

THE RELATION BETWEEN SOUND PRESSURE LEVEL AND R. M. S. FLUCTUATING PRESSURE

1. NOTATION

SPL	sound pressure level	dB	dB
p	root mean square fluctuating pressure	Pa	lbf/ft ²
p_{ref}	root mean square fluctuating pressure corresponding with 0 dB	Pa	lbf/ft ²

2. NOTES

In deriving structural loadings from noise data it is frequently necessary to convert a sound pressure level in decibels to a root mean square value of fluctuating pressure.

The Figure gives the relation between p in pascal and SPL in decibels (referred to 20 μ Pa) for the range 90 to 165 dB.

It is essential to check that the reference pressure is as quoted for this Item. If it is not the same, the required conversion may be derived from the definition of SPL in Section 2.2 of Item No. 66013.

It should also be noted that the conversion given applies *only to sound pressure level* and not to other quantities that may be given in decibels.

3. DERIVATION

$$SPL = 20 (\log_{10} p + 4.69897) \text{ when } p \text{ is in Pa}$$

$$SPL = 20 (\log_{10} p + 6.37913) \text{ when } p \text{ is in lbf/ft}^2$$

$$p_{ref} = 20 \mu Pa = 4.177 \times 10^{-7} \text{ lbf/ft}^2.$$

