

Sound Testing

The reduction of sound transmission is a major benefit of building with ARXX Insulating Concrete Forms (ICFs). ARXX ICFs create a wall assembly that consists of two panels of expanded polystyrene (EPS) foam insulation, on each side of a mass concrete core. When accompanied by additional combinations of wall finishes and application techniques, the resulting wall assembly provides an ideal buffer that significantly reduces the amount of acoustical noise that enters the structure or passes between interior spaces.

Sound transmission is reported on a logarithmic scale. Sound Transmission Class (STC) is the accepted rating system in the building industry. STC is an integer rating of how well a building partition attenuates airborne sound. STC is roughly the decibel reduction in noise a partition can provide, abbreviated 'dB'. If an 80dB sound on one side of a wall/floor/ceiling is reduced to 50dB on the other side, that partition is said to have an STC of 30.

The following table relates these numbers to the perceptions of all occupants:

STC	Audibility of Loud Speech From Opposite Side of Wall
25	Easily understood
30	Fairly understood
35	Audible but not intelligible
45	Must strain to hear
48	Barley audible
50	Inaudible

Source: *Insulating Concrete Forms for Residential Design and Construction/Huntsman Chemical.*

The preferred sound rating for exterior walls and demising walls is considered good at 40-49, better at 50-59 and excellent at 60 or above. Building codes require that walls separating dwelling units from each other, or from public spaces, shall have a minimum STC rating of 50. An ARXX ICF wall assembly provides a minimum STC rating of 50 or higher, depending on the selected interior and exterior wall finishes. Project specific requirements can be met by enhancing the overall wall assembly to achieve STC ratings of 60 or better and even over 70 for theatres and sound studios.

Wall Assemblies

A typical ARXX wall assembly has two layers of expanded polystyrene insulation, 2 1/2" (63.5mm) minimum thickness on each side of the mass concrete core, which may be 4", 5", 6", 8" or 10" (100, 125, 150, 200, 250mm) thick. Building codes require the EPS insulation be protected with a minimum of 1/2" gypsum board or an equivalent material. In the Summary table below, some ARXX assemblies were tested without gypsum board on the receiver side of the wall and still achieve a STC rating ≥50. Adding the gypsum board or an equivalent finish will improve that STC rating.

Sound testing considers one side of the wall assembly as the 'source' side and one side as the 'receiver' side. Sound and vibration is directed at the wall on the source side and the transmission is measured on the receiver side. To improve the STC rating, various finishing materials and assemblies on the source side of the wall have been tested. This Summary Table identifies testing results on various wall assemblies.

Sound Testing

ARXX has conducted acoustical testing by a third party acoustical engineering firm following the testing criteria conforming to ASTM E90, ASTM E336-90 and ASTM E413-87. A steady sound is generated and measured on one side of the wall, and the sound which passes through is measured in the adjacent room. The measurement of sound levels is made at sixteen frequencies, over a range of 125 to 4000cps, which is then reduced to a single STC number by means of comparing test results against a standard.

Summary of STC Ratings

ARXX 4" Form

STC Rating	Source Side Finish Assembly	ARXX ICF	Receiver Side Finish Assembly
50	1/2" gypsum wallboard	4"	not required

ARXX 6" Form

STC Rating	Source Side Finish Assembly	ARXX ICF	Receiver Side Finish Assembly
51	1/2" gypsum wallboard	6"	not required
55	5/8" gypsum wallboard	6"	1/2" gypsum wallboard
71	5/8" gypsum wallboard 2 1/2" non-load bearing steel studs cavities	6"	1/2" gypsum wallboard
50	vinyl siding	6"	1/2" gypsum wallboard

ARXX 8" Form

STC Rating	Source Side Finish Assembly	ARXX ICF	Receiver Side Finish Assembly
54	1/2" gypsum wallboard	8"	1/2" gypsum wallboard
75	5/8" gypsum wallboard 2 1/2" non-load bearing steel studs @ 24" o/c studs 1/4" from ARXX wall 2 1/2" fiberglass insulation in stud cavities	8"	1/2" gypsum wallboard

Testing: Howe Gastmeier Chapnik Limited, Intertek ETL Semko, Architectural Testing Inc.

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