Composite Partition Transmission Loss (Wall, Window, Door)

Overall transmission loss of a wall with up to three elements of different areas and transmission losses, by area-weighted transmission coefficients.

Method: Area-weighted transmission coefficient

Input parameters

Unit system: SI

Parameter	Value	Unit
Area of element 1 (wall)	20.000	m²
Transmission loss 1	50.000	
Area of element 2 (window)	3.0000	m²
Transmission loss 2	30.000	
Area of element 3 (door or gap)	2.0000	m²
Transmission loss 3	20.000	

Calculated results

Parameter	Value	Unit
Average transmission coefficient	9.2800e-04	
Composite transmission loss	30.325	
Transmission loss of element 1 alone	50.000	
Share of sound through element 3	86.207	%

Notes for this case

• τ_i = 10^(−TL_i/10); τ̄ = ΣS_iτ_i/ΣS_i; TL = −10log τ̄. The weakest element dominates: a small door or an open gap (TL ≈ 0) can cut a 50 dB wall to 20 dB. Use each element's TL in the same frequency band.

Formula and method

$$TL_c = -10 \log_{10} \frac{\sum S_i 10^{-TL_i/10}}{\sum S_i}$$

Variables

S_1	Area of element 1 (wall)	m²
TL_1	Transmission loss 1	-
S_2	Area of element 2 (window)	m²
TL_2	Transmission loss 2	-
S_3	Area of element 3 (door or gap)	m²
TL_3	Transmission loss 3	-
$\bar{\tau}$	Average transmission coefficient	-
TL_c	Composite transmission loss	-
$TL_{1,only}$	Transmission loss of element 1 alone	-
η_3	Share of sound through element 3	-

Method and standards

Composite TL.

Assumptions and limits

- Elements in the same band; diffuse incidence.

References

Area-weighted transmission coefficient

Report details

Report reference	FCC-5VVC-NJCV (the same inputs always give the same reference)
Generated	23 November 2026, 18:09 UTC
Calculator	Composite Partition Transmission Loss (Wall, Window, Door)
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 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/composite-partition-transmission-loss

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.