

view from the code floor

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A Story or Basement in NFPA 13R

... what happens if a residential building is four stories in height and has a basement ...

The National Fire Protection Association's (NFPA) Standard 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height*, has proven itself to be an affordable and effective approach to life safety fire protection for residential type occupancies. It is, however, limited to buildings that are no more than four stories in height. This limitation is where confusion can arise on determining the height of a building, especially when a basement is involved. As an example what happens if a residential building is four stories in height and has a basement or is located on a hill where the north side of the building is four stories in height but the south side is five stories in height? Is the building now a five-story because of the basement or its location on a hillside? The answer to these questions cannot be found in NFPA 13R. As stated in NFPA's *Automatic Sprinkler Systems Handbook*, you will have to go to the applicable building code to find your answer.

Starting with the NFPA codes and standards, NFPA 1 in subsection 13.3.2.14.3 states that systems installed in accordance with NFPA 13R shall be permitted in buildings up to and including four stories in height above grade. NFPA 1 goes on in subsection 3.3.16 to describe a basement as being a story of a building wholly below grade or partly below and partly above grade, located so that the vertical distance from grade to the floor below is greater than the vertical distance from grade to the floor above. NFPA 5000, *NFPA Building Construction and Safety Code*, subsection 3.3.48 provides the same definition of a basement and grade. subsection 3.3.271 of NFPA 5000

establishes building height as the vertical distance from the grade to the average elevation of the highest roof surface. The number of stories, per subsection 7.4.3.3, shall be counted starting with the first story above grade and ending with the highest occupiable story containing the occupancy considered.

The 2003 edition of the *International Building Code* (IBC) describes a basement as that portion of a building that is partly or completely below grade. A basement becomes a story in the IBC when more

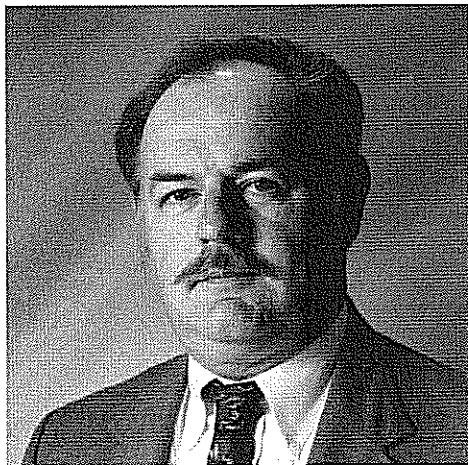
than 6 ft is above the grade plane; more than 6 ft above the finished ground level for more than 50 percent of the total building perimeter; or more than 12 ft is above the finished ground level at any point. The IBC definition of a story is that portion of a building between the upper surface of a floor and the upper surface of the floor or roof next above.

The main focal point in the NFPA 5000 and the IBC on establishing building height and number of stories is the grade line or grade plane. Both NFPA and IBC provide the same definition of the grade plane as a reference plane representing the average of finished ground level adjoining the building at exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane is established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 ft from the building, between the building and a point 6 ft from the building.

Getting back to our example, the answer lies in where the grade plane is and what code you are applying. There is a difference between the requirements of NFPA and IBC. These differences are:

- NFPA: A basement is the vertical distance from grade to the floor below and has to be greater than the vertical distance from grade to the floor above. So if the floor is 8 ft below the grade line and the floor above is 7 ft above the grade line then it is a basement and NFPA 13R can be used. If the scenario is reversed, it is a story and NFPA 13R cannot be used. In the case of the four stories on the North side and five stories on the South side, this is a five-story building and NFPA 13R cannot be used.
- IBC: To be a basement the floor/ceiling above the grade plane cannot exceed 6 ft. If it does it is no longer a basement but a story, which will prevent the use of NFPA 13R. The building on the hillside will be a 5-story building if the lower floor does not qualify as a basement or there is more than 12 ft from the floor to the floor/ceiling above the finished ground level at one point.

NFPA requirements for a basement are based on the amount of the portion of the basement above the grade plane while IBC is set at a measurement being greater than 6 ft. Building height is established in both NFPA and IBC using the number of stories above the grade plane. If a story qualifies as a basement it is not included in the establishment of building height. Thus a four-story building can have a basement and utilize NFPA 13R. Our next article will discuss the establishment of the grade plane. ●



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