is $3dB$, it can be inferred that the background noise is not as loud at the machinery, as combining two $40dB$ sources would result in a combined level of only $43dB$. Therefore, the machinery must be louder.

Test values for the machinery between $41dB$ and $45dB$.

$$SPL_{machinery} = 41dB \rightarrow Difference = 1dB \rightarrow Combined\,SPL = 41dB + 3dB = 44dB \neq 46dB$$

$$SPL_{machinery} = 42dB \rightarrow Difference = 2dB \rightarrow Combined\,SPL = 42dB + 2dB = 44dB \neq 46dB$$

$$SPL_{machinery} = 43dB \rightarrow Difference = 3dB \rightarrow Combined\,SPL = 43dB + 2dB = 45dB \neq 46dB$$

$$SPL_{machinery} = 44dB \rightarrow Difference = 4dB \rightarrow Combined\,SPL = 44dB + 2dB = 46dB = 46dB$$

$$SPL_{machinery} = 45dB \rightarrow Difference = 5dB \rightarrow Combined\,SPL = 45dB + 1dB = 46dB = 46dB$$

Note there are two viable answer choices, $44dB$ and $45dB$. However, only $45dB$ is an answer choice.

Answer D

45.5 The octave band measurements of a fan are: $63Hz$, $64dB$; $125Hz$, $67dB$; $250Hz$, $63dB$; $500Hz$, $63dB$; $1000Hz$, $59dB$; $2000Hz$, $54dB$; $4000Hz$, $50dB$; $8000Hz$, $46dB$. What is the NC rating?

A. NC-45

B. NC-50

C. NC-55

D. NC-60

Refer to the Noise Criteria curves and use the figure to plot the sound pressure level in dB for each octave band frequency. The NC rating is the lowest curve which all measured values fall below.

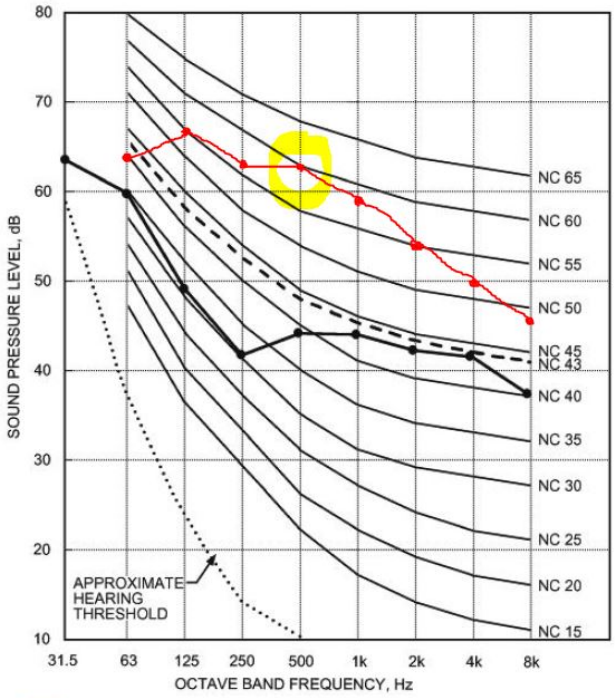

Fig. 7 NC (Noise Criteria) Curves and Sample Spectrum (Curve with Symbols)

In this case, the worst case octave band is the $500Hz$ frequency, and the rating is NC-60.
Answer D

45.6 A $5000lb_m$ machine rotates at $1800rpm$ and is mounted on vibration isolators with a combined stiffness of $40,000\frac{lb_f}{in}$. In parallel with the springs, a damper has been included. The damping ratio is 0.3. An unbalanced force of $2000lb_f$ is caused by the machine. What is the maximum force transmitted through the base?

A. $550lb_f$

B. $950lb_f$

C. $1050lb_f$

D. $1450lb_f$

Start by finding the natural frequency of the machine which is a function of the total combined spring stiffness and the mass. Note that g_c must be included to make the units consistent.

$$\omega_n = \sqrt{\frac{kg_c}{m}} = \sqrt{\frac{\left(40,000\frac{lb_f}{in}\right)\left(12\frac{in}{ft}\right)\left(32.2\frac{lb_m \cdot ft}{lb_f \cdot s^2}\right)}{5,000lb_m}} = 55.6\frac{rad}{s}$$