# Bladed wind file format
## Version 3.67 and later

**Information in *italics* is only for information, and not actually used in simulations.**

Record 1 (2-byte integer) with value -99 (indicates the current format).

Record 2 (2-byte integer):
          1 = 1-component von Karman
          2 = 1-component Kaimal
          3 = 3-component von Karman
          4 = improved von Karman
          5 = IEC-2 Kaimal
          6 = (not supported)
          7 = General Kaimal
          8 = Mann model

Subsequent records in the header are 4 byte real or integer values as follows:

The next group of records is only present if Record 2 >= 7:

(int)     Number of bytes in the header ($N_{header}$)
(int)     Number of turbulence components (1, 2 or 3)

The next group of records is only present in the case of the Improved von Karman model:

(int)     Number of turbulence components (1, 2 or 3)
(real)   *Latitude(in degrees)*
(real)   *Roughness length(m)*
(real)   *Reference height(m)*
(real)   *Longitudinal turbulence intensity(%)*
(real)   *Lateral turbulence intensity(%)*
(real)   *Vertical turbulence intensity(%)*

The next group is always present:

(real)   Grid point spacing in vertical direction, in m
(real)   Grid point spacing in lateral direction, in m
(real)   Grid point spacing in longitudinal direction, in m
(int)    Half the number of points in the alongwind direction
(real)   *The mean wind speed in m/s*
(real)   *The vertical length scale of the longitudinal component ($^{z}L_u$) in m*
(real)   *The lateral length scale of the longitudinal component ($^{y}L_u$) in m*
(real)   *The longitudinal length scale of the longitudinal component ($^{x}L_u$) in m*
(real)   The maximum frequency in Hz. *In Bladed 4.4 and earlier, this variable is not used.*
(int)    *The random number seed*
(int)    The number of grid points vertically
(int)    The number of grid points laterally

The next group of records is only present if there are three components of turbulence:

(real) *The vertical length scale of the lateral component ($^zL_v$) in m*
(real) *The lateral length scale of the lateral component ($^yL_v$) in m*
(real) *The longitudinal length scale of the lateral component ($^xL_v$) in m*
(real) *The vertical length scale of the vertical component ($^zL_w$) in m*
(real) *The lateral length scale of the vertical component ($^yL_w$) in m*
(real) *The longitudinal length scale of the vertical component ($^xL_w$) in m*

The next group of records is only present if Record 2 = 7 (General Kaimal model):

(real) *Coherence decay constant*
(real) *Coherence scale parameter in m*

The next group of records is only present if Record 2 = 8 (Mann model):

(real) *Shear parameter (gamma)*
(real) *Scale length (L) in m*
(real) *Ratio of lateral to longitudinal turbulence intensity*
(real) *Ratio of vertical to longitudinal turbulence intensity*
(real) *Maximum lateral/vertical wavelength in m*
(real) *Reserved*
(int) *Reserved*
(int) *No. of FFT points*
(int) *Reserved*
(real) *Reserved*
(real) *Reserved*
(int) *Reserved*
(int) *Reserved*
(int) *Reserved*
(real) *Reserved*
(real) *Reserved*

Then the actual data starts (at byte $N_{header}$+1 if defined). These records are TWO-BYTE INTEGERS x 1000, i.e. the integer values should be divided by 1000. The result will be: Normalised, zero mean, unit standard deviation wind speed deviations*. One entry per grid point, each entry being one record if just the logitudinal component, or 3 records if all three components (longitudinal, lateral, vertical in that order).

Start in the bottom right corner of the grid, work along the row from right to left, then next row, etc. Repeat for each 'plane' in the alongwind direction.

The file must have a .wnd extension.

* Mann model: although the wind speed deviations are nominally zero-mean and unit-standard-deviation, this is not quite true for the Mann model since the time histories at any one grid point do not necessarily all have the chosen mean wind speed and turbulence intensity: there is a certain amount of natural variation between grid points, especially for short time histories.