

Example of Sabine reverberation time calculation

Consider a rectangular room with floor dimensions 15m x 20m and a ceiling height of 4m.

For this example, let's assume that the floor material has absorptivity $a = 0.2$, ceiling $a = 0.4$, and wall material has $a = 0.6$.

Volume of the room is: $L \times W \times H = 15 \times 20 \times 4 \text{ m}^3 = \underline{\underline{1200 \text{ m}^3}}$

There are six surfaces:

Floor area = $15 \times 20 = 300 \text{ m}^2$

Ceiling area = $15 \times 20 = 300 \text{ m}^2$

Front and back walls = $15 \times 4 = 60 \text{ m}^2$ each

Side walls = $20 \times 4 = 80 \text{ m}^2$ each

The Sabine formula is:

$$T_{60} = \frac{0.161V}{\sum_i S_i a_i}$$

V = total volume in m^3

S_i = area of surface i in m^2

a_i = absorptivity of surface i

Thus, the numerator becomes $0.161 V = 0.161 \times 1200 = \underline{\underline{193.2}}$

The denominator is the sum of each surface area times its absorptivity:

Floor: $300 \times 0.2 = 60$

Ceiling: $300 \times 0.4 = 120$

Front: $60 \times 0.6 = 36$

Back: $60 \times 0.6 = 36$

Side1: $80 \times 0.6 = 48$

Side2: $80 \times 0.6 = 48$

Sum in denominator = **348**

So the estimated T_{60} for this example room is $193.2 / 348 = \underline{\underline{0.56 \text{ seconds}}}$
