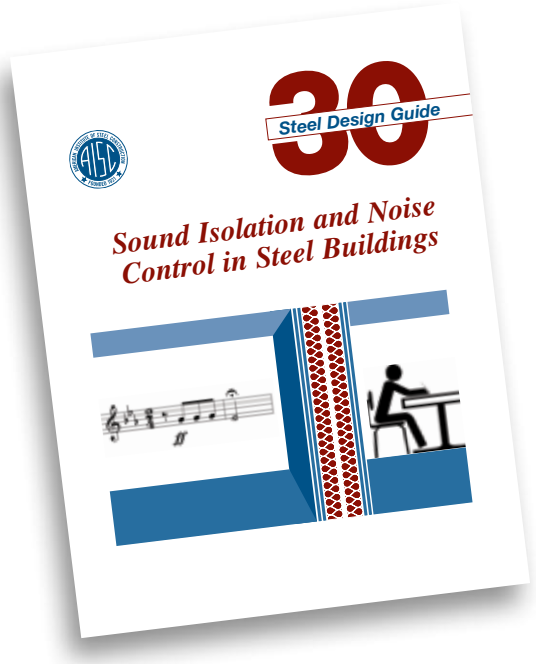

SOUND Judgment

BY BENJAMIN MARKHAM

A brief summary of AISC's new Design Guide 30: *Sound Isolation and Noise Control in Steel Buildings.*

SOUND MATTERS.

Research by AISC suggests that a key factor that influences what structural system to specify is acoustics. Regardless of which structural system is selected, good acoustical performance is a matter of good design. When it comes to acoustical design considerations in steel-framed projects, the new AISC *Design Guide 30: Sound Isolation and Noise Control in Steel Buildings* provides detailed guidance on how to optimize a building's design. Following is a brief overview of the guide.

Acoustical Roadmap

After a brief introductory chapter, the Design Guide begins in **Chapter 2** with a roadmap for addressing sound isolation and noise control. The process begins with a clear understanding of the acoustical goals in each space and of the potential noise sources that might disrupt those spaces. Once the acoustical goals and noise sources are known, the transmission paths are identified. This is where building design comes into play. The detailed design of floor/ceiling assemblies, walls, building envelope constructions and noise control design for mechanical systems are developed directly from the building's specific sound isolation and noise control criteria.

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Before delving into specifics, the guide continues in **Chapter 3** with an introduction into the basics of sound in buildings. Terms like *sound pressure level* and *frequency* are defined, metrics like *NC ratings* and *reverberation time* are introduced and the basic tenets of human perception of sound in buildings are outlined. One of the most important themes of building acoustics (and perhaps the most commonly misunderstood) is discussed in some detail: *Absorbing* sound and *blocking* sound are not the same!

The balance of Design Guide 30 is organized according to the roadmap outlined in Chapter 2.

Chapters 4 and 5 outline the typical acoustical goals and criteria for projects. Chapter 4 focuses on room noise criteria, with references to key standards and other industry references throughout. It introduces the concept that privacy is related not just to the loudness of an intrusive sound, but rather the relationship between the intrusive sound level and the level of the prevailing ambient background noise. Chapter 5 introduces sound isolation criteria, such as those found in many state building codes for multifamily housing. Standard reference criteria for sound isolation in other building types are outlined as well, including offices, schools, healthcare facilities and courthouses.

Chapter 6 provides guidelines for estimating noise levels of common noise sources. Interior noises (like speech), exterior noises (like traffic), impact sound sources (like footfalls) and mechanical system noise (like chillers and boilers) are all discussed. A simple method for calculating the combined contribution of multiple sources is outlined and illustrated by an example calculation of noise from mechanical equipment in a room.

Chapters 7 and 8 get into the meat of the Design Guide and serve as a useful reference for designers working to detail specific sound-isolating assemblies in steel buildings. **Chapter 7** introduces basic concepts of airborne sound isolation. Sound transmission through simple and multi-component assemblies is introduced, and the effects of sound absorption in the receiving room on perceived sound isolation are described in de-

tail. Section 7.2 goes on to introduce Sound Transmission Class (STC), the most common metric for sound isolation in the United States, as well as other relevant sound isolation metrics. Section 7.3 introduces basics of sound isolation improvement: mass, stiffness, damping, separation or decoupling, leaks and gaps and other building properties that affect sound isolation between spaces.

Chapter 8 covers building assemblies, providing information about sound transmission for wall assemblies, floor/ceiling assemblies, facades and roof structures. Section 8.3 continues with a discussion of impact sound transmission (primarily caused by footfall), and Section 8.4 details a range of floor/ceiling assembly designs found in steel buildings and developed to isolate increasing levels of impact sound. The chapter concludes with a brief discussion in Section 8.5 of "acoustical deck"—steel deck with a perforated bottom layer designed to incorporate a sound-absorbing finish into the structural deck system.

Finally, **Chapter 9** discusses mechanical noise and vibration control; indoor and outdoor mechanical noise criteria are introduced, and noise and vibration control methods for rooftop equipment and mechanical equipment rooms are outlined.

Whether for an office building, a residential tower, a school or a courthouse, steel buildings can provide excellent sound isolation and noise control for—and between—their occupants. This new resource for assisting in developing building details with good acoustics is now available now. AISC members can download it for free at **www.aisc.org/dg**. ■

Figure 1. An example partition detail for a double-stud demising wall.