FIRST SIGN;So;0;ON;;;;;N;;;;;
 11FE8;TAMIL SIGN MUDALIYA;So;0;ON;;;;;N;;;;;
 11FE9;TAMIL SIGN VAGAIYARAA;So;0;ON;;;;;N;;;;;
 11FEA;TAMIL SIGN CIRANJIVI;So;0;ON;;;;;N;;;;;
 11FEB;TAMIL SIGN PILLAI;So;0;ON;;;;;N;;;;;
 11FEC;TAMIL SIGN RAAJA;So;0;ON;;;;;N;;;;;
 11FED;TAMIL ABBREVIATION KKU;Lo;0;L;;;;;N;;;;;
 11FEE;TAMIL ABBREVIATION YUM;Lo;0;L;;;;;N;;;;;
 11FEF;TAMIL ABBREVIATION VUM;Lo;0;L;;;;;N;;;;;
 11FFF;TAMIL PUNCTUATION END OF TEXT;Po;0;L;;;;;N;;;;;

§3.2. Changes to NamesList.txt (BMP)

@@ -24,4 +24,6 @@

0B95 TAMIL LETTER KA
 0B99 TAMIL LETTER NGA
 + * also denotes the measure kuruni/marakkaal
 + x 11fd5 tamil sign muuvuzhakku
 0B9A TAMIL LETTER CA
 0B9C TAMIL LETTER JA

@@ -30,7 +32,11 @@

0BA3 TAMIL LETTER NNA
 0BA4 TAMIL LETTER TA
 + * also denotes the measure tuuni
 + x 11fd7 tamil sign mukkuruni
 0BA8 TAMIL LETTER NA
 0BA9 TAMIL LETTER NNNA
 0BAA TAMIL LETTER PA
 + * also denotes the fraction one twentieth
 + = maa
 0BAE TAMIL LETTER MA
 0BAF TAMIL LETTER YA

@@ -39,6 +45,10 @@

0BB2 TAMIL LETTER LA
 0BB3 TAMIL LETTER LLA
 + * also denotes the measure kalam
 + x 11fd7 tamil sign mukkuruni
 0BB4 TAMIL LETTER LLLA
 0BB5 TAMIL LETTER VA
 + * also denotes the fraction one quarter
 + = kaal
 0BB6 TAMIL LETTER SHA
 0BB7 TAMIL LETTER SSA

@@ -72,4 +82,7 @@

0BD0 TAMIL OM
 0BD7 TAMIL AU LENGTH MARK
 +@ Tamil clerical symbol
 +0BDF TAMIL CURRENT SIGN
 + = naaladu
 @ Reserved
 @+ For viram punctuation, use the generic Indic 0964 and 0965.

@@ -90,24 +103,58 @@

0BEF TAMIL DIGIT NINE
@ Tamil numerics
+@+ **Tamil fractions are encoded in the Tamil Supplement block starting at 11FC0**
0BF0 TAMIL NUMBER TEN
0BF1 TAMIL NUMBER ONE HUNDRED
0BF2 TAMIL NUMBER ONE THOUSAND
-@ *Tamil symbols*
+@ **Tamil calendrical symbols**
0BF3 TAMIL DAY SIGN
= naal
+ = **naazhi/padi**
+ * **denotes a measure of grain that equals 2 uri or 4 uzhakku**
+ **x (tamil sign uri - 11FD4)**
+ = **pillaiyaar suzhi**
+ * **denotes auspiciousness**
0BF4 TAMIL MONTH SIGN
= maatham
0BF5 TAMIL YEAR SIGN
= varudam
+@ **Tamil clerical symbols**
0BF6 TAMIL DEBIT SIGN
= patru
0BF7 TAMIL CREDIT SIGN
= *varavu*
+ = **eduppu**
+ * **denotes incoming cash which is set aside for unknown expenses**
+ * **sometimes used as the credit sign**
+ * **the traditional credit sign is different**
+ **x (tamil traditional credit sign - 0BFC)**
0BF8 TAMIL AS ABOVE SIGN
= merpadi
-@ *Currency symbol*
+@ **Tamil currency symbol**
0BF9 TAMIL RUPEE SIGN
= rupai
-@ *Tamil symbol*
+@ **Additional Tamil symbols**
0BFA TAMIL NUMBER SIGN
+ = **niluvai**
+ * **denotes balance**
+ * **sometimes used as the number sign**
+ * **the traditional number sign is different**
+ **x (tamil traditional number sign - 0BFB)**
+0BFB TAMIL TRADITIONAL NUMBER SIGN
= enn
+ * **this is the traditional number sign**
+ **x (tamil number sign - 0BFA)**
+0BFC TAMIL TRADITIONAL CREDIT SIGN
+ = **varavu**
+ * **this is the traditional credit sign**
+ **x (tamil credit sign - 0BF7)**
+0BFD TAMIL AND ODD SIGN
+ = **silvaanam/sillarai**
+ * **not to be confused with the sign for "long-lived"**
+ **x (tamil sign ciranjiivi - 11FEA)**
+0BFE TAMIL SPENT SIGN
+ = **poka**
+ * **not to be confused with the abbreviation for "pillai"**
+ **x (tamil sign pillai - 11FEB)**
+0BFF TAMIL TOTAL SIGN
+ = **aaka**
+@+ **More symbols are encoded in the Tamil Supplement block 11FC0-11FFF starting at 11FD0**

§3.3. Additions to NamesList.txt (SMP)

```
@@ 11FC0 Tamil Supplement 11FFF
@ Fractions
11FC0 TAMIL FRACTION ONE THREE-HUNDRED-AND-TWENTIETH
      = mundiri
11FC1 TAMIL FRACTION ONE ONE-HUNDRED-AND-SIXTIETH
      = araikkaani
11FC2 TAMIL FRACTION ONE EIGHTIETH
      = kaani
11FC3 TAMIL FRACTION ONE SIXTY-FOURTH
      = kaalviisam
11FC4 TAMIL FRACTION ONE FORTIETH
      = araimaa
11FC5 TAMIL FRACTION ONE THIRTY-SECOND
      = araiviisam
11FC6 TAMIL FRACTION THREE EIGHTIETHS
      = mukkaani
11FC7 TAMIL FRACTION THREE SIXTY-FOURTHS
      = mukkaalviisam
      * for one twentieth "maa" use 0BAA
      x 0baa tamil letter pa
11FC8 TAMIL FRACTION ONE SIXTEENTH
      = viisam/maakaani
11FC9 TAMIL FRACTION ONE TENTH
      = irumaa
11FCA TAMIL FRACTION ONE EIGHTH
      = araikkaal
11FCB TAMIL FRACTION THREE TWENTIETHS
      = mummaa
11FCC TAMIL FRACTION THREE SIXTEENTHS
      = muuviisam/mummaamukkaani
11FCD TAMIL FRACTION ONE FIFTH
      = naalumaa
      * for one quarter "kaal" use 0BB5
      x 0bb5 tamil letter va
11FCE TAMIL FRACTION ONE HALF
      = arai
11FCF TAMIL FRACTION THREE QUARTERS
      = mukkaal
11FD0 TAMIL FRACTION DOWNSCALING FACTOR KIIZH
      * when prefixed to a fraction, reduces its value by a factor of 1/320
@ Measures of grain
11FD1 TAMIL SIGN NEL
      * one grain of paddy
11FD2 TAMIL SIGN SUVADU
      * equals 360 nel
11FD3 TAMIL SIGN AAZHAAKKU
      * equals 5 suvadu
      * for the measure uzhakku which equals 2 aazhaakku, use 11FCF
      x 11fcf tamil fraction three quarters
11FD4 TAMIL SIGN URI
      * equals 2 uzhakku
11FD5 TAMIL SIGN MUUVUZHAKKU
      * equals 3 uzhakku
      * for the measure naazhi/padi which equals 2 uri or 4 uzhakku, use 0BF3
      x (tamil day sign - 0BF3)
      * for the measure kuruni/marakkaal which equals 8 naazhi/padi, use 0B99
      x (tamil letter nga - 0B99)
11FD6 TAMIL SIGN PADAKKU
      * equals 2 kuruni/marakkaal
11FD7 TAMIL SIGN MUKKURUNI
      * equals 3 kuruni
      * for the measure tuuni which equals 2 padakku or 4 kuruni, use 0BA4
      x (tamil letter ta - 0BA4)
      * for the measure kalam which equals 3 tuuni, use 0BB3
      x (tamil letter lla - 0BB3)
@ Old currency symbols
11FD8 TAMIL SIGN PAISAA
      * old paisa comprises 3 pai and equals 1/64 of a rupee
      * new or naya paisa equals 1/100 of a rupee
```

11FD9 TAMIL SIGN ANAA
 * equals 4 old paisa
 11FDA TAMIL SIGN KAASU
 * alternate old currency
 11FDB TAMIL SIGN PANAM
 * equals 80 kaasu
 11FDC TAMIL SIGN PON
 * equals 10 panam
 11FDD TAMIL SIGN VARAAGAN
 * equals 42 panam
 * equals 3½ rupee, 3¾ as per some
 @ Symbols of weight, length and area
 11FDE TAMIL SIGN BAARAM
 * approximately equals 500 pounds
 11FDF TAMIL SIGN GEJAM
 * approximately equals 3 feet
 11FE0 TAMIL SIGN KUZHI
 * equals 16 square gejam
 11FE1 TAMIL SIGN VELI
 * equals 2000 kuzhi
 @ Agricultural symbols
 11FE2 TAMIL WET CULTIVATION SIGN
 = nansey
 11FE3 TAMIL DRY CULTIVATION SIGN
 = punsey
 11FE4 TAMIL LAND SIGN
 = nilam
 11FE5 TAMIL SALT PAN SIGN
 = alam
 @ Other symbols and abbreviations
 11FE6 TAMIL CHARGE SIGN
 = vasam
 * possession
 11FE7 TAMIL FIRST SIGN
 = mudal
 11FE8 TAMIL SIGN MUDALIYA
 = et cetera
 * indicates items in a series
 11FE9 TAMIL SIGN VAGAIYARAA
 = et cetera
 * indicates items of a family or kind
 11FEA TAMIL SIGN CIRANJIIVI
 * a polite title for a young person
 * not to be confused with the sign for "and odd"
 x (tamil and odd sign - 0BFD)
 11FEB TAMIL SIGN PILLAI
 * not to be confused with the sign for "spent"
 x (tamil spent sign - 0BFE)
 11FEC TAMIL SIGN RAAJA
 * in the phrase mahaa raaja raaja shrii
 * 0BF1 is often used as a substitute
 x (tamil number one hundred - 0BF1)
 @ Abbreviations of word-endings
 11FED TAMIL ABBREVIATION KKV
 * used especially with numerals for the dative suffix
 11FEE TAMIL ABBREVIATION YUM
 * and
 11FEF TAMIL ABBREVIATION VUM
 * and
 @ Punctuation
 11FFF TAMIL PUNCTUATION END OF TEXT
 x (sinhala punctuation kunddaliya - 0DF4)

§4. Code Charts

	0B8	0B9	0BA	0BB	0BC	0BD	0BE	0BF
0		ஐ		ர	ீ	ஓ		ய
1				ற	ூ			ள
2		ஓ		ல	ூ			சூ
3	ஃ	ஓ	ண	ள				உ
4		ஓள	த	ழ				மீ
5	அ	க		வ				ஶ
6	ஆ			ய	ெ		ஃ	பூ
7	இ			ஷ	ே	ள	க	ஶ
8	ஈ		ந	ஸ	ை		உ	ஷெ
9	உ	ங	ன	ஹ			ந	ஶ
A	ஊ	ச	ப		ொ		ச	நீ
B					ோ		ஶ	ஶ
C		ஐ			ெள		கூ	ஶ
D					்		ள	ஶ
E	எ	ஞ	ம	ா			அ	பீ
F	ஏ	ட	ய	ி		று	கூ	ஶ

Tamil Supplement

11FC 11FD 11FE 11FF

0	ஊ	ஈ	ஊ	
1	ஊ	ஊ	ஊ	
2	ஊ	ஊ	ஊ	
3	ஊ	ஊ	ஊ	
4	ஊ	ஊ	ஊ	
5	ஊ	ஊ	ஊ	
6	ஊ	ஊ	ஊ	
7	ஊ	ஊ	ஊ	
8	ஊ	ஊ	ஊ	
9	ஊ	ஊ	ஊ	
A	ஊ	ஊ	ஊ	
B	ஊ	ஊ	ஊ	
C	ஊ	ஊ	ஊ	
D	ஊ	ஊ	ஊ	
E	ஊ	ஊ	ஊ	
F	ஊ	ஊ	ஊ	ஊ

§5. Official Proposal Summary Form

(Based on N3902-F)

A. Administrative

1. Title

Revised proposal to encode Tamil fractions and symbols

2. Requester's name

Shriramana Sharma

3. Requester type (Member body/Liaison/Individual contribution)

Individual Contribution

4. Submission date

2013-Mar-05

5. Requester's reference (if applicable)

6. Choose one of the following: This is a complete proposal (or) More information will be provided later

This is a complete proposal.

B. Technical – General

1. Choose one of the following:

1a. This proposal is for a new script (set of characters), Proposed name of script

No

1b. The proposal is for addition of character(s) to an existing block, Name of the existing block

These characters are additions to the Tamil encoding, but they cannot all be encoded in the existing BMP Tamil block due to lack of space. As a result, a new Tamil Supplement block is requested.

2. Number of characters in proposal

55 (fifty five)

3. Proposed category

Category B1, specialized small

4. Is a repertoire including character names provided?

Yes

4a. If YES, are the names in accordance with the “character naming guidelines” in Annex L of P&P document?

Yes

4b. Are the character shapes attached in a legible form suitable for review?

Yes

5. Fonts related:

a. Who will provide the appropriate computerized font to the Project Editor of 10646 for publishing the standard?

Shriramana Sharma

b. Identify the party granting a license for use of the font by the editors (include address, e-mail etc.)

Shriramana Sharma and other contributors to the Lohit Tamil font, under derivative rights granted by the OFL. See <https://fedorahosted.org/lohit/>.

6a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided?

See previous proposal L2/12-231.

6b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached?

See previous proposal L2/12-231.

7. Does the proposal address other aspects of character data processing (if applicable) such as input, presentation, sorting, searching, indexing, transliteration etc. (if yes please enclose information)?

See previous proposal L2/12-231.

8. Submitters are invited to provide any additional information about properties of the proposed character(s) or script that will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script.

See previous proposal L2/12-231.

C. Technical – Justification

1. Has this proposal for addition of character(s) been submitted before? If YES, explain.

This document replaces L2/12-231 as per recommendations from the 2013-Feb UTC meeting.

2a. Has contact been made to members of the user community (for example: National Body, user groups of the script or characters, other experts, etc.)?

Yes

2b. If YES, with whom?

G Balachandran of ICTA Sri Lanka, various Tamil scholars participating in the C-Tamil mailing list (ctamil-at-services.cnrs.fr), some members of INFITT WG02. See §1 of L2/12-231.

2c. If YES, available relevant documents

The matter was largely discussed in person or via email.

3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included?

Those who desire to store as digital text old Tamil manuscripts involving these characters, and those who may desire to revive the use of at least some of these characters

4a. The context of use for the proposed characters (type of use; common or rare)

Rare

4b. Reference

See detailed proposal.

5a. Are the proposed characters in current use by the user community?

Scholars who work with manuscripts will use these characters.

5b. If YES, where?

Largely in research institutions around the world involved with Tamil and some Grantha manuscripts.

6a. After giving due considerations to the principles in the P&P document must the proposed characters be entirely in the BMP?

No

6b. If YES, is a rationale provided?

6c. If YES, reference

7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)?

Yes

8a. Can any of the proposed characters be considered a presentation form of an existing character or character sequence?

No.

8b. If YES, is a rationale for its inclusion provided?

8c. If YES, reference

9a. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters?

No

9b. If YES, is a rationale for its inclusion provided?

9c. If YES, reference

10a. Can any of the proposed character(s) be considered to be similar (in appearance or function) to an existing character?

Some characters are similar (but not identical) to existing Tamil/Grantha letters or ligatures thereof.

10b. If YES, is a rationale for its inclusion provided?

Yes

10c. If YES, reference

They have a consistently distinct shape and meaning.

11a. Does the proposal include use of combining characters and/or use of composite sequences?

No

11b. If YES, is a rationale for such use provided?

11c. If YES, reference

11d. Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided?

12a. Does the proposal contain characters with any special properties such as control function or similar semantics?

No.

12b. If YES, describe in detail (include attachment if necessary)

13a. Does the proposal contain any Ideographic compatibility character(s)?

No

13b. If YES, is the equivalent corresponding unified ideographic character(s) identified?

13c. If YES, reference:

-O-O-O-