

**TechNotes Issue #424**  
**August 26, 2019**

**The Room Design Method**

Over the past few weeks, the NFSA's Engineering department has been asked several questions regarding the room design method through our Expert of the Day (EOD) service. Engineering staff has been asked to determine if the room design method is appropriate for CMDA, CMSA, ESFR, and other special sprinkler types. Luckily, with the most recent NFPA 13 technical committee meetings, the gaps in the standard will likely be addressed. This issue of TechNotes will discuss the application of the room design method for different types of sprinklers. It has been prepared by Kevin Hall, P.E., NFSA's Manager of Engineering Research.

We received a phone call last week on the EOD line and were asked if a small (800 sq. ft.) storage room having ESFR sprinklers installed could use the room design method (assuming all the other openings and door requirements were met). The initial response was "Sure, why not?" but after reviewing the standard to justify the position, it was found that the argument lacked definitive support.

In the reorganized NFPA 13-2019, design approaches using the occupancy hazard fire control approach are found in Chapter 19 and the provisions for the room design method are as follows:

**19.3.3.3 Room Design Method.**

**19.3.3.3.1\*** *The water supply requirements for sprinklers only shall be based upon the room that creates the greatest demand.*

**19.3.3.3.2** *The density selected shall be that from Figure 19.3.3.1.1 corresponding to the occupancy hazard classification and room size.*

**19.3.3.3.3** *To utilize the room design method, all rooms shall be enclosed with walls having a fire-resistance rating equal to the water supply duration indicated in Table 19.3.3.1.2.*

**19.3.3.3.4** *If the room is smaller than the area specified in Figure 19.3.3.1.1, the provisions of 19.3.3.1.4(1) and 19.3.3.1.4(2) shall apply.*

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The remaining sections of 19.3.3.3 detail room opening requirements and special circumstances to choose the number of sprinklers based on self-closing doors and the occupancy hazard as well as special provisions for corridors. When dealing with light, ordinary, and extra hazard occupancies using standard spray sprinklers, this design option is pretty straight forward; however, when special sprinklers or storage applications are involved, the intent strays away from the language of the standard.

Chapter 20 contains the general requirements for storage and details additional circumstances where the room design method can be used in storage applications:

**20.8 Room Design Method.**

**20.8.1\*** *The water supply requirements for sprinklers only shall be based upon the room that creates the greatest demand.*

**20.8.2** *To utilize the room design method, all rooms shall be enclosed with walls having a fire resistance rating equal to the required water supply duration.*

**20.8.2.1** *Minimum protection of openings shall include automatic- or self-closing doors with the appropriate fire protection rating for the enclosure.*

**20.8.3** *Where the room design method is used, the density shall correspond to that required for the smallest area acceptable under the density/area method.*

Based on the requirements of section 20.8.3, it seemed that the room design method could potentially be limited to designs utilizing density/area requirements, but why should the room design method not be allowed to be applied to CMSA, ESFR, and other sprinklers that have been proven with fire test data?

NFSA representation on the NFPA's Technical Committee for Sprinkler System Discharge (AUT-SSD) identified that the requirements of section 20.8 have the potential for being limited to CMDA design approaches and asked for the Discharge Committee to weigh in on this issue. As a result of the discussion, a first draft revision for the 2022 edition of NFPA 13 was made to add an annex section to provide clarification regarding the requirement of section 20.8.3. The following language was added:

**A.20.8.3** *This section is not intended to limit the use of the Room Design Method to density/area sprinkler design. The room design method can be used with any type of ceiling sprinklers as long as the room enclosure requirements are met.*



The committee's statement for this change stated, "There is confusion regarding the use of the Room Design Method with CMSA and ESFR sprinklers. There is no prohibition on using such sprinklers, yet this section seems to imply that only density/area concepts are valid, which was not the intent of the standard." If the proposed annex language passes committee ballot, the next edition of the standard will have a definitive answer to the gray area uncovered by one of our member's introspective question.

In addition to the ESFR question that prompted this discussion, there were several Public Inputs submitted to the NFPA 13 Technical Committees regarding the use of the room design method with different sprinkler types. Specifically, Public Input No. 373 suggests that a new subsection should be added to the standard following NFPA 13-2019 section 19.4.1.1:

**19.4.1.1\*** *The design area shall be the area that includes the four adjacent sprinklers that produce the greatest hydraulic demand.*

While there is annex text associated with this section of the standard, it only provides direction on the appropriate area of coverage to be used based on the spacing and listing of each individual residential sprinkler. The proposed language reads, "The room design method in accordance with 19.3.3.3 shall be permitted to be used." However, the committee agreed on the following language, "The room design method in accordance with 19.3.3.3, using light hazard criteria, shall be permitted to be used." This addition is helpful to designers who are trying to defend their decision to the AHJ.

While the standard does not specifically restrict the use of the room design method to standard spray sprinklers, one could interpret the text of section 19.4.1.1 to be the only acceptable design method for residential sprinklers which is not the case or the intent of the committee.

While the proposed language has not passed official ballot, a motion was made and carried that agreed with the submitter of Public Input 373. The committee's statement for their first draft revision stated, "Provided the design criteria for light hazard room design is used, it is applicable for residential sprinklers."

It should be noted that all of the first draft revisions mentioned in this article have not been officially balloted by the technical committees. The First Draft Report is scheduled to be posted by February 26, 2020, and Public Comments on the First Draft Report close on May 6, 2020.

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Elmira, NY  
October 8, 2019**

**Understanding, Applying and  
Enforcing NFPA 25  
Northbrook, IL  
October 22, 2019**

**Inspection, Testing and  
Maintenance for the Building  
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Oak Brook, IL  
October 23, 2019**

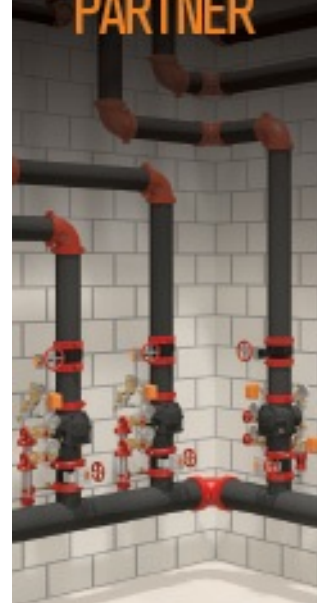
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