

The Palestra Building
London, England



VII. Acoustical Breadth – Mechanical Noise Impact on Community

When altering the mechanical equipment that is placed outdoors (i.e. roof level) it is important to understand the acoustical effects of these changes to ensure that neighboring buildings are not affected by the additional noise, if any.

An increase in acoustical levels is expected when switching from electric air-cooled chiller to IC engine driven chillers because of the nature of the machines. However, if there is a dramatic increase in sound pressure levels then measures will need to be taken to install acoustical barriers.

The following are the calculations used to determine the community’s reaction to the existing chiller plant in comparison to the proposed engine driven chiller plant.

Step 1: Plot decibel (dB) levels for the sound emitter on the Composite Noise Rating (CNR) curve. The CNR rating is the lowest CNR curve not exceeded.

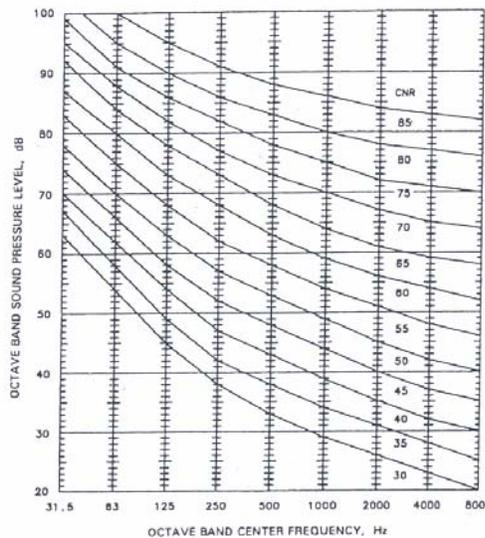


Figure 7.1 Composite Noise Rating Curves

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Step 2: Correct for Background Noise

Condition	Background Correction Number
Nighttime, rural; no nearby traffic of concern	+15
Daytime, rural; no nearby traffic of concern	+10
Nighttime, suburban; no nearby traffic of concern	+10
Daytime, suburban; no nearby traffic of concern	+5
Nighttime, urban; no nearby traffic of concern	+5
Daytime, urban; no nearby traffic of concern	0
Nighttime, business or commercial area	0
Daytime, business or commercial area	-5
Nighttime, industrial or manufacturing area	-5
Daytime, industrial or manufacturing area	-10
Within 90 m of intermittent light traffic	0
Within 90 m of continuous light traffic	-5
Within 90 m of continuous medium-density traffic	-10
Within 90 m of continuous heavy-density traffic	-15
90 to 300 m from intermittent light traffic	+5
90 to 300 m from continuous light traffic	0
90 to 300 m from continuous medium-density traffic	-5
90 to 300 m from continuous heavy-density traffic	-10
300 to 600 m from intermittent light traffic	+10
300 to 600 m from continuous light traffic	+5
300 to 600 m from continuous heavy-density traffic	-5
600 to 1200 m from intermittent light traffic	+15
600 to 1200 m from continuous light traffic	+10
600 to 1200 m from continuous medium-density traffic	+5
600 to 1200 m from continuous heavy-density traffic	0

Figure 7.2 Correction Values for Possible Background Noise

Step 3: Correct for other factors.

Correction for time-of-day and seasonal factors	
<i>(for full-time operation, total correction is 0)</i>	
Daytime only	-5
Nighttime (2200 to 0700 hrs)	0
Winter only	-5
Winter and summer	0
Correction for intermittency	
<i>(ratio of source "on" time to reference time period)</i>	
1.00 to 0.57	0
0.56 to 0.18	-5
0.17 to 0.06	-10
0.05 to 0.018	-15
0.017 to 0.0057	-20
0.0057 to 0.0018	-25
Correction for character of noise	
Noise is very low frequency (peak level at 1/1 octave center frequency of 125 Hz or lower)	+5
Noise contains tonal components	+5
Impulsive sound	+5
Correction for previous exposure and community attitude	
No prior exposure	+5
Some previous exposure but poor community relations	+5
Some previous exposure and good community relations	0
Considerable previous exposure and good community relations	-5

Figure 7.3 Correction Values for Other Factors

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Step 4: Determine probable community reaction.

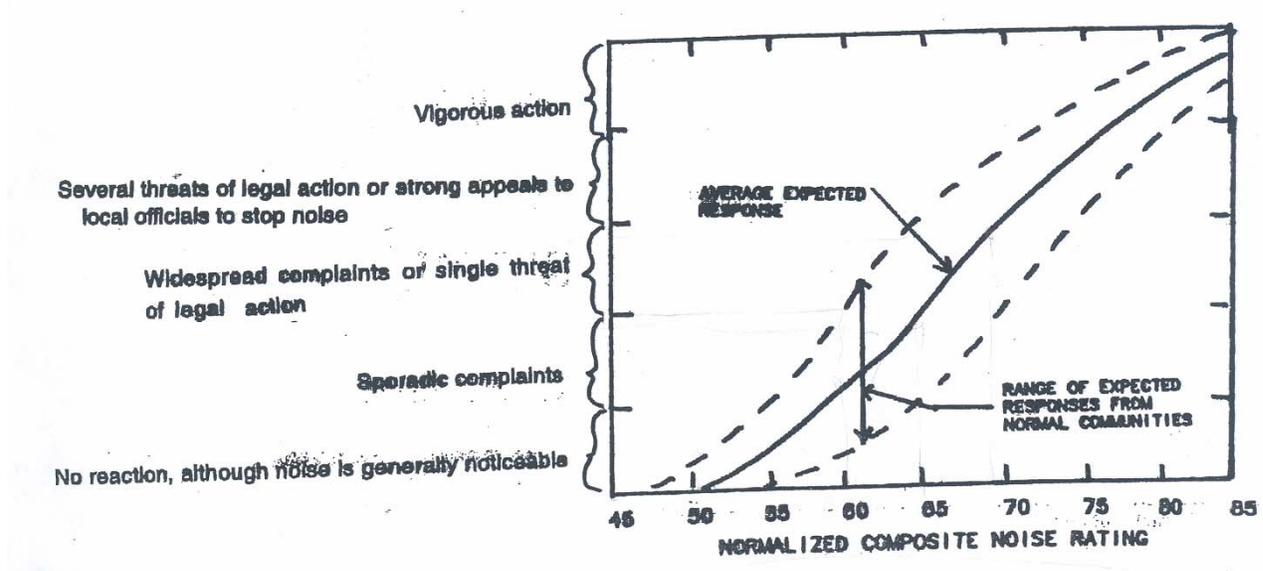


Figure 7.4 Community Reaction Graph

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Tables 7.1 and 7.2 outline the acoustic calculations for both the existing conditions and the proposed engine system.

Table 7.1 Existing HVAC Acoustics

Composite Noise Rating (CNR)

Existing Electric Chillers

Freq	dBA @ 1m	dBA-dB conversion	dB
63	57	-26.2	31
125	71	-16.1	55
250	70	-8.6	61
500	72	-3.2	69
1000	66	0	66
2000	62	1.2	63
4000	55	1	56
8000	46	-1.1	45
Uncorrected CNR = 70			

Background Noise Correction Factors

90-300m from continuous heavy density traffic = -10

Time of Day

Daytime Only = -5

Winter and Summer = 0

Intermittency

1.00-0.57 = 0

Character of Noise

None

Previous Exposure and Community Attitude

Considerable previous exposure and good community relations = -5

Corrected CNR 50
REACTION: No reaction, although noise is generally noticeable

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Table 7.2 Proposed HVAC Acoustics

Composite Noise Rating (CNR)

Proposed Engine Driven Chiller

Freq	dB @ 1m
63	72
125	78
250	84
500	89
1000	86
2000	80
4000	72
8000	64

Uncorrected CNR = 85

Background Noise Correction Factors

90-300m from continuous heavy density traffic = -10

Time of Day

Daytime Only = -5

Winter and Summer = 0

Intermittency

1.00-0.57 = 0

Character of Noise

None

Previous Exposure and Community Attitude

Considerable previous exposure and good community relations = -5

Corrected CNR 65
REACTION: Sporadic
Complaints

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Tables 7.1 and 7.2 also summarize the results of the Composite Noise Rating for the electric chiller scheme as well as the IC engine driven chiller plant. The community’s reaction to the existing design is “No reaction, although noise is generally noticeable,” while the new plant has a reaction of “Sporadic Complaints.” The Palestra Building has a large advantage because of its location with respect to noise because it is such a high traffic area with the Underground Station, the above ground trains, and a busy intersection. The members of the community are somewhat desensitized to the additional noise created.



Figure 7.5 View of High Traffic Areas from 7th Floor