

Guidelines for
**Acoustical Performance
of Standard Steel Doors
and Frames**



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Guidelines for Acoustical Performance of Standard Steel Doors and Frames

1 General

1.1 Scope

This document shall provide guidelines for the specifying, installing, and adjusting of standard steel doors and frames in applications where sound control is a consideration.

1.2 Definitions

1.2.1 Sound Transmission Class

A single number rating that indicates the sound transmission loss over a defined range of frequencies of a door assembly between adjacent closed rooms, abbreviated STC. Higher values equate to better sound reduction performance.

1.2.2 Outdoor-Indoor Transmission Class

A single number rating used to compare door assemblies when subjected to exterior sounds, such as ground or air transportation noise, is abbreviated OITC.

1.2.3 Sound transmission loss – TL

The reduction in sound level at specific frequency levels when sound passes through a door assembly.

1.2.4 Frequency

The number of cycles per second of a sound wave, measured in units of Hertz and abbreviated Hz.

1.2.5 Decibel – dB

A unit used to express the intensity of a sound wave, equal to 20 times the common logarithm of the ratio of the pressure produced by the sound wave to a reference pressure, usually 0.0002 microbar.

1.2.6 Sound Control Door Assembly

An assembly consisting of a door, frame, hardware, threshold, and gasketing, capable of reducing the transmission of sound.

2 Gauge vs. Thickness

While the term 'gauge' is no longer common for defining material thickness it is still used to specify doors and frames for ordering purposes. The term 'thickness' is used when defining the actual dimension of an item, and the term 'gauge' is used in the context of specifying a particular door or frame.

3 Testing

3.1 Test Specimen

Unless otherwise specified, the test specimen shall be a nominal 36" (914 mm) wide, by 84" (2133 mm) high for single doors and 72" (1,829 mm wide, by 84" (2133 mm) high for pairs of doors. All doors shall be 1 3/4" (44 mm) in thickness. All doors shall be fully operable. A detailed description of the test assembly shall be included in the test report.

Ratings derived from non-operable assemblies shall only be used for experimental purposes and are not part of this document.

3.2 Test Method

The door assemblies shall be tested in accordance with ASTM E 90. The STC and OITC ratings shall be calculated in accordance with ASTM E 413 and E 1332, respectively. The latest editions of the standards shall be used in determining the STC and OITC ratings. Testing shall be performed at laboratories that are accredited under the National Voluntary Laboratory Accreditation Program (NVLAP)

3.3 Test Results and Report

The test report shall be prepared by the test laboratory and shall contain the information identified in Section 13 of ASTM E 90 or Section 8 of ASTM E 1425.

4 Design Criteria

4.1 Performance Considerations

The proper function of acoustical doors relies on a combination of factors that are under the control of various firms, trades, specifiers, suppliers, and designers. Without the cooperation of all concerned, the installed opening may not function as intended. Proper seal installation and adjustment are critical to the performance of the opening. The installation guidelines shall be provided by the manufacturer.

Consideration must be given to correctly specifying the door capability for the project condition. Some doors, although rated higher in overall STC or OITC ratings may not perform as well as lower rated doors at certain frequencies. The test reports should be reviewed to establish the best TL values at the frequencies under consideration for a given project.

Room design should create a full enclosure equal to or greater than the door's TL capabilities. For example, walls that do not run full height to a similar rated overhead structure will allow sound leakage through ceilings, louvers, pipe chases, access doors, etc.

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 nature does not provide that type of surface.

Walls, in addition to their STC rating, should be designed to support the additional weight of acoustical doors. A wall that moves or flexes each time the door is operated cannot ensure that the gasket alignment will be maintained.

The manufacturer's literature should be consulted to determine the weight of acoustical doors; especially, those that have higher acoustical ratings.

4.2 Field Testing

Results obtained from field-testing may vary from those obtained under laboratory conditions. Atmospheric conditions, room volumes, wall type and design, sound diffusion, test equipment, etc. may affect the results obtained when testing in the field.

4.3 Hardware Considerations

Hardware should be specified giving special consideration to the fact that it will be used on acoustical doors. Any type of hardware that may be the source of sound leakage should be avoided. Since all acoustical doors depend on a tight perimeter seal, some types of hardware will become difficult to operate due to the compression required to seal the opening.

AVAILABLE PUBLICATIONS

Specifications

- ANSI/SDI A250.6** Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
- ANSI/SDI A250.8** Specifications for Standard Steel Doors and Frames (SDI-100)
- SDI-108** Recommended Selection & Usage Guide for Standard Steel Doors
- SDI-118** Basic Fire Door, Fire Door Frame, Transom/Sidelight Frame, and Window Frame Requirements
- SDI-128** Guidelines for Acoustical Performance of Standard Steel Doors and Frames
- SDI-129** Hinge and Strike Spacing
- SDI-133** Guideline for Specifying Steel Doors & Frames for Blast Resistance

Test Procedures

- ANSI/SDI A250.3** Test Procedure & Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames
- ANSI/SDI A250.4** Test Procedure & Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors
- ANSI/SDI A250.10** Test Procedure & Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- ANSI/SDI A250.13** Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies for Protection of Building Envelopes (Not applicable for FEMA 320/361 or ICC-500 Shelters)
- SDI-113** Standard Practice for Determining the Steady-State Thermal Transmittance of Steel Door and Frame Assemblies
- SDI-131** Accelerated Physical Endurance Test Procedure for Steel Doors

Construction Details

- ANSI/SDI A250.11** Recommended Erection Instructions for Steel Frames
- SDI-110** Standard Steel Doors & Frames for Modular Masonry Construction
- SDI-111** Recommended Details for Standard Steel Doors, Frames, Accessories and Related Components
- SDI-122** Installation Troubleshooting Guide for Standard Steel Doors & Frames

Miscellaneous Documents

- SDI-112** Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames
- SDI-117** Manufacturing Tolerances for Standard Steel Doors and Frames
- SDI-124** Maintenance of Standard Steel Doors & Frames
- SDI-127** Industry Alert Series (A-L)
- SDI-130** Electronic Hinge Preparations
- SDI-134** Glossary of Terms for Hollow Metal Doors and Frames
- SDI-135** Guidelines to Measure for Replacement Doors in Existing Frame Openings

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