Noise Dose and 8-Hour Time-Weighted Average

Daily noise dose and 8-hour TWA from up to three exposures at measured levels, by the OSHA 90 dBA, 5 dB exchange rule or the 85 dBA, 3 dB rule.

Method: 29 CFR 1910.95 Appendix A (OSHA): T = 8/2^((L − 90)/5); D = Σ C/T; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Criterion	OSHA: 90 dBA, 5 dB exchange (29 CFR 1910.95)	
Level of exposure 1 (dBA)	95.000	
Duration of exposure 1	4.0000	h
Level of exposure 2 (dBA)	88.000	
Duration of exposure 2	3.0000	h
Level of exposure 3 (dBA)	80.000	
Duration of exposure 3	1.0000	h

Calculated results

Parameter	Value	Unit
Noise dose	131.54	%
8-hour time-weighted average (dBA)	91.978	
Permitted time at level 1	4.0000	h

Notes for this case

• A dose above 100 % exceeds the criterion. OSHA counts only levels of 80 dBA and above for the action level and 90 dBA and above for the PEL; this calculator counts every level entered, so against the PEL it can overstate the dose.

Formula and method

$$T = \frac{8\ \text{h}}{2^{(L-L_c)/q}}, \quad D = \sum \frac{C_i}{T_i}, \quad TWA = L_c + \frac{q}{\log_{10} 2} \log_{10} D$$

Variables

rule	Criterion	-
L_1	Level of exposure 1 (dBA)	-
C_1	Duration of exposure 1	s
L_2	Level of exposure 2 (dBA)	-
C_2	Duration of exposure 2	s
L_3	Level of exposure 3 (dBA)	-
C_3	Duration of exposure 3	s
D	Noise dose	-
TWA	8-hour time-weighted average (dBA)	-
T_1	Permitted time at level 1	s

Method and standards

Equal-energy (3 dB) or OSHA (5 dB) exchange rule.

Assumptions and limits

- Steady levels in each period.

- Every level entered is counted; OSHA counts only levels of 80 dBA and above for the action level and 90 dBA and above for the PEL, so enter only those levels for a strict OSHA comparison.

References

- 29 CFR 1910.95 Appendix A (OSHA): T = 8/2^((L − 90)/5)
- D = Σ C/T
- TWA = 16.61 $\log_{10}$(D) + 90
- NIOSH 1998 criterion: 85 dBA
- 3 dB exchange

Report details

Report reference	FCC-P99A-7ESA (the same inputs always give the same reference)
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Calculator	Noise Dose and 8-Hour Time-Weighted Average
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/instrumentation/vibration-noise/noise-dose-twa

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.