

Homework #4

Assigned Friday, November 3, 2006

Due at the start of class on Monday, November 13, 2006

(1) An industrial worker sustains the following noise exposure:

1 hour at 95 dBA

1 hour at 100 dBA

How many hours can this worker now spend in a 90 dBA noise field without exceeding the OSHA industrial noise guidelines (Table 13.11.2)? Explain.

(2) A large, rectangular meeting room has floor dimensions 20m wide x 60m long, and a floor-to-ceiling height of 15m. A balcony attached to the middle of the back wall extends 15m into the room. The balcony is 3m thick. The entire main floor area and top of the balcony is occupied by audience and orchestra. The two side walls, the front and underside of the balcony, and the ceiling are constructed of wooden wall material. The back wall above and below the balcony is heavy plate glass windows, while the front of the hall is painted concrete block.

a) Using the absorptivity data from Table 12.5.1 in the K&F text and the Sabine equation (12.3.4 and 12.3.6), determine an estimate for the reverberation time (T_{60}) for the room at 125 Hz, 500 Hz, and 4kHz.

b) Determine r_d , the critical distance for this room (see 12.7.2), using the total absorption at 500 Hz.

c) The effect of sound absorption in the hall due to atmospheric (air) losses can be estimated using the modified Sabine equation (12.3.10 and 12.3.11). Assuming the air in the hall has a relative humidity of 35%, recalculate the reverberation times at frequencies 125 Hz, 500 Hz, and 4 kHz. Comment on the results.

