Docket No. 7156
Exhibit UPC-Cross-PG 15
Admitted: ____________

ANSI S12.9-1996—Part 4
(Reprinted October 1997 including errata)

AMERICAN NATIONAL STANDARD

Quantities and Procedures for Description and Measurement of Environmental Sound — Part 4: Noise Assessment and Prediction of Long-Term Community Response

Secretariat

Acoustical Society of America

Approved 6 November 1996

American National Standards Institute, Inc.

Abstract

This Standard specifies methods to assess environmental sounds and to predict the annoyance response of communities to long-term noise from any and all types of environmental sounds produced by one or more distinct or distributed sound sources. The sound sources may be separate or in various combinations. Application of the method of the Standard is limited to areas where people reside and related long-term land uses. This Standard does not address the effects of intrusive sound on people in areas of short-term use such as parks and wilderness areas, nor does it address other effects of noise such as sleep disturbance or health effects. This Standard does not provide a method to predict the community response to short-term, infrequent, non-repetitive sources of sound.

Annex C
(informative)

Sounds with tonal content

The test for the presence of a prominent discrete-frequency spectral component (tone) typically compares the time-average sound pressure level in some one-third-octave band with the time-average sound pressure levels in the adjacent two one-third-octave bands. For a prominent discrete tone to be identified as present, the time-average sound pressure level in the one-third-octave band of interest is required to exceed the time-average sound pressure level for the two adjacent one-third-octave band by some constant level difference.

The constant level difference may vary with frequency. Possible choices for the level differences are: 15 dB in low-frequency one-third-octave bands (25-125 Hz), 8 dB in middle-frequency bands (160-400 Hz), and 5 dB in high-frequency bands (500-10 000 Hz).

NOTE – The above guidance is from annex C of Part 3 of ANSI S12.9. Part 3 of ANSI S12.9 also contains guidance on the measurement of one-third-octave-band sound pressure levels.

Annex D
(informative)

Sounds with strong low-frequency content

D1 Introduction

Sounds with strong low-frequency content engender greater annoyance than is predicted from the A-weighted sound level. The additional annoyance may result from a variety of factors including (1) less building sound transmission loss at low frequencies than at high frequencies and (2) increased growth in subjective loudness with changes in sound pressure level at low frequencies. In addition, environmental sound pressure levels in excess of 75 to 80 dB in the 16, 31.5, or 63-Hz octave bands may result in noticeable building rattle sounds. Rattle sounds can cause a large increase in annoyance. The methods in this annex may be used to assess environmental sounds with strong low-frequency content.

D2 Analysis factors

Analysis of sounds with strong low-frequency content is based on the following three factors:

1) Generally, annoyance is minimal when octave-band sound pressure levels are less than 65 dB at 16, 31.5, and 63-Hz midband frequencies. However, low-frequency sound sources characterized by rapidly fluctuating amplitude, such as rhythm instruments for popular music, may cause annoyance when these octave-band sound pressure levels are less than 65 dB.

2) Annoyance grows quite rapidly with sound pressure level at very low frequencies. A "squared" function represents this phenomenon in this annex.

3) Annoyance to sounds with strong low-frequency content is virtually only an indoor problem.

Although windows and house walls have significant high-frequency sound transmission loss, sounds in the 16, 31.5 and 63-Hz octave bands pass through these structures to the interior with relative ease. The low-frequency sound pressure level within these structures is nearly equal to the outdoor sound pressure level because the minimal sound transmission loss of the windows and walls often is offset by modal resonance amplification in enclosed rooms.