HOT TOPICS IN THE FIRE SPRINKLER INDUSTRY

Kevin Hall, P.E., MSFPE
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NFSA National Fire Sprinkler Association
The Voice of the Fire Sprinkler Industry
NFSA ACTIVITIES

- Engineering and Standards Committee (E&S)
- UL/FM/NFSA Standards Review Committee
- USTAG TC-21/SC 5
- NFPA Technical Committees
- UL Standard Technical Panel (STP)
- White Papers
  - Insulation, Bed Bugs, High-Rise Retrofit Guide
NFSA TRAINING

- Tech Tuesdays
- Layout Technician Training Class
- Numerous other opportunities

[www.nfsa.org/training](http://www.nfsa.org/training)
COMMODITY CLASSIFICATION

Cardboard Boxes
NOT THE SAME OLD CARDBOARD
NOT THE SAME OLD CARDBOARD
New Section

20.3.1.5 Storage in cardboard cartons shall be treated as encapsulated storage where criteria in this standard is more stringent for encapsulated storage than for unencapsulated storage.

Proponents of the revision:
- Additional wax and recycled materials
- Easily sheds water
- Less absorption of water

Opponents of the revision:
- Very conservative design approach
- Not applicable to all boxes
- Need additional data
15.6 Electrically Operated Sprinklers. Electrically operated sprinklers shall be permitted where such devices have been evaluated and listed for performance under the following conditions:

1) Fire tests related to the intended hazard
2) Distribution of the spray pattern with respect to wetting of floors and walls
3) Distribution of the spray pattern with respect to obstructions
4) Performance under horizontal or sloped ceilings
5) Area of design
6) Allowable clearance to ceilings
**HYDRAULIC DESIGN (TYCO EAS-1)**

- Building construction requirements – Same as ESFR
- Horizontal ceilings/Unobstructed construction
- 9 Sprinkler Design (4-4-1)

<table>
<thead>
<tr>
<th>Ceiling Height (ft)</th>
<th>Storage Height (ft)</th>
<th>Minimum Aisle Spacing (ft)</th>
<th>Design Pressure (psi)</th>
<th>Minimum Recommended Number of Sprinklers</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>30</td>
<td>8</td>
<td>52</td>
<td>9 Sprinklers</td>
</tr>
</tbody>
</table>
SPRINKLER POSITIONING

Minimum distance from ceiling
  • Per NFPA 13

Maximum vertical distance
  • 3 feet below detector

Maximum horizontal distance
  • 1 foot from detector
FRICTION LOSS FOR LISTED FITTINGS
27.2.4.8 Friction Loss.

27.2.4.8.1 Pipe friction loss shall be calculated in accordance with the Hazen–Williams formula with C values from Table 27.2.4.8.1, as follows:

(9) Friction loss shall be excluded for the fitting directly connected to a sprinkler.
UL Side Outlet K-factor Test Equipment (K ≤ 8)
UL END OUTLET K-FACTOR TEST EQUIPMENT (K > 8)
27.2.4.8 Friction Loss.

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27.2.4.8 Friction Loss.

27.2.4.8.1 Pipe friction loss shall be calculated in accordance with the Hazen–Williams formula with C values from Table 27.2.4.8.1, as follows:

(9) Friction loss shall be permitted to be excluded for the fitting directly connected to a sprinkler, except as required in 27.2.3.1.2 and 27.2.3.5
27.2.3.1.2 For saddle-type fittings having friction loss greater than that shown in Table 27.2.3.1.1, the increased friction loss shall be included in the hydraulic calculations.
### Victaulic Style 922 Mechanical Tee

#### 5.0 PERFORMANCE

**Style 922**

<table>
<thead>
<tr>
<th>Run Size x Outlet Size</th>
<th>Equivalent Length of 1 inch Schedule 40 Steel Pipe (per UL 213, Section 16) ($C=120$)$^4$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Threaded feet</td>
</tr>
<tr>
<td></td>
<td>meters</td>
</tr>
<tr>
<td>1 1/4 x 1</td>
<td>8.5</td>
</tr>
<tr>
<td>DN32 x DN25</td>
<td>2.6</td>
</tr>
<tr>
<td>1 1/2 x 1</td>
<td>8.5</td>
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<tr>
<td>DN40 x DN25</td>
<td>2.6</td>
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<tr>
<td>2 x 1</td>
<td>8.5</td>
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<tr>
<td>DN50 x DN25</td>
<td>2.6</td>
</tr>
<tr>
<td>2 1/2 x 1</td>
<td>8.5</td>
</tr>
<tr>
<td>DN65 x DN25</td>
<td>2.6</td>
</tr>
</tbody>
</table>

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27.2.3.5 Differing Values. Specific friction loss values or equivalent pipe lengths for listed fittings not in Table 7.4.1 shall be used in hydraulic calculations where these losses or equivalent pipe lengths are different from those shown in Table 27.2.3.1.1
FLEXIBLE HOSE ASSEMBLIES
UL 2443 – FLEXIBLE SPRINKLER HOSE ASSEMBLIES

- Adds additional requirements to the product standard when listed sprinklers are installed into listed flexible sprinkler hoses
  - Construction
  - Protection
  - Installation Instructions
Construction

6.6 Sprinklers shall be permitted to be installed into the end fitting on a flexible hose prior to shipment if all of the following conditions are met:

a) Each flexible hose and sprinkler assembly shall be pressure tested in accordance with Section 23 prior to shipment.

b) The sprinkler shall be installed in accordance with the sprinkler manufacturer’s installation instructions.

c) Protection, such as a plastic cover, shall be provided for the entire sprinkler, including the deflector, heat responsive element and escutcheon (if provided), to minimize the potential for damage during shipment, storage, and installation.

d) The installation instructions include a statement indicating that the protection shall remain in place prior to and during installation and shall be removed from the sprinkler prior to the time when the sprinkler system is placed into service. See 25.1 p).
Installation Instructions

25.1 (p) If a sprinkler is installed into the flexible hose end fitting, a statement indicating that the protection shall remain in place prior to and during installation and shall be removed from the sprinkler prior to the time when the sprinkler system is placed into service. Protection should not be removed until construction activities or other events have progressed to the point where the sprinkler will not be subjected to conditions which may cause it to be damaged.
AREA/DENSITY CURVES
### Area/Density Curves

**Occupancy Hazard** | **Density/Area** (gpm/ft² / ft²)
--- | ---
**Light** | 0.1/1500 or 0.07/3000*
**Ordinary Group 1** | 0.15/1500 or 0.12/3000*
**Ordinary Group 2** | 0.2/1500 or 0.17/3000*
**Extra Group 1** | 0.3/1500 or 0.28/3000*
**Extra Group 2** | 0.4/1500 or 0.38/3000*

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Global revision to remove references to area/density curves for new construction

Occupancy Hazard options
- 1500 sq. ft
- 3000 sq. ft (only if protecting a space adjacent to an unsprinklered combustible concealed space)

Storage (CMDA) – 2000 sq. ft
- Ordinary Temperature
- High Temperature

CMSA and ESFR are not affected
ESFR Obstructions
FPRF Fire Test at UL
Hose Connections
Hose Connections

• Does a hose valve have to be listed?
• Is the hose valve cap required to be listed?
• Does the hose valve cap have to be rated to meet a minimum operating pressure?
• Is a hose valve cap required?
Hose Connections

AV150
AV250

Female Inlet
- Male outlet - specify thread *
- NPT inlet thread only
- Aluminum handwheel
- Working pressure: 300 PSI
- Alloy: C84400, C83600, C36000
- Manufactured in the USA

Available finishes:
- Cast (standard)
- Polished: -P
- Chrome: -C

AVF150
AVF250

Double Female
- NPT inlet and outlet only
- Aluminum handwheel
- Working pressure: 300 PSI
- Alloy: C84400, C83600, C36000
- Manufactured in the USA

Available finishes:
- Cast (standard)
- Polished: -P
- Chrome: -C
POSSIBLE SOLUTIONS

- List hose connection caps
- Higher pressure requirements
- Additional testing
- More expensive materials
- No more plastic thread protectors or caps

- Add a tamper

- Drill a weep
- Small amount of water will leak through
- Address problem before it becomes a major issue
MOST LIKELY SOLUTION

- No Action (UL/FM/NFSA)
- Anecdotal concerns
- Additional documented incidents would be needed to justify a change in the standard
QUESTIONS?
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