U.S. EXPERIENCE WITH SPRINKLERS

Kimberly D. Rohr
Fire Analysis and Research Division
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101
www.nfpa.org

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Table 6.
Sprinkler Presence and Operationality in Structure Fires, by Property Use

Property Use	% of Fires Where Sprinklers Were Present*	% of Fires With Sprinklers Where Sprinklers Operated**	% of Fires Where Sprinklers Were Present & Operated
Public assembly properties	23.0%	73.9%	17.0%
Educational properties	21.6%	79.6%	17.2%
Health care or correctional facilities	51.2%	80.0%	41.0%
All residential properties	2.6%	84.6%	2.2%
One- & two-family dwellings	0.7%	80.0%	0.5%
Apartments	6.6%	87.6%	5.8%
Hotels and motels	32.8%	82.7%	27.1%
Department stores	52.0%	84.9%	44.2%
Offices	24.2%	80.6%	19.5%
Industrial facilities	12.6%	85.9%	10.8%
Manufacturing facilities	49.8%	91.1%	45.3%
Storage properties	3.0%	84.0%	2.5%

*Estimated as percentages of structure fires with sprinklers present divided by the number of structure fires with sprinkler status known. Does not distinguish type of sprinklers of completeness of coverage.

**Excludes fires where sprinkler was present but fire was coded as too small to test operational status of sprinklers.

Note: These are fires reported to U.S. municipal fire departments and so exclude fire reported only to Federal or state agencies or industrial fire brigades. Fire statistics do not include proportional shares of fires with sprinkler status unknown or unreported.

Source: National estimates based on 1989-1998 NFIRS and NFPA survey.

Table 10.
Groups of Leading Reasons for Unsatisfactory Sprinkler Performance

Problem Group		% of Cases	Problem	% of Cases
A.	Failure to maintain operational status of system	53.4	A1. Water shut off	35.4
			A2. Inadequate maintenance	8.4
			A3. Obstruction to water distribution	8.2
			A4. System frozen	1.4
B.	Failure to assure adequacy of system for complete coverage of current hazard	21.6	B1. System not adequate for level of hazard in occupancy	13.5
			B2. System designed for partial protection only	8.1
C.	Defects affecting but not involving sprinkler system	15.9	C1. Inadequate water supply	9.9
			C2. Faulty building construction	6.0
D.	Inadequate performance by sprinkler system itself	5.6	D1. Antiquated system	2.1
			D2. Slow operation of sprinklers	1.8
			D3. Defective dry-pipe valve	1.7
E.	Other	3.6	E1. Exposure fire	1.7
			E2. Other or unknown	1.9
Total		100.0		100.0

Source: "Automatic Sprinkler Performance Tables, 1970 Edition," *Fire Journal*, July 1970, page 37. Based on 3,134 fires reported to NFPA during 1925 to 1969 for which sprinkler performance was deemed unsatisfactory. Of these, 75.0% were in industrial facilities, 12.0% were in storage facilities, 5.6% were in stores, and 7.4% were in all other properties.

from report conclusions:

This is essentially the message of the AFSCC, as also stated by NFPA

4. Sprinkler systems are so effective that it can be tempting to overstate just how effective they are. For example, some sprinkler proponents have focused too narrowly on the reliability of the components of the sprinkler system itself. If this were the only concern in sprinkler performance, then Tables 9-10 show there would be little reason for concern at all, but human error is a relevant problem. On the other hand, some people, concerned that sprinklers will be treated as a panacea to the detriment of other essential elements of fire protection, have treated the human errors that dominate Tables 9-10 as intrinsic to sprinkler performance. In fact, all the elements of fire protection tend to show more problems with human error than with intrinsic mechanical or electrical reliability. It is important for all concerned parties to (a) distinguish between human and mechanical problems because they require different strategies; (b) include both as concerns to be addressed when deciding when and how to install, maintain, and rely on sprinklers and other automatic suppression systems; (c) strive to use performance analysis in assessing any other element of fire protection; and (d) remember that the different elements of fire protection support and reinforce one another and so must always be designed and considered as a system.

5. Because sprinkler systems are sophisticated enough to require competent fire protection engineering and function best in buildings where there is a complete integrated system of fire protection, it is especially important that proper procedures be used in the installation and maintenance of sprinkler systems. This means careful adherence to the relevant standards: NFPA 13, *Standard for the Installation of Sprinkler Systems*; NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*; NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height*; and NFPA 25, *Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems*.

6. Because sprinkler systems are so demonstrably effective, they can make a major contribution to fire protection in any property. NFPA 101, the *Life Safety Code®*, identifies some properties where the use of sprinklers is essential to produce minimal fire protection for life safety. These properties should receive top priority in any national program to expand the use of sprinklers. But no one in the fire community, least of all the NFPA, endorses an approach of settling for minimum standards of fire safety.