# SOUND SOLUTIONS

## SOUND RATED PARTITIONS

No. 4

There are a wide variety of partition types and systems available to the building designer and contractor, and making an appropriate selection for your project is not always easy. There are many factors to consider including availability, cost, maintenance, appearance, thermal performance, fire rating, sound rating, as well as other factors. The purpose of this article is to give the reader some basic knowledge about partition sound ratings and overall acoustical performance so that you will be better able to select an appropriate system for your project.

The most widely utilized sound rating for partitions is the STC (sound transmission class) rating. This is a single number rating in decibels determined by laboratory sound transmission loss tests of the partition under controlled conditions at various frequencies. Generally, the higher the STC number the greater the reduction in sound transmission through the wall. The rating is intended to allow direct comparisons between different partition systems, but it is primarily weighted for measuring the effectiveness in reducing speech and speech-like sounds.

In most cases the STC rating is a reliable method of comparing partitions. In some cases, however, a higher STC rating does **not** mean lower noise levels in the adjacent space. This is often the case with low frequency mechanical equipment noise.

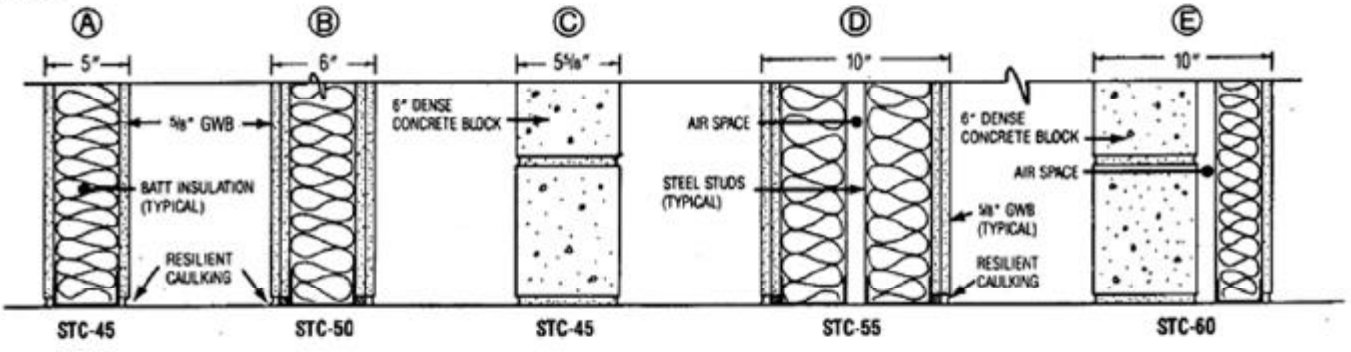
Five section drawings of commonly used sound rated partitions are shown below along with their approximate STC ratings. These particular partitions are shown because they are usually the most cost effective means of achieving the specified level of performance. Of course, there are numerous possible modifications to these four basic wall types which may be more appropriate in particular situations. The following paragraphs provide some guidance for evaluating other options.

**Internal Acoustical Insulation.** Filling the stud cavity with fiberglass or mineral wool batt insulation greatly improves the sound transmission loss of most wall types at all frequencies. In general, omitting the batt insulation will reduce the STC value about 5 dB. One should be cautioned not to use rigid thermal insulation in the stud cavity, because it provides little or no acoustical value.

**Mass vs. Thickness.** The surface weight of the partition (in pounds per square foot of surface area) is a prime factor determining STC. For single layer partitions (such as a concrete wall), each doubling of the surface weight should increase the STC by 5 dB. For double layer partitions (such as type C shown below), improved performance can be obtained by increasing the mass of the gypsum board panels or by increasing the cavity air space. One common method of increasing the mass of gypsum board panels is to laminate a layer of sheet lead to the drywall. In this way it is possible to double the surface weight of the partition without significantly increasing its thickness.

**Steel vs. Wood Studs.** In general, simple steel stud partitions out-perform wood stud partitions of similar construction. This is because of the inherent flexibility of the steel stud which allows the source side panel to vibrate somewhat independently from the gypsum panel on the receiver side of the partition. Wood stud partitions readily telegraph this vibration from the source side to the receiver side of the wall. The acoustical performance of wood stud partitions can be raised to the level of equivalent steel stud partitions by inserting a metal resilient channel between the stud and drywall on one side of the partition. The resilient channel (approximately ½" thick) is screwed directly to the wood stud, and the drywall is screwed to the resilient channel. Care should be taken to ensure that the drywall screws do not contact the wood studs. Resilient channels are not necessary on double stud partitions.

**Masonry vs. Gypsum Construction.** For most purposes gypsum board construction is preferred over masonry because of lower cost and weight for comparable acoustical performance. The primary exception is the case of isolating low frequency noise. Depending upon the frequency and the level of the noise, it may be necessary to use masonry construction to meet design goals. For example, the sound transmission loss of partition type A at 63 Hz is on the order of 20 dB whereas the type C partition is about 30 dB at the same frequency. Even though the STC values are about the same, 63 Hz mechanical noise would be about 10 dB higher (twice as loud) in the adjacent space using the type A partition instead of type C.




**Penetrations and Leaks.** Of course, the acoustical performance of a partition can be severely degraded by penetrations and leaks. Small leaks generally cause problems only at mid and high frequencies, but these can be very annoying. Certainly, it does not make sense to invest good money in an acoustical partition if there will be leaks to destroy its performance. Leaks are common at duct, pipe and conduit penetrations above the ceiling, at back to back electrical outlets, and at the partition perimeter. Leaks can usually be prevented by sealing the opening with a non-hardening, acoustical caulking. Note that the partition sections shown above call for continuous acoustical caulking at the floor/partition interface.

There are many other acoustical factors which should also be considered when selecting an appropriate partition system for a given project (e.g., flanking transmission, noise transfer through HVAC ductwork, etc.), but these are beyond the scope of this article. These issues should be referred to a qualified acoustical consultant to ensure optimum results at minimum cost to the owner.

The above information has been reviewed and is believed to be accurate, however we assume no responsibility for errors or omissions.