



Field Sound Transmission Class (FSTC)

Field Sound Transmission Class (FSTC) evaluates the sound-insulating properties of in-place building elements. It quantifies sound isolation between two rooms and the performance of a partition installed in the interior of a building. Testing is conducted to be as independent of the field conditions as possible and to yield a number for the partition only.

In practice, the Sound Transmission Class (STC) of laboratory samples represents optimum conditions, and is rarely achieved in actual construction. The difference between the FSTC and STC results from sound leaks and “flanking” paths. Flanking is sound that travels between two rooms along paths other than through the demising partition. FSTC is a function of background noise levels, room volumes, surface areas, sound absorption values, and spectral content of the sound source. Partitions composed of multiple elements such as doors, windows and walls will tend to have an overall FSTC close to the lowest FSTC value of any component.

The behavior of two partitions with similar FSTC rating can be considerably different. For example, one of the most annoying sounds transmitted between dwelling units tends to be the bass in music, a part of the sound spectrum far removed from the voice range. An eight inch concrete block wall rated at FSTC 50, that can block 20 dB more sound in some bass frequencies would be a better choice than an FSTC 50 drywall partition for an application where music or mechanical noise will be a problem.

Table 1: Subjective Interpretation of Effects of FSTC as Measured

STC (Lab)	FSTC (Field)	Subjective description of effectiveness
26-30	20-22	Most sentences clearly understood
30-35	25-27	Many phrases and some sentences understood without straining to hear
35-40	30-32	Individual words and occasional phrases clearly heard and understood
42-45	35-37	Medium loud speech clearly audible, occasional words understood
47-50	40-42	Loud speech audible, music easily heard
52-55	45-47	Loud speech audible by straining to hear; music normally can be heard and may be disturbing
57-60	50-52	Loud speech essentially inaudible; music can be heard faintly but bass notes disturbing
62-65	55-60	Music heard faintly, bass notes "thump"; power woodworking equipment clearly audible
70-	60	Music still heard very faintly if played loud.
75+	65+	Effectively blocks most air-borne noise sources

The International Building Code (IBC) requires partitions separating dwelling units have a STC 50 (FSTC 45). IBC provides sample ratings for several types of wall construction.



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Engineering and Planning

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Unfortunately, in field situations, test ratings of the same wall section vary from test to test and walls do not perform as well as under laboratory conditions. This drop in performance can leave the builder liable for additional construction to bring up the performance of the wall if the tenants obtain field test results from the dwelling units that confirm a reduced STC. The builder's best options for getting a satisfactory STC result are to specify partitions with a laboratory rating of STC 54 or better. At an early stage in the construction, testing can be done to rate the construction and upgrades recommended before costly finishing is in place.

How is FSTC Measured and Calculated?

Transmission loss data is measured in the field by means of a standardized procedure defined in ASTM E336 for field tests in actual buildings, while the calculation procedures for FSTC are defined in ASTM E413. The FSTC is heavily weighted in favor of the speech frequency range above 125 Hz and correlating with human hearing acuity. For the determination of the final FSTC number, the values between 400 Hz and 1250Hz are somewhat discounted, the values below 400Hz are increasingly discounted. The FSTC number is determined from Transmission Loss values using an algebraic formula for maximum or sum of deficiencies. The standard test method also requires minimum room volumes for the test to be correct at low frequencies.

To calculate FSTC

- Background measurements are taken in the source and receiving room.
- A speaker is set up in a corner of the source room away from the wall to be tested.
- Sound levels measurements are taken at several positions in the source and receiving room.
- Reverberation time is measured in the receiving room.
- The FSTC is calculated per ASTM E-413.

Recommended Readings

Measurement of Airborne Sound Insulation in Buildings ASTM E366-97, American Institute of Physics and Acoustical Society of America, 1997

Classification for Rating Sound Insulation, ASTM E413-87, American Institute of Physics and Acoustical Society of America, 1987

Architectural Acoustics, Egan, M. David, McGraw-Hill, 1988