PERFORMING TEMPERATURE STUDIES – CRITICAL TO COMPLETION OF A FIRE SYSTEM DESIGN

Congratulations! You've just completed (maybe) the new installation of a fire suppression system in a commercial kitchen. Before you can hang a tag, collect payment, and perform final acceptance testing, an integral part of the design must be completed to insure the system will activate in the event of a fire. It's time to select the temperature(s) of the fusible link(s) you intend to use in the detection.

The code states that fusible links are required in ducts as well as over each protected appliance. The question is **"WHAT TEMPERATURE FUSIBLE LINK(S) NEED TO BE INSTALLED"?** The only way to answer that question is to perform a temperature study above each protected appliance and in the duct area where the detection will be placed. By performing a temperature study, you gather information that allows you to select the correct fusible link temperature for each area of the protection zone. Failing to complete this important task may render the new installation ineffective in the event of a fire. The alternative if you DO NOT perform a temperature study is guessing at a temperature or using the highest temperature rated fusible link. Either of these choices is just not good fire protection.

Unfortunately, when talking with installers throughout the county, I've learned that many do not perform this required temperature study. In fact, many are not aware the system brand manufacturer requires a temperature study be conducted prior to selection of the fusible link temperature. A requirement clearly called out in the installation, design, and maintenance manual(s). Because these systems are UL Listed it is imperative that the installation be performed as per the manual. If this step is ignored as a part of the installation, you are playing a guessing game as to the correct temperature fusible link to use. Installing too low a temperature may result in an unwanted discharge. Installing too high a temperature will result in delayed activation of the system. This delay could potentially result in reducing the suppression systems' effectiveness. Kitchen fires grow exponentially with each second. Delayed activation of the suppression system could render the fire suppression system ineffective allowing propagation to areas outside the non-combustible cooking operation. The result: heavy fire & smoke damage, loss of a building and its contents, or even injury or loss of life to the occupants. Every fire suppression system **MUST** be subjected to a temperature study if it is to be properly designed for maximum performance and effectiveness.

Conducting a temperature study is not difficult but does require the commercial kitchen to be fully operational. For the hazard to be fully operational it is necessary to have the fire suppression system installed, fusible links in place, fire system armed and acceptable to the AHJ. Since the commercial kitchen may not be up and operating yet, this will involve a little creativity. The first task is to get the system operational and approved by the AHJ. So, links need to be installed so the cooking can begin. Never render the system inoperable during a temperature study. To accomplish this task a recommendation is to install a minimum 360-degree fusible link or higher in each area requiring detection. Keep in mind these links are TEMPORARY since you have not verified the temperature of the hazard yet. Once the commercial kitchen becomes operational, the next step is to be present and on-site during the peak cooking hours of the operation. Never render the system inoperable during a temperature study. Heat measurements **MUST** be obtained from all points behind the plenum area. Be sure to take measurements at many different locations. Hood duct openings, above each protected appliance, each end of the plenum and both the inside surface of the filter bank and the back wall of the plenum. Make a sketch of the hazard and be sure to record the temperatures you are seeing at each location. You might find one area hotter than the rest. You may be surprised at how cool the plenum is

or how hot it is in each area. The information you gather will assist you in the proper selection of the correct temperature fusible link. Many installers use the same temperature fusible link throughout their installations. This is NOT recommended unless the temperature study indicates the need for the same fusible link in each area. The correct temperature fusible link should be about 60 degrees greater than the temperature you recorded in that area during the temperature study. For example: If you measure a temperature in the duct of 300 degrees Fahrenheit then the proper temperature fusible link will be one rated and designed to function at 360 degrees. Likewise, if the temperature you record is higher or lower in an area you will need to select the temperature fusible link designed for areas experiencing those low or elevated temperatures. Globe Technologies offers fusible links beginning at 135 degrees Fahrenheit to 500 degrees Fahrenheit so there are many options. Consult the installation design and maintenance manual for the system brand you are installing for further info on ambient temperatures and the proper temperature fusible link to be used. You may find that the hazard will require the use of different temperature fusible links throughout the hazard. This is not a problem and in fact, has fine-tuned the system design for maximum performance based on the hazard and the temperature study. Once you have recorded the temperature within the plenum and and at various locations throughout the hazard you will need to remove the temporary links used for testing purposes and replace them with the proper temperature links selected based on the study. You have now complied with the requirement of the installation, design and maintenance manual and the fire system is ready to be put online standing watch and ready for action should it be called upon.

For you to conduct a heat temperature study you will need the proper tools of the trade. There are several different available options. For more information, please view this YouTube Video: https://youtu.be/YDwNCQhfMgM. Each will do the job so use the one that best meets your needs. Never render the system inoperable during a temperature study.

To validate that temperatures do not change, place in the job file the original temperature study document you created. At least once a year or more frequently, or as necessary perform this study again confirming the findings. Insure things have not changed within the hazard. Dirty hoods, plugged filters, degrading exhaust fans, drive belt wear may change the information forcing you to change out a lower temperature fusible link for a higher temperature fusible link to meet the changes in ambient temperatures at the fusible link locations.

Changing fusible link temperatures should only be done as a temporary solution to a more serious underlying issue. Dramatic increases in temperature are a clear indication that the ventilation system is not operating to its original installation specifications or that additional appliances may have been added after the ventilation system was designed creating a potential hazard. Be sure to inform the ownership of these temperature changes and that the ventilation system should be inspected to insure it is operating as intended and to its peak performance.

Follow up after ventilation inspections or corrective actions to the hazard verifying they have been performed and using the original heat temperature study info, verify that the temperatures are now within the original design. Install the correct temperature fusible links in the detection zones. Document these changes as well as the changes you have made to the fusible link temperatures if you found changes to the original study during the verification process. Always be sure to keep good records. Should a problem ever arise with the design, operation or effectiveness of the fire suppression system your best defense is documentation, documentation, documentation!

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Bio:

49 plus years in the fire protection industry working in all facets of manufacturing & sales. Past committee member on NFPA 1, 17, 17A, 96, 5000, 10, 101 & 505 technical committees. Served 9 years as Code Consultant to the Fire Equipment Manufacturers' Association (FEMA). Also served as a member of Underwriters Laboratories STP 605 for Portable Extinguishers and STP 300 for Pre-engineered Systems and STP 407 on Standpipes. Presently, serving as President of Globe Technologies Corp. Remains actively involved in Educational Seminars throughout the country and the code review process.