

Submitter: Technical Committee on Sprinkler System Discharge Criteria

Recommendation:

Add definition of "Compact Shelf Storage" to read:

Compact Shelf Storage. Storage on solid shelves not exceeding 36 inches in total depth, arranged as part of a compact storage module, with no more than 30 inches between shelves vertically, and with no internal vertical flue spaces other than those between individual shelving sections.

Add definition of "compact storage module" from NFPA 909:

Compact Storage Module. An assembly of shelving sections mounted on carriages with the arrangement of carriages on tracks so as to provide one moving aisle serving multiple carriages between fixed end ranges.

Move existing material from 12.2.2.4 into a subsection 12.2.2.4.1 entitled "Storage with Intermediate Walkways"

Renumber current 12.2.2.4 as 12.2.2.4.1 entitled "Storage with Walkways", and add new Section 12.2.2.4.2 entitled "Compact Shelf Storage"

12.2.2.4.2.1 Compact shelf storage shall be protected using quick response sprinklers within a wet pipe, non interlock preaction system or single interlock preaction system.

12.2.2.4.2.2 Spacing of pendent or upright sprinklers shall be limited to maximum 10 ft on centers.

12.2.2.4.2.3 Where less than 18 in. clearance can be maintained between sprinkler deflectors and the top of storage, horizontal sidewall sprinklers shall be installed with minimum 6 in. clearance between the sprinkler deflectors and top of storage.

12.2.2.4.2.4 Where sidewall sprinklers are utilized, they shall be quick response horizontal sprinklers placed such that sprinkler discharge is parallel to the movable aisle within the compact storage. Sidewall sprinklers shall be limited to a maximum distance along the wall (S) of 10 ft and maximum room width (L) of 12 ft, except that opposite rows of sidewall sprinklers shall be permitted for widths of up to 20 ft where sprinklers are staggered. Sidewall sprinklers shall operate at a minimum discharge pressure of 30 psi.

12.2.2.4.2.5 Where spacers are used to create a minimum flue space of 3 in. between shelving sections, the sprinkler system shall meet a design point of 0.3 gpm/sq. ft. over 1500 sq. ft. for protection of compact shelf storage up to 8 ft in height.

12.2.2.4.2.6 For compact shelf storage without minimum 3 in. flue spaces between shelving units, the sprinkler system shall meet a design point of 0.3 gpm/sq. ft. over 2500 sq. ft. for protection of compact shelf storage up to 8 ft in height.

Substantiation:

There is a need to address the protection of this specialized storage arrangement within NFPA 13. The definition of "compact storage modules" is extracted from NFPA 909.

The sprinkler protection criteria for compact/movable shelf storage is based on tests conducted in 1978 by Factory Mutual for the General Services Administration, tests conducted in 1989 at Underwriters Laboratories for HOK Architects Joint Venture and Gage-Babcock Associates, and tests conducted in 1991 at the National Research Council of Canada for the National Archives and Library of Canada. Testing of sprinkler protection for compact shelf storage has demonstrated the need to maximize water spray coverage and minimize the possibility of the spray from one sprinkler delaying the discharge of other sprinklers in the area.

Committee Meeting Action: Accept

Number Eligible to Vote: 27

Ballot Results: Affirmative: 24 Negative: 1

Ballot Not Returned: 2 BLUMENTHAL, MULTER

Explanation of Negative:

PEHRSON: The proposed protection scheme is an amalgamation of a number of different tests done for specific storage and building arrangements. There is no assurance that this protection will work as intended when looking in more detail at the actual tests:

- Successful fire control required all storage to be in Hollinger boxes and is not included in the criteria - tests without were not acceptable (as determined by the test sponsor).
- 4 in. to 5 in. spacers were used during the tests, not 2 in.
- Successful fire tests required different combinations of horizontal and vertical dividers that are not included in the criteria.
- The referenced fire tests were for specific shelf configurations (styles). No work was done to verify if the shelf configurations represent the wide range of styles in actual use or if the ignition locations represented the worst case.
- Open newspapers, even with very high sprinkler densities, were not controlled, yet this is a common configuration for libraries.
- The proposed sprinkler densities were shown in the FM tests to be unable to protect mixed media (paper with a small amount of plastic).
- The horizontal sidewall configurations showed mixed performance for one storage height/ceiling clearance test arrangement, yet are incorporated in the criteria for general use.

Comment on Affirmative:

KEEPING: Some items that were deemed to be pertinent in the reports concerning the tests for the National Library of Canada do not appear to have been addressed. For example, the mobile shelving units had to be fitted with spacers to create 1 in. wide flue spaces, the systems had to be capable of providing a minimum density of 0.70 gpm/sq.ft. with five sidewall sprinklers flowing and the operating pressures were based on 1/2 in. orifice sprinklers, (which were probably the only quick response types that were available at that time). I believe that such matters still need to be incorporated and that some further development of this proposal will be necessary.