

Speaker coverage calculation

How to calculate the number of speakers needed for a project

Before calculating the number of speakers that are needed for a certain area, you need to know the area's ceiling height. Since speakers, as opposed to cameras, do not have sharp angles, the number of speakers in a certain project can vary depending on how uniform you need the audio experience to be. With more speakers, it is possible to create a more even dB SPL throughout the area.

This document will cover two different systems. Your number of speakers can be anything in between these two systems, depending on the project requirements and final cost.

Basic system

This system will give you the minimum number of speakers needed to cover a certain area. Going below this number of speakers is never recommended, since the dB SPL would vary too much within the area.

Examples of businesses choosing a Basic system could be a grocery store or a DIY store.

Premium system

This system will give you twice the number of speakers compared to a Basic system. A more even dB SPL will be created throughout the area. If you wish, you can also go above this number of speakers.

Example of businesses choosing a Premium system could be a high-end fashion store.

Choosing the right speaker

These calculations are mainly for AXIS C1004-E and AXIS C2005 speakers. In certain cases, you need AXIS C3003-E speaker, for instance, in a warehouse with a ceiling higher than around 15 ft / 5 m, or in a noisy environment with a loud ambient dB SPL. For more details, see the document Introduction to Audio, which includes a diagram over different noise levels and how they can be perceived.

AXIS Site Designer

You can also use the AXIS Site Designer available at <https://sitedesigner.axis.com> to calculate the number of speakers needed. Calculations are default to a Premium system but you can check the Basic system checkbox to calculate for a Basic system.

Coverage Calculation Tables

Mounting Height	dB SPL @ 1,5m from floor	Premium System Coverage per speaker	Basic System Coverage per speaker
2,5m	96	19,6m ²	39,3m ²
3,0m	93	28,3m ²	56,5m ²
3,5m	90	38,5m ²	76,9m ²
4,0m	88	50,2m ²	100,5m ²
4,5m	86	63,6m ²	127,2m ²
5,0m	85 / 110*	78,5m ²	157,0m ²
5,5m	84 / 109*	95,0m ²	190,0m ²
6,0m	83 / 108*	113,0m ²	226,1m ²
6,5m	82 / 107*	132,7m ²	265,3m ²
7,0m	81 / 106*	153,9m ²	307,7m ²
8,0m	80 / 105*	201,0m ²	401,9m ²
9,0m	79 / 104*	254,3m ²	508,7m ²
10,0m	78 / 103*	314,0m ²	628,0m ²

Mounting Height	dB SPL @ 5ft from floor	Premium System Coverage per speaker	Basic System Coverage per speaker
8ft	96	211sq ft	422sq ft
10ft	93	304sq ft	608sq ft
11ft	90	414sq ft	828sq ft
13ft	88	541sq ft	1081sq ft
15ft	86	684sq ft	1368sq ft
16ft	85 / 110*	845sq ft	1689sq ft
18ft	84 / 109*	1022sq ft	2044sq ft
20ft	83 / 108*	1216sq ft	2432sq ft
21ft	82 / 107*	1427sq ft	2855sq ft
23ft	81 / 106*	1655sq ft	3311sq ft
26ft	80 / 105*	2162sq ft	4324sq ft
30ft	79 / 104*	2736sq ft	5473sq ft
33ft	78 / 103*	3378sq ft	6756sq ft

* AXIS C3003-E