Q is the directivity factor of the sound source
R is the room constant

Example:

$$\text{loss}\,(4') = 10\log\left[\frac{6}{4\pi(4)^2}\ \frac{4}{1000}\right] = -14.71\ \text{dB}$$

$$\text{loss}\,(40') = 10\log\left[\frac{6}{4\pi(40)^2}\ \frac{4}{1000}\right] = -23.67\ \text{dB}$$

The difference is 23.67 - 14.71 = 8.96 dB-SPL

Outdoors, the formula for the inverse square law is as follows:

loss in dB-SPL at the measurement point, $r = 20\log\dfrac{r}{r_1}$

where:
r is the distance to the measurement point
r_1 is the measured reference distance

APPENDIX 1-1
Low frequency dispersion control.

At lower frequencies sound is dispersed in a very wide pattern. This is because the cone of the transducer is small in comparison to the wavelength of the low frequencies being reproduced. The approximate wavelength of a frequency in feet can be achieved by using this simple formula:

$$\text{wavelength} = \frac{1130'}{\text{frequency}}$$

example:
$$\text{wavelength of } 250\ \text{Hz} = \frac{1130'}{250\ \text{Hz}} = 4.52'$$

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