

Noise – Occupational Exposure Limits for Extended Workshifts Fact Sheets



ARE THERE GUIDELINES FOR NOISE EXPOSURE ON SHIFTS LONGER THAN 8 HOURS?

Most standards and guidelines concerning noise exposure limits are based on an 8-hour work shift and also provide exposure limits for shorter and longer working days. In real life conditions, longer working days are common. When determining exposure limits for an extended work shift such as a 12-hour shift, one must take into account information on health effects related to noise exposure and those related to a 12-hour shift work. The final answer has to come from a study of actual work places that might have experimented or adapted such work practices.

A change from an 8-hour shift to a 12-hour shift must consider the following issues:

- Eight-hour time-weighted noise exposure level in dB(A).
- Problems related to use of hearing protectors for such a prolonged work shift.
- Combined effect of stress factors related to a 12-hour shift and noise exposure.

How do I calculate the exposure limit?

Equal energy rule

Many regulatory agencies recommend a time-weighted average (TWA) sound level of 85 dB(A) to 90 dB(A) as a noise exposure limit for 8-hour work day.

The International Organization for Standardization standard ISO 1999:1990 – Acoustics – Determination of occupational noise exposure and estimation of noise-induced hearing impairment recommends the use of the equal energy principle (3 dB exchange rate) in calculating the TWA for a work shift:

$$\text{Limit for a given shift} = \text{L}_{\text{exposure limit}} - 10 \log (T/8)$$

where T = duration of work shift in hours. Results of such calculation for various extended work shifts are listed in Table 1.

Table 1 also shows the noise exposure limit for extended shifts using both 5dB and 3dB exchange rates.

Table 1 Calculation of Noise Exchange Rates for Extended Shifts			
3dB exchange rate		5 dB exchange rate	
Time (hours)	Noise limit	Time (hours)	Noise limit

T	85	90	T	85	90
4	88.01	93.01	4	90.00	95.00
5	87.04	92.04	5	88.39	93.39
6	86.25	91.25	6	87.08	92.08
7	85.58	90.58	7	85.96	90.96
8	85.00	90.00	8	85.00	90.00
9	84.49	89.49	9	84.15	89.15
10	84.03	89.03	10	83.39	88.39
11	83.62	88.62	11	82.70	87.70
12	83.24	88.24	12	82.08	87.08
13	82.89	87.89	13	81.50	86.50
14	82.57	87.57	14	80.96	85.96
15	82.27	87.27	15	80.47	85.47
16	81.99	86.99	16	80.00	85.00

The noise exposure limit for a 12-hour shift using an exchange rate of 3dB and limit of 85 dB(A), based on the equal energy rule, is 83.24 dB(A). In other words, if the noise level is kept below 83 dB(A) then, according to equal energy concept, the maximum permissible limit is not exceeded.

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