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Guidelines for
Acoustical Performance of Standard Steel Doors and Frames

STEEL DOOR INSTITUTE
30200 DETROIT ROAD - CLEVELAND, OHIO 44145

Guidelines for Acoustical Performance of Standard Steel Doors and Frames

1 General

1.1 Scope

This document shall provide guidelines for the specifying, designing, installing, and adjusting of standard steel doors and frames in Sound Control applications.

1.2 Definitions

1.2.1 Sound transmission class (STC)

A rating system which is an average estimate of sound insulation properties of a door or partition. The higher the STC rating, the more effective the barrier is against sound penetration.

1.2.2 Sound transmission loss (TL)

When sound strikes a partition, a small portion of sound is transmitted. TL is the ability of a door assembly to block incident sound. TL is expressed in decibels.

1.2.3 Frequency

The rate of sound pulsations or waves. When expressed in cycles per second, it is referred to as hertz (Hz).

1.2.4 Decibel (dB)

A unit expressing the ratio of sound power level to reference sound power level. Generally it can be used to compare loudness, the higher the decibel value, the louder the sound.

1.2.5 Sound control (acoustical) door assembly

An STC rated door, frame, and gasketing which, when properly installed with the proper hardware, is capable of reducing sound transmission.

2 Testing

2.1 Test specimen

Unless otherwise stated, the test specimen shall be fully operable and of nominal size 36" (914 mm) wide, by 84" (2133 mm) in height, and 1 3/4" thick (44 mm). Minimum gauge shall be 20, of either cold rolled or galvanized steel. As most Steel Door Institute members utilize multiple core construction details, it is understood that each unique product design listed as an STC assembly shall be tested and documented.

It is important for the purpose of this document that the specimen be operable rather than sealed in place. To assure this, the door is cycled prior to final latching and testing.

Ratings of a non-operable assembly shall not be used except for experimental purposes and are not part of this document.

2.2 Test method

Unless otherwise stated, all measurements, facilities and procedures shall be in strict conformance with ASTM designations E90 and E413-87 or most recent edition. This document does not condone the use of test standards older than 1987. Testing shall be conducted only at laboratories accredited by the National Institute of Standards and Technology under the National Voluntary Laboratory Accreditation Program (NVLAP).

2.3 Test results and report

Manufacturers shall have on file and readily available a copy of the original certified laboratory report. The report shall have sound transmission loss values tabulated at the 18

standard frequencies and state the resulting average STC value.

3 Design criteria for walls/enclosures

3.1 Performance considerations

The proper function of acoustical doors relies on a combination of factors which are under the control of various firms, trades, specifiers, suppliers, or designers. Without the cooperation of all concerned, the installed opening may not function as intended.

3.1.1 Consideration must be given to correctly specifying the door capability for the job condition. Some doors, although rated higher in overall STC rating, may not perform as well as lower rated doors in certain specific frequency ranges. Test reports should be consulted to establish the best TL values at the frequencies involved if the intent of the barrier is to limit noise transmission at a certain limited range of frequencies.

3.1.2 Room design should create a full enclosure equal to or greater than the doorÕs capability. For example, walls that do not run full height to a similar STC rated overhead structure will allow sound leakage through ceilings. Louvers, pipe chases, access doors, etc., installed in the same partition as the acoustical door may create additional points of sound leakage.

3.1.3 Carpeting, although considered a good source of sound absorption, should not be used underneath acoustical doors. Door bottom gaskets must compress against a solid object to affect a proper seal. Carpeting by its pliant nature does not provide a proper seal.

3.1.4 Walls should be sufficiently designed to, in addition to STC rating, maintain the frame rigidly in position and to support the additional weight of acoustical doors. A wall that flexes or moves each time the door is opened or closed cannot assure that gasket alignment will be maintained.

3.1.5 Test reports should be consulted for the weight of doors especially for the higher range of STC ratings. The extra weight and forces due to proper gasket compression of acoustical doors may result in a door that is somewhat difficult to operate. This is a normal condition, therefore some acoustical doors may not be suitable for use in handicapped access areas or egress corridors.

3.2 Field testing

Atmosphere conditions, room volumes, sound diffusion, sophisticated test and analysis equipment, and strict control needed to maintain uniformity in laboratory testing are not achievable in most other installations. Test results from field tests will vary somewhat from lab tests.

3.3 Hardware considerations

Hardware should be specified giving special consideration to acoustical doors. Thru-bolted hardware, concealed closers, etc., can become sources of sound leakage. Stop mounted hardware can restrict gasket function or adjustment. Deadlocking hardware, especially those relying on key turn operation, will suffer operational difficulties due to gasket compression necessary for proper seal. Electric strikes may not be capable of holding doors in a closed position once gasketing is compressed.

Lever handle lock trim is recommended to eliminate ÒhollowÓ knobs and allow for easier operation of doors that are subject to forces of gasket compression. Needless to say, all latching devices should be heavy duty.