BBS MEMO

Ohio Board of Building Standards March 31, 2014 6606 Tussing Road, P.O. Box 4009,
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Low-Frequency Audible Alarm Notification Appliances

Effective January 1, 2014, the National Fire Alarm and Signaling Code, NFPA standard 72-2010, adopted by the BBS and referenced in the Ohio Building Code (OBC), the Ohio Mechanical Code, and the Residential Code of Ohio (RCO) contains a new dated requirement that audible alarm notification appliances connected to a fire alarm system and provided for sleeping areas must produce a low frequency square wave signal. Research has revealed that the low frequency (520 Hz) audible alarm notification appliances (as compared to the standard frequency (approximately 2000-4000Hz) audible alarm notification appliances commonly used) are the most effective at waking sleeping individuals, especially those with mild to severe hearing impairments, older adults, children and young adults, and those who may be alcohol impaired.

Fire Alarm System Audible Alarm Notification Appliances

The new requirement for low frequency audible alarm notification appliances in sleeping areas found in the NFPA standard supplements the building code and NFPA standard requirements for sound pressure levels of audible alarm notification appliances and would apply when plans are submitted for a new fire alarm system, a replacement fire alarm system, and, depending upon the exact scope of the work, when plans are submitted for alterations to an existing fire alarm system that are proposed within an existing sleeping area or when a new sleeping area is created.

Where occupant notification is required to be provided as part of a fire alarm system in accordance with OBC Section 907.2, audible alarm appliances are required in accordance with OBC Section 907.5.2. The audible alarm notification appliances are required to comply with OBC Section 907.5.2.1 and/or Section 907.5.2.2 (if an emergency voice/alarm communication system is required or installed), NFPA 72-2010 Chapters 18 & 24 (if an emergency voice/alarm communication system is required or installed), OBC Chapter 11, and ICC A117.1-2009.

In accordance with NFPA 72-2010 Section 18.4.5.3, effective January 1, 2014, where audible alarm notification appliances are provided to produce signals for sleeping areas, the appliances are required to produce a listed square wave, low frequency (520 Hz) alarm signal. Audible alarm notification appliances provided for non-sleeping areas of the building are not required to be of the low frequency square wave type. The requirement is meant to apply only to those notification appliances that are provided and intended to awaken occupants.

In accordance with NFPA 72-2010 Section 24.4.1.4.1 (applicable when an emergency voice/alarm communication system is installed), the tone preceding the voice message is required to be a low frequency square wave tone when the system is installed in an occupancy where sleeping accommodations are required. Realizing that this language needed clarification, the NFPA Standards Council issued a Tentative Interim Amendment (TIA). NFPA TIA 10-4 clarifies that the low frequency square wave pre-alert tone is only required when the signal is intended to awaken those occupants who may be sleeping. The TIA also clarifies that the low frequency square wave pre-alert tone is not required in non-sleeping areas of a building that may contain sleeping accommodations.

Smoke Alarm and Household Fire Alarm System Audibility

In addition to the audible alarm notification appliances connected to a fire alarm system that may be required to alert occupants in accordance with OBC Section 907.2 and 907.5.2, the OBC Section 907.2 requires single- and multiple-station smoke alarms to be installed in certain sleeping occupancies to alert

those that may be sleeping such as in Group I and Group R occupancies. These smoke alarms are to be installed in accordance with OBC Section 907.2.11 and NFPA 72-2010 Chapter 29, are to be interconnected, and are to be provided with an audible signal. In accordance with NFPA 72-2010 Section 29.3.6, as written and published, the single-station or multiple-station smoke alarm audible signals are required to meet the performance requirements of NFPA 72-2010 Sections 18.4.3 (public mode audible requirements) and 18.4.5 (sleeping area requirements). As stated above, NFPA 72 Section 18.4.5.3 requires the square wave, low frequency audible signal. It follows then that a square wave, low frequency audible device would be required to be incorporated into or connected to the required smoke alarms. However, this was not the intent of the NFPA Technical Committees. After realizing the unintended consequence of broadly referencing Section 18.4.5, the NFPA Standards Council issued TIA 10-5 clarifying the intended application of the low frequency alarm signals.

The TIA 10-5 clarifies that NFPA 72-2010 Section 29.3.6 is only intended to reference Sections 18.4.3, 18.4.5.1, 18.4.5.2, and 29.3.8. By eliminating the broad reference to Section 18.4.5 and adding the reference to Section 29.3.8, **the smoke alarm audible signal is not required to produce the low frequency square wave signal unless the smoke alarm is provided in a sleeping room or guest room intended for those with a mild to severe hearing loss.** In that case, NFPA 72-2010 Section 29.3.8.1 would trigger the low frequency square wave signal requirement.

Smoke alarms or a household fire alarm system are also required in the Residential Code of Ohio (RCO) Section 314. The smoke alarms or household fire alarm systems are required to comply with NFPA 72-2010 Chapter 29. Consistent with the discussion above, **the TIA 10-5 clarifies that audible fire alarm signals (smoke alarms or household fire alarm system notification appliances) are not required to produce the low frequency square wave signal unless the smoke alarm is provided in a sleeping room intended for those with a mild or severe hearing loss.**

For those situations where the smoke alarm is required and provided in a sleeping room intended for those with a mild or severe hearing loss, the designer may have to be creative in their design. Currently, one would have great difficulty finding a listed 110 volt AC smoke alarms with an integral low frequency sounder on the market. We have been told that there are some design challenges that need to be addressed before we will see these devices readily available. Apparently, the physical size of the smoke alarm appliance will have to increase in order to incorporate the low frequency signal device. It seems that increasing the size of the smoke alarm is not a desirable option. In order to create this signal, we are told that a large speaker is actually required to be incorporated into the device rather than the smaller piezo horn that is currently integral to the typical smoke alarm. Additionally, the current draw for the low frequency signal is approximately four times that of the sounder that is currently found in a typical smoke alarm. As a result, the battery backup required in the device would have to be much larger, again, increasing the physical size of the device.

The BBS is proposing to officially adopt these clarifying TIAs as soon as possible. In the meantime, until the TIAs have been adopted, we recommend that the building officials liberally construe this code language, as required in OBC Section 101.2 and RCO Section 101.4. Understanding and enforcing the intent and limitations in availability is especially important when applying the requirement for smoke alarms as clarified in TIA 10-5. If a code official were to literally enforce the requirement as currently written in NFPA 72-2010 Section 29.3.6, without regard for the intent, he or she would be creating an impossible compliance situation. The referenced TIA's can be viewed by selecting the 2010 edition on the drop-down menu found at the following NFPA website link: http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=72

If you have further questions regarding these requirements, please call the Board's office at 614-644-2613 or E-mail to dic.bbs@com.state.oh.us.