

# Minimum Acoustic Performance



## *LEED 2009 – EQ P3 for Schools, LEEDv4 – Acoustic Performance*

### **Requirements LEED 2009 (BD+C for Schools)**

#### Background noise

Achieve a maximum background noise level from heating, ventilating and air conditioning (HVAC) systems in classrooms and other core learning spaces of 45 dBA.

#### **AND**

#### Reverberation Time

Design classrooms and other core learning spaces to include sound-absorptive finishes to sufficiently limit reverberation in classrooms and other core learning spaces.

#### **Case 1. Classrooms and core learning spaces <20,000 cubic feet (560 cubic meters)**

For classrooms and core learning spaces less than 20,000 cubic feet, option for compliance include:

#### **Option 1, Minimum NRC**

For each room, confirm that the total surface area finished with a material with a Noise Reduction Coefficient (NRC) of 0.70 or higher equals or exceeds the total ceiling area (excluding lights, diffusers and grilles).

#### **OR**

#### **Option 2, Compliance with ANSI Standard S12.60-2002 or non-U.S. equivalent**

Confirm through calculations described in ANSI Standard S12.60-2002 that rooms are designed to meet reverberation time requirements as specified in that standard. Projects outside the U.S. may use a local equivalent to ANSI Standard S12.60-2002.

#### **Case 2. Classrooms and core learning spaces >20,000 cubic feet (560 cubic meters)**

For classrooms and core learning spaces 20,000 cubic feet or greater, confirm through calculations described in ANSI Standard S12.60-2002 that rooms are designed to have a reverberation time of 1.5 seconds or less. Projects outside the U.S. may use a local equivalent to ANSI Standard S12.60-2002.

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## Requirements LEED v4:

### HVAC background noise

Achieve a maximum background noise level<sup>1</sup> from heating, ventilating and air conditioning (HVAC) systems in classrooms and other core learning spaces. Follow the recommended methodologies and best practices for mechanical system noise control in ANSI Standard S12.60-2002, Part 1, Annex A.1; the 2011 HVAC Applications ASHRAE Handbook, Chapter 48, Noise and Vibration Control (with errata); AHRI Standard 885-2008; or a local equivalent for projects outside the U.S.

### Exterior noise

For high-noise sites (peak-hour Leq above 60dBA during school hours), implement acoustic treatment and other measures to minimize noise intrusion from exterior sources and control sound transmission between classrooms and other core learning spaces. Projects at least one-half mile (800 meters) from any significant noise source (e.g. aircraft over-flights, highways, trains, industry) are exempt.

### Reverberation Time

Adhere to the following reverberation time requirements.

### **Classrooms and core learning spaces <20,000 cubic feet (566 cubic meters)**

Design classrooms and other core learning spaces to include sufficient sound-absorptive finishes for compliance with the reverberation time requirements specified in ANSI Standard S12.60-2002, Part 1, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools, or a local equivalent for projects outside the U.S.

### **Option 1**

For each room, confirm that the total surface area of acoustic wall panels, ceiling finishes, and other sound-absorbent finishes equals or exceeds the total ceiling area of the room (excluding lights, diffusers, and grilles). Materials must have an NRC of 0.70 or higher to be included in the calculation.

**OR**

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## Option 2

Confirm through calculations described in ANSI Standard S12.60-2002 that rooms are designed to meet reverberation time requirements as specified in that standard.

### **Classrooms and core learning spaces >20,000 cubic feet (566 cubic meters)**

Meet the recommended reverberation times for classrooms and core learning spaces described in the NRC-CNRC Construction Technology Update No. 51, Acoustical Design of Rooms for Speech (2002), or a local equivalent for projects outside the U.S.

### Exceptions

Exceptions to the requirements because of a limited scope of work or to observe historic preservation requirements will be considered.

### Implementation:

#### Reverberation

An appropriate reverberation time can be confirmed in the design phase through a calculation, or it can be achieved prescriptively by using sufficient quantities of materials with a specified noise reduction coefficient (NRC).

#### Sound Transmission

Specified sound transmission performance is not required for compliance with this prerequisite. For information on sound transmission, see EQc9, Enhanced Acoustical Performance.

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## Avanti Product Contribution:

Avanti, in their supplied acoustic chart, lists the product's  $R_w$  numbers which measure sound transmission reduction.  $R_w$  is roughly a measurement of how much sound, in decibels, is restricted from passing through a surface. This prerequisite is looking for sound absorption information not sound transmission reduction ratings. For both reverberation time measurements and minimum Noise Reduction Coefficient ratings for sound-absorbent finishes, LEED requires (NRC) statistics. NRC is a type of sound absorption measurement, averaged over specific frequencies. Sound absorption measurements describe the percentage of incident sound that reflects back into a room (e.g. a surface with a NRC of 0.5 will at an average frequency reflect back half of the sound incident upon it). Unfortunately,  $R_w$  and NRC statistics can be a bit counteractive,  $R_w$  is focused on keeping sound in. While NRC is concerned with making sure it doesn't stay in. Though a high  $R_w$  value means a high level of sound absorption and not just reflection back into the room, Avanti's partition would have to be tested to determine exact absorptive properties like NRC. An RT60 Test is necessary to calculate reverberation time and an NRC test is necessary to measure NRC ratings. As it seems unlikely that Avanti's products will contribute very much to this prerequisite, these tests are an unnecessary expense and should not be undertaken.