NFSA NATIONAL FIRE SPRINKLER ASSOCIATION
The Voice of the Fire Sprinkler Industry

# TechNotes

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The following issue of TechNotes has been written by Mark Hopkins, P.E., Vice President of Engineering for the NFSA.

## Temperature Concerns During Shipping, Handling and Storage of Sprinklers

The use of quick response sprinklers with the lowest operating temperature available has long been thought to provide the best possible fire protection, as the sprinklers will respond when a fire is small and thus requires less water to achieve control or suppression. However, balancing a quick response against an unwanted response is a challenge for both installing contractors and design professionals alike. No one aims to have non-fire sprinkler operations, but ignoring ambient temperature exposure during shipping, handling and storage perpetuates the problem. Use of quick response intermediate temperature sprinklers in many cases will aide in reducing concerns of ambient temperature exposure and those undesired operations.

As most of the country transitions into the hottest part of the year, temperature concerns begin to enter everyone's mind once again. Having gone to Denver last week, I fully understand that this does not apply unilaterally throughout the U.S. and Canada. When I was driving to the airport in Baltimore, MD the thermometer in my car indicated 100°F, but when I landed in Denver it was snowing. Nonetheless, elevated ambient temperature concerns are beginning to escalate in most areas.

This issue of Tech Notes focuses on temperature concerns during shipping, handling and storage of sprinklers. The May-June 2017 Issue of National Fire Sprinkler Magazine (#202) contains an article, titled "What's the Temperature? Considerations Regarding the Environmental Conditions of Sprinklers," which touches on many of the issues surrounding ambient temperature



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exposure and heating of sprinklers. In addition, Tech Notes Issue #368 written by Louis Guerrazzi titled "A Snapshot of Sprinklers and Ambient Heat: Summary of Sprinklers' Operating Mechanism" also discusses ambient temperature and response characteristics of sprinklers.

You may be asking how can sprinklers be affected during shipping and handling? Considering how materials are shipped there may be very little consideration given to the maximum ambient temperature. It is very unlikely that package handlers will read cautionary warning labels printed on the sides or tops of boxes at distribution centers. Consider how many boxes marked "fragile" have broken contents when received.

Boxes containing sprinklers are often shipped via unventilated railcar, aircraft, ship board container or truck. Consideration of placing these components in climate controlled environments is likely nonexistent. As a result, the sprinklers will be exposed to the environmental temperature of the vehicle they are being shipped in. Sprinklers having an ordinary temperature classification are envisioned to be within an environment with a maximum temperature of 100° F (38° C). Remember this includes all sprinklers with a temperature rating between 135 and 170° F (79 and 107° C).

Do you consider the temperature when receiving a shipment? If the temperature is above 100°F (38° C) or has been during the previous week you should.

Do you ask if the sprinklers were shipped in a conditioned vehicle? Having food products exposed to elevated temperatures would be found quickly. Usually, by someone getting food poisoning, or detecting a foul odor. However, this is not the case with sprinklers. Apparent damage may not be observed by fitters when the sprinklers are removed from the boxed and the sprinklers are installed. This might lead to an undesired response during non-fire conditions.

Shipping, handling and storage environments need to be considered at each stage from when a sprinkler leaves the factory and when it is installed and the system turned over. Consideration must be given to the shipping and handling procedures of each intermediary in the supply chain. Where are sprinklers stored before they are sold to you? What are the conditions during shipping? How did you receive the sprinklers? Consider the answers to these questions when deciding on a temperature rating. It is also important to educate owners and design professionals on this issue when they are imposing the use of low temperature sprinklers.




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The NFSA keeps a member of the Engineering Department staff on duty every business day to answer your technical questions live. We call this the Expert of the Day (EOD) program and it is available to our members by phone, fax or e-mail. Call us at (845) 878-4200 and press 2, or you can send a fax to (845) 878-4215, or you can e-mail us at eod@nfsa.org. Last year we answered more than 2600 requests for assistance.

The same temperature threshold conditions also apply during storage in a warehouse, on a truck or van, in a job box or on a job site. If the temperature exceeds a maximum temperature of 100° F (38° C) where the sprinklers are stored, they have been altered from their original state in a negative way. These sprinklers should be returned to the manufacturer and they will often be replaced free of charge. As the old saying goes, "it is better to be safe than sorry." If in question, contact the sprinkler manufacturer before installing the potentially thermal damaged sprinklers. Some manufacturers apply labels with a color changing component that will change from normal (white) to an abnormal (black) if exposed to a temperature exceeding the recommended maximum temperature.

The conditions of a job site should also be considered. If the sprinklers are being installed in a building or structure prior to having the air handling system in operation, the maximum exposure temperature should be considered. If the sprinklers are being installed in an environment where the ambient temperature exceeds 100° F (38° C) it would be better to wait until the air conditioning is operational. Not only will this help protect the sprinklers, the sprinkler fitters will also appreciate a day in a cool building. This holds true during winter months as well. Salamanders and other heating appliances are often used to prevent damage to drywall (gypsum board) products during cold periods. These heating appliances may expose sprinklers to elevated temperatures.

Exposure to direct sunlight or through a window will also increase the heat exposure to the sprinkler due to radiative heating. As a result, ambient temperatures below but near 100° F (38° C) could cause thermal damage. Remember you can always measure the temperature if you are unsure of the conditions.