A crack under a door or a wall penetration created by a loosely fitting electrical outlet box can compromise the insulating properties of an otherwise excellent partition.

Air tightness is absolutely necessary to insulate against airborne noises.

For this reason, construction elements such as louvered doors and windows must be avoided, masonry walls should be painted when possible, and it is critically important to seal any holes or leaks in partitions with a flexible, non hardening sealant. Similarly, rubber gaskets must be used around doors or other openings.

An example

Theoretically,

A barrier with a 4-in thickness may have a TL of 40 dB at 500 Hz.

If the thickness (and mass) is doubled to 8 in, the new TL is about 45 dB.

To achieve another 5-dB increase in TL, the barrier's thickness would have to be increased to 16 in, and another 5 dB would demand 32 in, and so on.

Mass is extremely useful for sound insulation, but is not always the best approach.

Porous absorbers are useful for reducing reflected or ambient sound in a noise source room.

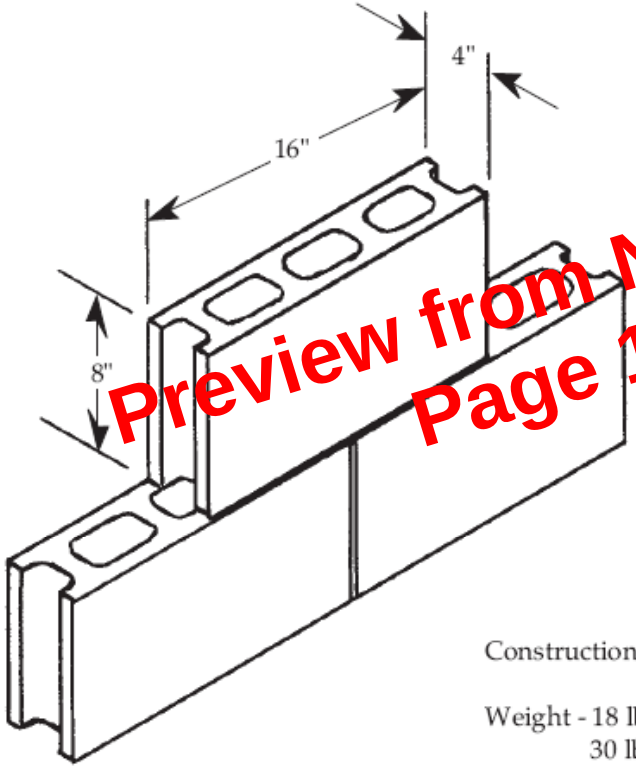
Additional absorption is effective at reducing sound levels when a room is relatively reflective; in some cases, a 10-dB reduction may be achieved.

The amount of sound transmitted through a barrier also depends on the surface area of the barrier. In particular, the noise reduction between two adjacent rooms is given by:

$$NR = TL + \log\ (A_{receiving} / S)$$

NR = noise reduction, dB
TL = transmission loss of barrier
A receiving = absorption in receiving room, sabins
S = surface area of common barrier, ft2

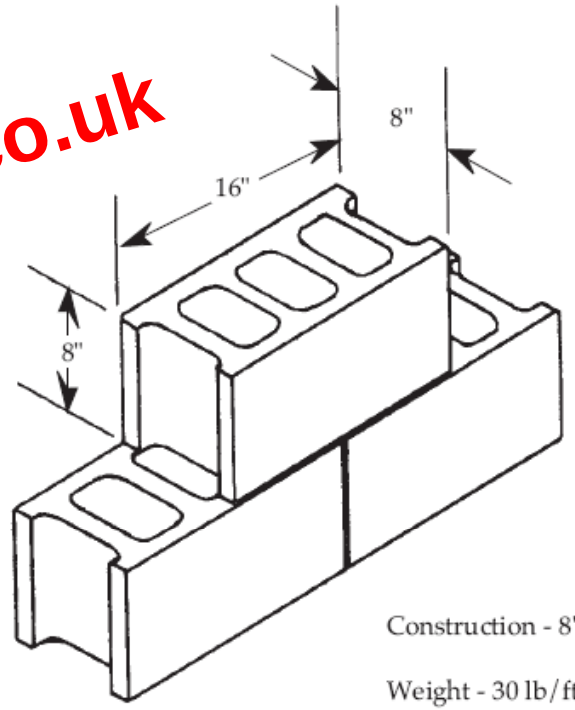
COMPARISON OF WALL STRUCTURES



Construction - 4" concrete block

Weight - 18 lb/ft^2 (plain)
30 lb/ft^2 (plastered both sides)

Sound transmission class -
STC 40 dB plain
STC 48 dB plastered both sides



Construction - 8" concrete block

Weight - 30 lb/ft^2 (plain)
67 lb/ft^2 (plastered both sides)

Sound transmission class -
STC 45 dB plain
STC 56 dB plastered both sides

By adding gypsum-board partitions to both sides of a concrete-block wall, STC can be increased to about 70.

Fig shows an adaptation to the staggered-stud construction.

In the latter there are, in effect, two entirely separate frames-one fixed to the inner and the other to the outer staggered- stud walls.