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# Character Sets

This chapter contains a table comparing the character sets of WGL4 (the Windows Glyph List defined for Windows 95), UGL, Window 3.1x (for the U.S.), and the Macintosh (for the U.S.). The characters checked are required in a font for compatibility with the respective platforms. Microsoft suggests that at a minimum, the U.S. Windows 3.1x (ANSI) set and the Macintosh/PostScript set be supported in all your fonts. For the character set to properly support codepages under OS/2, the full UGL character set must also be included.

The character set table in this chapter contains the following information:

Field Name	Description
Min	Minimum character set recommended
Unicode	Unicode value of glyph
PostScript Name	PostScript name of glyph
Descriptive Name	Descriptive name of glyph
WGL4	Glyph in WGL4 character set
UGL	Glyph in UGL character set
Win31	Glyph in US Win31 character set
MacChar	US Macintosh character code for glyph
MacGlyph	US Macintosh glyph index for glyph

Font files for Microsoft platforms *must* use Unicode indices (given here as hexadecimal values).

### ***Microsoft Platform Requirements***

TrueType font files use the ‘cmap’ table to access glyphs. Thus, it is feasible to map similar looking characters to single internal glyph (e.g. latin capital letter eth and latin capital letter d with stroke). However, future international extensions to TrueType may require a unique glyph for each character in the font, so this practice is not recommended.

The ‘cmap’ table used for this list of characters will be implemented with the format 4 as described in Chapter 2.

Note that space (U+0020) and no-break space (U+00a0) should be mapped to a glyph with no contours and a positive advance width; this advance width should be the same for the two glyphs.

Lining numbers (U+0030 through U+0039; i.e. the digits 0 - 9) should be monospaced. Old style figures need not be monospaced.

White space should be evenly distributed between the left and right side bearings of glyphs. Extra space should be placed on the right if grid-fitting results in an odd number of pixels.

## Macintosh Platform Requirements

Since the Macintosh requires the use of ‘cmap’ subtable format 0 (which only allows for BYTE glyph indices), the glyphs required by the Macintosh must appear within the first 256 positions in the ‘glyf’ table. Apple recommends a particular order for the glyphs; this glyph order is indicated in the final column of the following table.

A list of Macintosh mapping requirements follows:

- Glyph 0 is the missing character glyph.
- Glyph 1 is the null glyph; it has no contours and zero advance width.
- All characters in the character set defined in the table must be present. Certain specified characters, however, are mapped to glyph 0 (the missing character glyph) as stated below.
- The following character codes must be mapped to glyph 0 (the missing character glyph). Note that all character codes are given as decimal values.

001-031	Misc. ASCII control codes	<i>(note exceptions below)</i>
127	DEL	Delete
- The following characters must map to glyph 1 (the null glyph).

000	NUL	Null
008	BS	Backspace
029	GSGroup	Separator
- The following characters must map to a glyph with no contours and positive advance width:

009	HT	Horizontal Tabulation
032		space
202		figureSpace (No-Break Space)
- The following groups of characters must have the same width  
009 (HT) and 032 (space)
- The mapping of the Carriage Return (CR, 13) depends on whether the font is designed to be used left-to-right or right-to-left. For left-to-right (e.g., Roman), it must be mapped to a glyph with no contours and positive advance. For right-to-left (e.g., Hebrew), it must be mapped to glyph 1 (null glyph).

## Recommendations

In cursive fonts, glyphs should overlap to allow glyphs to join together in device-independent text. A five per cent (5%) overlap is recommended.

Follow all recommendations for Microsoft platforms (listed above).