



INVISIBLE LOUDSPEAKER APPLICATION STUDY

# COMMERCIAL AUDIO SYSTEMS

— Retail, Corporate, Public Spaces & Galleries —

*amina.*



Luxury Retail Store, Tokyo, Japan - Speakers throughout

## Commercial Audio

Commercial properties often have a unique set of project requirements compared to residential projects.

Although some commercial properties require more specialist systems, the vast majority of projects are likely to have a fairly similar set of requirements:

- Even sound coverage
- High-impedance compatibility
- Full bandwidth performance

Additional requirements may be for high SPLs in bars and clubs or multichannel systems in boardrooms.

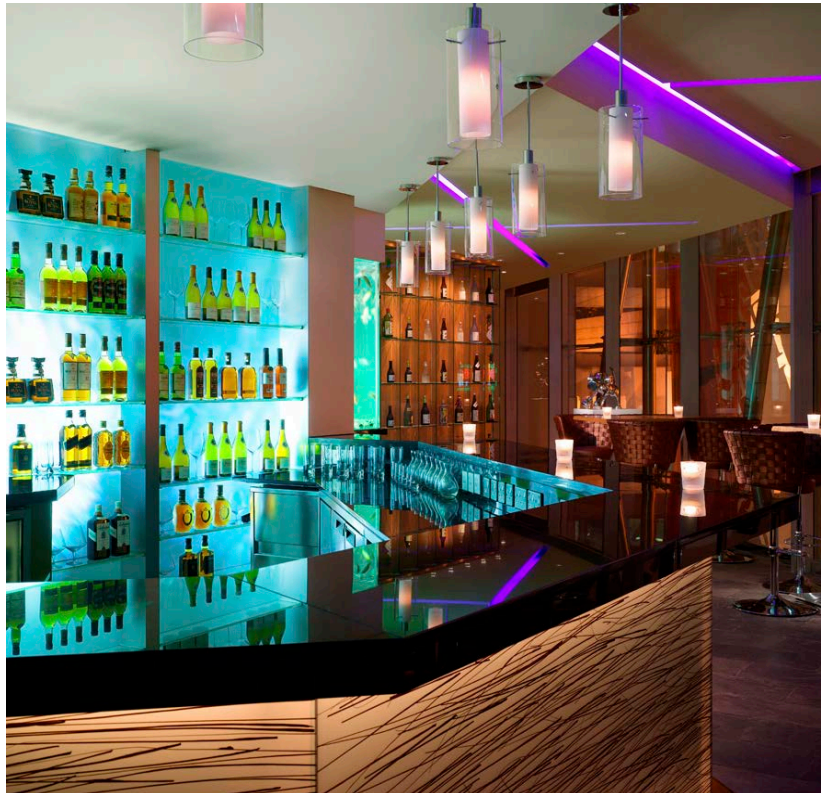
High-end retail projects require every aspect of the design to create a luxurious environment that emphasises brand identity, allowing complete focus on the product.

Restaurant, bar and lounge areas may require even sound coverage for the purpose of sound masking, privacy and creation of ambience.

Amina commercial loudspeaker installations can provide a great solution for even sound coverage in restaurants, hotels, galleries, public spaces, educational facilities, conference centers, office spaces and boardrooms, all in an easy to install and low maintenance package.



Cheltenham College, Cheltenham, UK - Speakers in traditional wooden panelling



Toroko Restaurant, Hong Kong - In-ceiling speakers throughout dining and bar areas

## High & Low Impedance

All Amina flat panel loudspeakers are available to purchase in both high and low impedance varieties. With a range of high quality toroidally wound transformers, loudspeakers can easily be installed where 100V / 70V line systems have been specified.

Both fixed value and multi-tapped transformers are available for both maximum acoustic performance and installation flexibility across large commercial properties.

High impedance (sometimes referred to as fixed voltage) systems allow for loudspeakers to be installed with long cable runs with a lower number of amplifier channels.

While a high impedance system is often a great choice for commercial installations, there may be times when a low impedance system offers greater flexibility. Having the ability to individually adjust each loudspeaker post-installation, or reconfigure the system, allowing adjustments to the use of the space, might make a low impedance system more desirable.

Low impedance loudspeaker systems also benefit from improved low frequency performance when compared to a 100V / 70V line system.





Langham Place Hotel, Hong Kong - Speakers throughout bar, lounge and dining areas

## Loudspeaker Spacing

With a loudspeaker that has a full-bandwidth 180° dispersion pattern, there are a number of construction and design benefits. This can allow a system-integrator to create a highly effective commercial audio system, with incredibly smooth coverage throughout the space.

VPT loudspeakers typically allow for two to four times less units to be used to achieve the exact same coverage within a space. This can help to reduce installation time, amplification cost, cable requirements and ultimately total system cost.

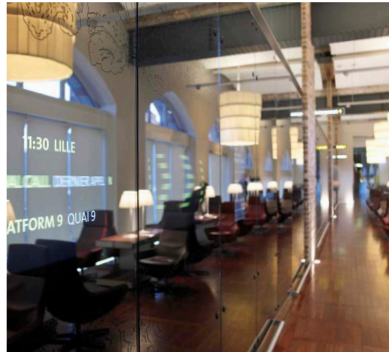
With both full-bandwidth 180° dispersion and the incoherent-phase waveform generated by

a VPT loudspeaker, consistent sound coverage can be easily achieved with next to no variation in frequency response across the entire space. The reduction in hot and cold spots makes the loudspeakers a great option for bars and restaurants where every customer requires the same level of privacy.

With any loudspeaker specification, as the ceiling height increases, the loudspeaker spacing also increases. The exact spacing will depend on requirements for variation in SPL across the listening space. Use table on page 8 as a guide.

Although loudspeaker spacing is an important aspect to consider, it is also worth considering audio channel count (mono/stereo) and sound localisation. Some areas may require additional coverage, such as a changing room; some areas may require a reduced SPL, such as the serving area within a bar.

Once installed, Amina loudspeakers are completely maintenance free. Plastered in and painted over, the loudspeakers can be treated in exactly the same way as the rest of the ceiling or wall.



Business Lounge, St Pancras International Station, London, UK





Plataforma Das Artes - Guimarães, Portugal - Art gallery with large open neutral spaces for flexible usage. Speakers throughout.

## Loudspeaker Spacing Chart

This chart should be used to calculate correct spacing for ceiling-mounted **Amina loudspeakers only**. It should not be used to calculate spacing of other manufacturers loudspeakers.

Recommended spacing is suggested based on ceiling height, listener head-height and desired variation in SPL across the listening position. Consideration for sound localisation, channel count and min/max SPL should also be taken.

Options for 0dB, 3dB and 6dB variation in SPL are provided, with both sitting and standing listening positions have (taken as 1m and 1.6m respectively). For multi-use rooms, select spacing for standing position.

Note that absolute loudspeaker location will depend on ceiling layout, space availability as well as correct spacing. Intelligent-compromise can be made to achieve the best solution for the space.

This chart should be used as a guideline and does not account for multichannel/stereo systems, or where a more customised loudspeaker spacing is required.

For more information or assistance on loudspeaker specification, please contact your Amina distributor.

Ceiling Height (m)	Loudspeaker Spacing for Stated Variation in SPL					
	0dB SPL Variation		3dB SPL Variation		6dB SPL Variation	
	Sitting (1m)	Standing (1.6m)	Sitting (1m)	Standing (1.6m)	Sitting (1m)	Standing (1.6m)
2.4	2.80	1.60	4.85	2.77	6.45	3.69
2.6	3.19	2.00	5.54	3.46	7.37	4.61
2.8	3.59	2.40	6.24	4.16	8.30	5.53
3	3.99	2.80	6.93	4.85	9.22	6.45
3.2	4.39	3.19	7.62	5.54	10.14	7.37
3.4	4.79	3.59	8.31	6.24	11.06	8.30
3.6	5.19	3.99	9.01	6.93	11.98	9.22
3.8	5.59	4.39	9.70	7.62	12.90	10.14
4	5.99	4.79	10.39	8.31	13.83	11.06
4.2	6.39	5.19	11.09	9.01	14.75	11.98
4.4	6.79	5.59	11.78	9.70	15.67	12.90
4.6	7.19	5.99	12.47	10.39	16.59	13.83
4.8	7.59	6.39	13.16	11.09	17.51	14.75
5	7.99	6.79	13.86	11.78	18.43	15.67
5.2	8.39	7.19	14.55	12.47	19.36	16.59
5.4	8.79	7.59	15.24	13.16	20.28	17.51
5.6	9.19	7.99	15.93	13.86	21.20	18.43
5.8	9.58	8.39	16.63	14.55	22.12	19.36
6	9.98	8.79	17.32	15.24	23.04	20.28



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