



TECHNICAL BULLETIN 135

Subject: Understanding STC and NRC Ratings

When solving noise problems, acoustic principles such as STC and NRC are the first differences to understand. With all the talk about decibels, transmission loss, and frequencies, it is easy to get lost in all the jargon. All you really want to know is the difference between sound absorption and sound blocking, as well as which noise barriers will best serve your needs.

What is STC?

STC stands for Sound Transmission Class and is measured to calculate the effectiveness of soundproofing materials in reducing sound transmission between rooms. STC is a measurement of how well a material or partition blocks sound measured in decibels (dB). The higher the STC number rating indicates more effective sound insulation than a lower number. In the USA, sound transmission loss values from the ASTM E90 test are used to calculate the STC (Sound Transmission Class) ratings in accordance with ASTM International Classification E413 and ASTM E1332 respectively.

<u>STC</u>	<u>Performance</u>	<u>What Sounds Can Be Heard</u>
50-60	Excellent	Loud sounds heard faintly or not at all.
40-50	Very Good	Loud speech heard faintly.
35-40	Good	Loud speech heard but hardly intelligible.
30-35	Fair	Loud speech understood well.
25-30	Poor	Normal speech understood easily and distinctly.
20-25	Very Poor	Low speech audible

Where is STC used?

STC is used in many applications such as industrial, construction, architectural, and even residential. Anywhere there is a need for reduced noise transmission in public places, STC comes into play.

What factors impact STC?

The following are several factors that can either improve or reduce the STC rating of a barrier.

Mass

More mass means more STC. However, doubling the mass of a barrier does not double the STC, as STC is calculated from a non-linear equation.

Framing Methods

Decoupling barriers from the framing can result in a significant increase in STC.

Air Gaps

Sound leakage due to air gaps resulting in a drastic decrease in STC and should be sealed if possible.

Acoustic Medium

Sound travels through both the air and structure, and both paths must be considered when designing sound isolating walls and ceilings. To eliminate air born sound all air paths between the areas must be eliminated. This is achieved by making seams airtight and closing all sound leaks. To eliminate structure born noise one must create isolation systems that reduce mechanical connections between those structures and limit reverberation.

What is NRC?

NRC stands for Noise Reduction Coefficient. It is a measurement of how well a material absorbs sound. NRC ratings generally range from 0 to 1. An NRC of 0 means that a material absorbs no sound. An NRC of 1 means that a material absorbs all sound. Popular opinion is that the NRC is thought of as a percentage of absorption per square foot.

Calculating NRC values?

Calculating the NRC for an acoustic product is no small task. There are a few different ways to determine NRCs, the following is an explanation of how our products are tested for NRC using the ASTM Standard Test Method C422 for Sound Absorption.

- A special sound test lab room specifically designed for measuring sound absorption equipped with a microphone and tools that measure sound frequencies.
- An initial measurement is taken by transmitting a noise signal into the room and the equipment takes a measurement of how much sound was absorbed.
- Once the initial measurement is taken, the product being tested is placed in the same test lab, and the sound absorption is measured across a range of frequencies.
- The NRC is calculated by averaging the various measurements and rounded off to the nearest 0.05.

Where is NRC used?

NRC is typically used in applications where there is a need to reduce sound echo and reverberation which are caused by lack of acoustic absorption. Public spaces such as libraries, churches, offices, schools, bars, restaurants, and other architectural venues benefit from acoustic materials with high NRC ratings.

Materials with STC Ratings

Materials with published STC ratings include anything that is used as a wall partition between spaces.

Materials with NRC Ratings

Materials with published NRC ratings include acoustic wall and ceiling panels, baffles, and sound curtains. These products can be made of foam, fiberglass, insulation, or acoustic wood. All of which have varying NRC ratings, and some are more effective than others.

Conclusion

STC is how well a material blocks sound transmission and NRC is how well a material absorbs sounds. Both are used for specific acoustic applications but can often be combined to create an excellent acoustic environment.

Expansion Joint Solution

The MM Systems Insulated Vapor Barrier (IVB Series) product can help mitigate sound transmission through an expansion joint opening in a building while also providing sound absorption, thermal insulation and vapor transmission control.