

Proposals of Exposure Limits for Infrasound From Wind Turbines

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Abstract : Human tolerance to infrasound is defined by the hearing threshold. Infrasound that cannot be heard (or felt) is not annoying and is not thought to have any other adverse or health effects. Recent research has largely confirmed earlier findings. ISO 7196:1995 recommends the use of G-weighted characteristics for the assessment of infrasound. There is a strong correlation between G-weighted SPL and annoyance perception. The aim of this study was to propose exposure limits for infrasound from wind turbines. However, only a few countries have set limits for infrasound. These limits are usually no higher than 85-92 dBG, and none of them are specific to wind turbines. Over the years, a number of studies have been carried out to determine hearing thresholds below 20 Hz. It has been recognized that 10% of young people would be able to perceive 10 Hz at around 90 dB, and it has also been found that the difference in median hearing thresholds between young adults aged around 20 years and older adults aged over 60 years is around 10 dB, irrespective of frequency. This shows that older people (up to about 60 years of age) retain good hearing in the low frequency range, while their sensitivity to higher frequencies is often significantly reduced. In terms of exposure limits for infrasound, the average hearing threshold corresponds to a tone with a G-weighted SPL of about 96 dBG. In contrast, infrasound at L_{p,G} levels below 85-90 dBG is usually inaudible. The individual hearing threshold can, therefore be 10-15 dB lower than the average threshold, so the recommended limits for environmental infrasound could be 75 dBG or 80 dBG. It is worth noting that the G86 curve has been taken as the threshold of auditory perception of infrasound reached by 90-95% of the population, so the G75 and G80 curves can be taken as the criterion curve for wind turbine infrasound. Finally, two assessment methods and corresponding exposure limit values have been proposed for wind turbine infrasound, i.e. method I - based on G-weighted sound pressure level measurements and method II - based on frequency analysis in 1/3-octave bands in the frequency range 4-20 Hz. Separate limit values have been set for outdoor living areas in the open countryside (Area A) and for noise sensitive areas (Area B). In the case of Method I, infrasound limit values of 80 dBG (for areas A) and 75 dBG (for areas B) have been proposed, while in the case of Method II - criterion curves G80 and G75 have been chosen (for areas A and B, respectively).

Keywords : infrasound, exposure limit, hearing thresholds, wind turbines

Conference Title : ICSV 2024 : International Conference on Sound and Vibration

Conference Location : Boston, United States

Conference Dates : April 22-23, 2024