Load Factor on Fusible Links

By: Michael Laderoute, President Globe Technologies Corporation

If you have been in the fire suppression business more than a few years you most likely already experienced an unwanted discharge of a system. If you haven't experienced one yet, you will. It's only a matter of time. Unwanted discharges are those that occur without explanation, without an obvious fire present or for some other unknown reason. But the truth be told most unwanted discharges can be avoided and when they do occur the culprit can many times be traced back to the installation or the maintenance of the fire suppression system. Somewhere along the line, someone took a short cut and now is paying the price.

Today's subject is LOAD FACTOR. Every fusible link has a load factor assigned to it. This load factor is an essential requirement in the link design and is critical in assuring the proper operation of the fusible link.

The load factor window identifies the load (tension) that MUST be applied to the fusible link in order for the fusible link to fuse (operate) within the design temperature. Not applying the minimum load factor or applying too much load factor to a fusible link will produce unwanted results and may cause the fusible link to respond too early, too late, or not at all. (https://youtu.be/WewCty-DXhc)

As part of the Underwriter's Laboratories performance testing, the load factor is part of the overall listing of a fusible link. Failure to apply the correct load factor to a fusible link violates the UL Listing. All fire suppression system manufacturers also use this load factor in design of their operating controls thereby requiring this load factor as a part of their UL performance testing and eventual approvals. If you do not apply the correct load factor on the fusible link you are not using the product as per its UL Listed & tested criteria. It is unknown what your results will be should it ever be called upon at the time of a fire or catastrophic event. Too little load factor being applied will cause the fusible link to fuse at a much HIGER temperature than referenced on the link. Too much load factor being applied to the fusible link will cause the fusible link to fuse at a much LOWER temperature than referenced on the link. Exactly what these temperatures are is unknown because using the link in this way has never been tested but you can be assured the end results, should the fusible link be called upon, will be quite different than your expectation. In fact, YOU MAY EVEN EXPERIENCE AN UNWANTED DISCHARGE.

Many times we hear from companies or technicians who have performed service on fire suppression systems and shortly after this service experienced an unwanted system discharge occurs. Troubleshooting the discharge seems a mystery and they are unclear as to why the discharge occurred. There was no visible evidence of a fire! Many think the fusible link may have broken prematurely but after 40 years in this business I can tell you almost certainly the fusible link DID NOT break or fall apart. It just doesn't happen that way.

The fact is the root cause of the unwanted discharge may be a violation of the load factor. Each mechanical control head of a fire suppression system when set up properly applies a load to its detection line cable. Each is quite different but necessary. It is assumed this load being applied by the control head is within the design criteria load factor of the fusible link being used. QUESTION: Did you ever check it? In the case of a new system installation with new equipment there is always an assumption that the load factor is within tolerance but, after several operations of the control head during setup, installation and semi-annual maintenance as well as years of service the load being applied may have changed.

Did you know that link manufacturers recommend you check and validate the load factor being applied to the fusible link about every two (2) years? This is nowhere to be found in the fire code or even discussed in the manufacturer's manual however, since the load factor is a critical requirement to assure the performance of the fusible link, measuring this load factor during an installations life cycle just makes good safety sense.

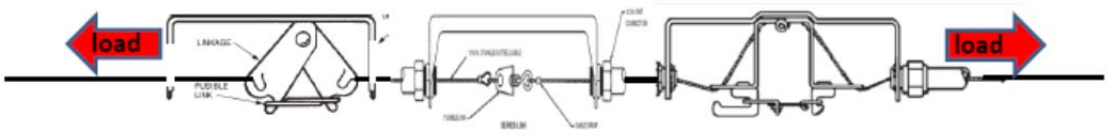
Many system control heads use a spring and ratchet assembly to apply the required load factor. As you exercise the spring it gradually becomes weaker over time. Most service technicians compensate by increasing the tension. They will apply increasingly more turns on the ratchet assemble in the control head creating greater stress on the fusible link and placing it in a position that is outside the required load factor window. Having done that, should the fusible link ever be call upon, what will be the result????? It's unpredictable!

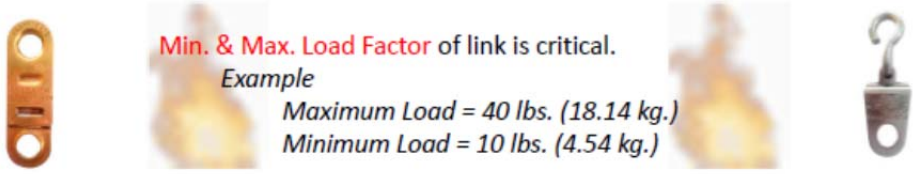
We all learned during UL300 re-qualification testing of fire suppression systems it was important to detect the fire early in order to have successful extinguishment. Load factor requirements play an important part in achieving that goal. I cannot stress enough the importance of not skipping the step of validating the load factor or re-validating it after installation and during service and maintenance. Ignoring it may cause or contribute to undesirable results.

Applying the proper load factor to the fusible link via the detection line along with proper placement of the fusible link above each protected appliance, and in the plenum area in the exhaust stream allows you to fine tune your system and chose the best temperature rating fusible link for the application. This link temperature rating is identified during your temperature study. WHAT? You didn't perform a temperature study? The truth be told the industry uses way too many 450ºF & 500ºF degree fusible links in places where lower temperature fusible links should be installed. By doing this, the system is not fined tuned to its maximum "fire detection capabilities" & optimal operating condition.

For additional info visit www.globetechnologies.com.

Critical Information about Load Factors!





- Too MUCH tension on link will cause response at lower temp than expected
- Too LITTLE tension on link will cause response at a higher temp than expected.

Proper setting of detection cable is critical!

Michael Laderoute Bio:

- Currently President, Globe Technologies Corporation
- 49 year's experience in Fire Protection
  - First 20 years as a Fire Equipment Dealer
  - Proceeding 29 years representing various Manufacturers
- Past Technical Committee Member:
  - NFPA 1, 10, 17, 17A, 96, 101, 505 & 5000
- Past Member UL STP Committee
  - 605 (Portables), 300 (Systems), 407 (Standpipe)
- Past Member ICC/NAFED PES Exam Certification Committee Served *(9 years)* as **FEMA's** Code Consultant
- Past Member IKECA I-10 & C10 ANSI Documents
- Inventor / Hold Patent on wet chemical discharge nozzle