



# Acoustic performance

Possible 2 points

## Intent

To provide workspaces and classrooms that promote occupants' well-being, productivity, and communications through effective acoustic design.

## Requirements

For all occupied spaces, meet the following requirements, as applicable, for HVAC background noise, sound isolation, reverberation time, and sound reinforcement and masking.

### HVAC Background Noise

Achieve maximum background noise levels from heating, ventilating, and air conditioning (HVAC) systems per 2011 ASHRAE Handbook, HVAC Applications, Chapter 48, Table 1; AHRI Standard 885-2008, Table 15; or a local equivalent. Calculate or measure sound levels.

For measurements, use a sound level meter that conforms to ANSI S1.4 for type 1 (precision) or type 2 (general purpose) sound measurement instrumentation, or a local equivalent.

Comply with design criteria for HVAC noise levels resulting from the sound transmission paths listed in ASHRAE 2011 Applications Handbook, Table 6; or a local equivalent.

### Sound Isolation

Meet the composite sound transmission class (STCC) ratings listed in Table 1, or local building code, whichever is more stringent.

**Table 1. Minimum composite sound transmission class ratings for adjacent spaces**

Adjacency combinations		STCC
Residence (within a multifamily residence), hotel or motel room	Residence, hotel or motel room	55
Residence, hotel or motel room	Common hallway, stairway	50
Residence, hotel or motel room	Retail	60
Retail	Retail	50
Standard office	Standard office	45
Executive office	Executive office	50
Conference room	Conference room	50
Office, conference room	Hallway, stairway	50
Mechanical equipment room	Occupied area	60

### Reverberation Time

Meet the reverberation time requirements in Table 3 (adapted from Table 9.1 in the Performance Measurement Protocols for Commercial Buildings<sup>1</sup>).

**Table 3. Reverberation time requirements**

Room type	Application	T60 (sec), at 500 Hz, 1000 Hz, and 2000 Hz
Apartment and condominium	—	< 0.6
Hotel/motel	Individual room or suite	< 0.6
	Meeting or banquet room	< 0.8
Office building	Executive or private office	< 0.6
	Conference room	< 0.6
	Teleconference room	< 0.6
	Open-plan office without sound masking	< 0.8
	Open-plan office with sound masking	< 0.8

Courtroom	Unamplified speech	< 0.7
	Amplified speech	< 1.0
Performing arts space	Drama theaters, concert and recital halls	Varies by application
Laboratories	Testing or research with minimal speech communication	< 1.0
	Extensive phone use and speech communication	< 0.6
Church, mosque, synagogue	General assembly with critical music program	Varies by application
Library		< 1.0
Indoor stadium, gymnasium	Gymnasium and natatorium	< 2.0
	Large-capacity space with speech amplification	< 1.5
Classroom	—	< 0.6

## Sound Reinforcement and Masking Systems

### Sound Reinforcement

For all large conference rooms and auditoriums seating more than 50 persons, evaluate whether sound reinforcement and AV playback capabilities are needed.

If needed, the sound reinforcement systems must meet the following criteria:

- Achieve a speech transmission index (STI) of at least 0.60 or common intelligibility scale (CIS) rating of at least 0.77 at representative points within the area of coverage to provide acceptable intelligibility.
- Have a minimum sound level of 70 dBA and must
- Maintain sound-level coverage within  $\pm 3$  dB at the 2000 Hz octave band throughout the space.

### Masking Systems

For projects that use masking systems, the design levels must not exceed 48 dBA. Ensure that loudspeaker coverage provides uniformity of  $\pm 2$  dBA and that speech spectra are effectively masked.

<sup>1</sup> Adapted from ASHRAE (2007d), ASA (2008), ANSI (2002), and CEN (2007)