

The following issue of TechNotes has been written by Louis Guerrazzi, E.I.T., Manager of Product Standards. Mr. Guerrazzi serves as the secretary for the UL/FM/NFSA Standards Review Committee which reviews many product standards.

An inadvertent omission to address the installation of residential sprinklers below beamed ceilings has manifested itself between NFPA 13R, NFPA 13D, NFPA 13, and product listings and some manufacturer's installation instructions. In July 2010, the Fire Protection Research Foundation published a two-part paper titled "Analysis of the Performance of Residential Sprinkler Systems with Sloped or Sloped and Beamed Ceilings" which investigated design criteria of residential sprinklers in one- and two-family dwellings with the goal of allowing other typical residential ceiling constructions beyond the scope of smooth, flat ceilings and sloped ceilings. The results of these tests shows that sprinklers tested under flat, smooth, horizontal ceilings will provide the prescribed level of safety when installed under smooth and beamed sloped ceilings with a pitch up to 8/12. The full report can be found on the Fire Protection Research Foundations website:

<http://www.nfpa.org/research/fire-protection-research-foundation/projects-reports-and-proceedings/suppression/home-fire-sprinklers/analysis-of-the-performance-of-residential-sprinkler-systems>

This report was then presented to the Residential Sprinkler Systems Technical Committee and incorporated into NFPA 13R (2013) under section 7.1.1.3 and also into NFPA 13D (2013) under section 8.1.2. This expanded the previous design criteria from only addressing installation under "flat, smooth horizontal ceilings" to also address 4 common ceiling configurations with a combination of sloped and sloped and beamed ceilings. Prior to this research being done, most, if not all, residential sprinklers achieved a listing for installation under sloped ceilings and sloped and beamed ceilings. The listing allowed for sprinklers to be installed below beamed ceilings where the beams were up to 14 inches in depth as the sprinklers still operated early enough to control the fire. However, upon completion of this research and the delivery of this research to the applicable NFPA Committees modifications were made to the installation criteria for residential sprinklers. Following the revisions in the standards, Underwriters Laboratories has since terminated their listing criteria for the installation of residential sprinklers under sloped and sloped and beamed ceilings. It is important to note that this was not due to a change in procedures or technology.

What is the issue? Well, the committee only included language under the design chapters of NFPA 13R and NFPA 13D and did not include any language into the installation requirements. This, along with the termination of the UL listing for sloped and beamed ceilings of residential sprinklers, now leaves a gap in where the residential sprinklers can be installed in respect to beams in all three standards. This issue came into light when some of the manufacturer's removed the listing and installation guidelines from

their data sheets in their most recent revisions. While nothing has changed with the design of these residential sprinklers there is no longer manufacturer's installation criteria to provide the appropriate required positioning of sprinkler deflector in relation to beams up to 14 inches in depth. While some manufacturers have not updated their data sheets since this change, it seems likely that when a revision takes place they would also remove it.

What's the verdict? Well currently there is no prescribed guidance under NFPA 13, NFPA 13R and NFPA 13D in respect to installation of residential sprinklers below beams up to 14 inches deep. All three standards require pendent and upright residential sprinklers to be installed 1 inch to 4 inches from the ceiling unless listed for more. While some residential sprinklers are listed for up to 12-inch deflector distance from the ceilings, which could allow installation below beams up to 12 inches in depth. There is still no solution for those beams greater than 12 inches up to 14 inches. While there are some proposals expected to be submitted this cycle to address this, in the meantime it is advisable to work with the authority having jurisdiction for an appropriate design and installation for situations dealing with the installation of residential sprinklers in the described beamed ceilings. When dealing with products which may no longer have the specific listing for these applications, it may be warranted to follow an earlier data sheet with the installation criteria however, the manufacturer should be contacted to ensure appropriate installation guidelines.