A Technical Interim Amendment (TIA) to the 2002 edition of NFPA was issued by NFPA, and the 2007 edition of NFPA 13 (NFPA 2006) published in the latter half of 2006 aligns NFPA 13 requirements with the 2000 NEHRP Provisions and with ASCE 7-05. This updated 2007 edition of NFPA 13 implements the following two main changes, with which the Seismology Committee generally concurs.

1. It clarifies that the seismic design loads should be computed in accordance with local building codes.

2. It updates the capacities to be used for generic fasteners.

Until the updated 2007 edition of NFPA 13 is adopted by the building code, the Seismology Committee position is that design loads should be computed per ASCE 7-05 section 13.6.8, including section 13.6.8.2 for Seismic Design Category C and 13.8.6.3 for Seismic Design Category D, E, or F. Specifically, the design load procedure in the 2002 edition of NFPA 13, which is based on half the weight of the water-filled pipe, is not appropriate.

With respect to fasteners, the Seismology Committee position is that the tabulated design values of NFPA for wood, concrete, and masonry are unconservative and that fastener capacities should be determined in accordance with the appropriate materials chapter of the governing building code.

With regard to existing building evaluations, the engineer must take into account the changing seismic installation requirements of NFPA 13 over the years. While the standard dates back to 1896 and was the central issue that caused the formation of the National Fire Protection Association that year, the inclusion of seismic bracing requirements extends back only to the 1939 edition of NFPA 13. Only as of the 1940s in some areas of the Western United States was such “sway bracing” installed. Because of insurance industry requirements, some seismic bracing may be found in older buildings that otherwise received no nonstructural protection, because the building code of the day did not yet include seismic requirements for nonstructural components. NFPA 13 seismic bracing requirements have evolved over the years, increasing in specificity and required level of earthquake resistance, resulting in a variety of as-built conditions that may be encountered, even in a single building that has been remodeled or enlarged at various times.

Recommended Research

Research is needed to determine the strength and deformation capacity of sprinkler piping components, both braced and unbraced, under cyclic loading, as well as consideration of the behavior of related components such as suspended ceilings. The findings will support system models to predict performance under different levels of shaking—information that is needed to implement performance-based design of these critical nonstructural components. Research is also needed to support estimates of amplitude, frequency, and cyclic-demand parameters at different floor levels within buildings.

A protocol exists for testing seismic brace components under monotonic loading (UL 1995). A relatively new cyclic testing protocol has been proposed for testing brace components under cyclic loading (FM Global, 2001) and used in a series of tests (Malhotra et al. 2003). Shake table testing of piping at the University of Nevada at Reno, although not specifically representative of fire sprinkler piping, is reported in Maragakis et al. (2003) and Maragakis et al. (2005). The in-progress Federal Emergency Management Agency (FEMA) Performance-Based Seismic Design Guidelines (ATC-58) includes tasks related to the definition of engineering demand parameters for nonstructural components and has developed testing protocols for acquisition of data that can support the development of fragility curves (Bachman et al. 2004). Research using those protocols is outside the scope of that FEMA-funded project. issues

References

ASCE (American Society of Civil Engineers) (2002). *ASCE 7-02, Minimum Design Loads for Buildings and Other Structures* American Society of Civil Engineers, Reston, VA.

ASCE (American Society of Civil Engineers) (2006). *ASCE 7-05, Minimum Design Loads for Buildings and Other Structures, Including Supplement No. 1.* American Society of Civil Engineers, Reston, VA