

N4115 – an alternative encoding for geometric shapes

This document proposes alternative encodings for some of the geometric shapes in ISO/IEC JTC1/SC2/WG2 N 4115, Proposal to add Wingdings and Webdings Symbols.

Only graduated sizes of regular convex shapes are considered, and then only where of interest regarding the importation of Wingdings. Enclosed shapes, non-convex shapes and differences in weight are not covered.

This document uses the classification system found in Table 2.5 of UTR 25, which is almost identical to that used in the Wingdings fonts. This strong similarity is demonstrated in the two appendices

“slightly small” a redundant measure

and

“size 9, centered” a misnamed measure

which show how this schema can be reconciled to that given in N4115.

The measured size of a Wingdings glyph is sufficient to decide which graduated shapes fit where, within a revised Table 2.5 – either as new entries, or as duplicates of existing characters. A lot of w-xxxx numbers are unified with different U+xxxx codepoints from those proposed in N4115, but the net effect is not great:

- 4 explicitly medium-sized triangles remove ambiguity from the existing standard, forcing 8 characters to default to “regular” size;
- 2 additional explicitly “medium small” shapes – black diamond and black lozenge – remove ambiguity from the existing standard, forcing U+2b25, 2b26, 2b27 and 2b28 to default to “medium” size;
- codepoints 1f7d7, 2bb0, 2bb1 and 1f786, defined in N4115, are not needed after simplification, because their associated shapes do not differ significantly from characters already encoded.

Finally, two charts showing how well the two sets of shapes fit together – the first showing how Table 2.5 might look after merging in the Wingdings shapes, and another showing the same table using Wingdings glyphs only.

The names of some of the sizes differ from those in N4115 and so, inevitably, do the names of many of the characters. The name of each character is shown as it appears in N4115, but edited, in some cases, by ~~striking through~~ words which are misleading or superfluous, and/or by inserting additional underlined words. Where the name in N4115 conflicts with that in TUS 6.0, the TUS name is shown above, and the name from N4115 shown below, [bracketed].

w-xxxx	Wingding codepoint		side length	size	name	N4115 codepoint	alt. coding
3131	f083	◀	1282	M	black medium left-pointing triangle centered ¹	2bb7	
3132	f084	▶		M	black medium right-pointing triangle centered ¹	2bb8	
3129	f081	▲		M	black medium up-pointing triangle centered ²	2bb5	
3130	f082	▼		M	black medium down-pointing triangle centered ³	2bb6	
3116	f074	◀	1709	Reg	black left-pointing triangle	25c0	
3118	f076	◁		Reg	white left-pointing triangle	25c1	
3117	f075	▶		Reg	black right-pointing triangle	25b6	
3119	f077	▷		Reg	white right-pointing triangle	25b7	
3112	f070	▲		Reg	black up-pointing triangle	25b2	
3114	f072	△		Reg	white up-pointing triangle	25b3	
3113	f071	▼		Reg	black down-pointing triangle	25bc	
3115	f073	▽		Reg	white down-pointing triangle	25bd	
2159	f09f	·	198	tiny	black tiny square	1f795	
1160	f0a0	▪	296	VS	black very small square	2b1d	
2160	f0a0	▪	394	S	black slightly small square ⁴	1f797	25aa
1167	f0a7	▪	592	MS	black <i>medium</i> small square	25aa	25fe

2161	f0a1	■	790	M	black medium small square	25fe	25fc
2190	f0be	■	1046	Reg	black square centered ¹	2bb0	25a0
1110	f06e	■	1184	Reg	black medium square	25fc	
2162	f0a2	■	1480	L	black <i>large</i> square	25a0	2b1b
2163	f0a3	□	1480	L	white <i>large</i> square	25a1	2b1c
0103	f067	■	2048	XL	black <i>extra</i> large square ⁵	2b1b	?
0099	f063	□	2048	XL	white <i>extra</i> large square ⁵	2b1c	?
2171	f0ab	·	197	t	black tiny diamond	1f7a6	
2172	f0ac	·	296	VS	black very small diamond	1f7a7	
2173	f0ad	◆	395	S	black small diamond	2b29	
1119	f077	◆	593	MS	black <i>medium small</i> diamond [black diamond 4]	1f7a9	
2174	f0ae	◆	789	M	black medium diamond	2b25	
2191	f0bf	◆	1046	Reg	black diamond centered ¹	2bb1	25c6
1117	f075	◆	1184	Reg	black diamond	25c6	
2175	f0af	◇	1184	Reg	white diamond	25c7	
2180	f0b4	·	172	t	black tiny lozenge	1f7b0	
2181	f0b5	·	256	VS	black very small lozenge	1f7b1	
2182	f0b6	◆	342	S	black small lozenge	2b2a	

1115	f073	◆	513	MS	black medium small lozenge	1f7b3	
2183	f0b7	◆	684	M	black medium lozenge	2b27	
1116	f074	◆	1025	Reg	black lozenge	29eb	
2184	f0b8	◇	1025	Reg	lozenge	25ca	
2192	f0c0	⬠		Reg	black pentagon	2b1f	
2193	f0c1	⬠		Reg	turned black pentagon	2bb2	
2194	f0c2	⬡		Reg	horizontal black hexagon	2b23	
2195	f0c3	⬢		Reg	black hexagon	2b22	
2196	f0c4	⬤		Reg	horizontal black octagon	2bb3	
2197	f0c5	⬤		Reg	black octagon	2bb4	
2149	f095	·	∅ 198	t	dot operator	22c5	
1158	f09e	•	296	VS	bullet operator	2219	
2150	f096	•	394	S	<i>bullet</i> black slightly small circle ⁴	1f786	2022
1159	f09f	•	592	MS	<i>Z notation spot</i> ⁵ bullet	2022	2981
2151	f097	●	789	M	<i>medium black circle</i> Z notation spot	2981	26ab
1108	f06c	●	1185	Reg	<i>black circle</i> medium black circle	26ab	25cf

2152	f098	●	1480	L	<i>black large circle</i> black circle	25cf	2b24
2153	f099	○	1480	L	<i>large circle</i> white circle	25cb	25ef
0110	f06e	●	2048	XL	black <i>extra</i> large circle ⁵	2b24	?

Notes:

1. The word “centered” is superfluous. These geometric shapes are vertically centered by default.
2. The word “centered” is misleading. The glyph is drawn within a circumscribed circle which *is* centered; the Wingdings glyph itself is raised. The proposal here is that U+2BB5 should have $\frac{1}{2}$ of its height above the math axis, rather than $\frac{2}{3}$.
3. The word “centered” is misleading. The glyph is drawn within a circumscribed circle which *is* centered; the Wingdings glyph itself is lowered. The proposal here is that U+2BB6 should have $\frac{1}{2}$ of its height above the math axis, rather than $\frac{1}{3}$.
4. “Slightly small” is a redundant concept, which can be unified with UTR 25’s classification of “small” .
5. U+2001 was hitherto a Unicode oddity, being the only character defined to fit an “em quad”. N4115 introduces 3 more: a black square, a white square and a black circle. These em-quad shapes are not part of the graduated set of shapes, so that the “extra large” names suggested here might well be misleading. In addition to better names, these characters need to be allocated codepoints.
6. Forcing a particular size upon a character used in a formal notation is not something the UTC should be doing. U+2218, 2219 and 2981 all provide instances of this regrettable practice. If the UTC ever permits items of formal notation to be distinguished from abstract shapes the Windings \Rightarrow Unicode mapping will need to be updated.

graduated sizes of regular convex shapes

including proposed additions

size	tiny	very small	small		medium small		medium (default1)		regular (default2)		large		
triangle left													
			25c2	25c3			2bb7		25c0	25c1			
triangle right													
			25b8 =2023	25b9			2bb8		25b6	25b7			
triangle up													
			25b4	25b5			2bb5		25b2	25b3			
triangle down													
			25be	25bf			2bb6		25bc	25bd			
square													
	1f795	2b1d	2b1e	25aa	25ab	25fe	25fd	25fc	25fb	25a0	25a1	2b1b	2b1c
diamond													
	1f7a6	1f7a7	2b29	22c4	1f7a9		2b25	2b26	25c6	25c7			
lozenge													
	1f7b0	1f7b1	2b2a	2b2b	1f7b3		2b27	2b28	29eb	25ca			
pentagon up													
									2b1f	2b20			
pentagon down													
									2bb2				
hexagon horizontal													
									2b23	2394			
hexagon vertical													
									2b22	2b21			
octagon horizontal													
									2bb3				
octagon vertical													
									2bb4				
circle													
	22c5	2219	2218	2022	25e6	2981	26ac	26ab	26aa	25cf	25cb	2b24	25ef
ellipse horizontal													
										2b2c	2b2d		
ellipse vertical													
										2b2e	2b2f		

graduated sizes of regular convex shapes
using only Wingdings glyphs

size	tiny	very small	small	medium small	medium (default1)	regular (default2)	large
triangle left							
					3131	3116 3118	
triangle right							
					3132	3117 3119	
triangle up							
					3129	3112 3114	
triangle down							
					3130	3113 3115	
square							
	2159	1160		2160	1167	2161	1110 2190 2162 2163
diamond							
	2171	2172		2173	1119	2174	1117 2191 2175
lozenge							
	2180	2181		2182	1115	2183	1116 2184
pentagon up							
						2192	
pentagon down							
						2193	
hexagon horizontal							
						2194	
hexagon vertical							
						2195	
octagon horizontal							
						2196	
octagon vertical							
						2197	
circle							
	2149	1158		2150	1159	2151	1108 2152 2153
ellipse horizontal							
ellipse vertical							