KITCHEN SUPPRESSION SYSTEMS

Part 3: Maintenance, Testing, & Recharging

3 VIRTUAL TRAINING

FED®

LEARNING CENTER

ICC PREFERRED EDUCATION PROVIDER

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#NFPA17A #NFPA10
#GenerationTrained

What is the FED Learning Center?

The FED Learning Center is an educational platform supporting training and developmental needs of the Fire and Life Safety industry.

In late 2017, Fire and Life Safety industry leaders came together to address challenges in employee hiring, retention, and training. Specific focus was given to the need for technical training, as it relates to the field technician responsible for maintenance, inspection, and repair in fire suppression applications. Continued research and planning, by BHC, resulted in the development of the FED Learning Center. The plan was officially announced in the spring of 2018, with courses held later that summer.

The FED Learning Center was created to fulfill the need for educational opportunities on a variety of topics affecting the Fire and Life Safety industry. To strengthen the educational value the program provides, several industry experts have participated in developing the facilities and content, including many Engineers, Product Specialists, Code Professionals, and Facility Experts. Additionally, great care has been given to Instructional Design so that learners of all types benefit from the courses offered within the program.

Our Work Saves Lives

What We Believe?

Our **POSITION** is simple. We believe that the better educated we are as a community of fire and life safety professionals, the safer we all are. Understanding safety is a **CHALLENGE** and keeping others safe is a **CALLING**. So the team at the FED Learning Center is committed to doing everything within our reach to promote and provide educational opportunities that support the needs of those who hear the calling and have accepted the challenge.

Our **VISION** is to provide an industry-specific, educational platform for all members of the Fire and Life Safety community, because we are on a **MISSION** to educate as many people as possible on what it takes to protect the world from safety hazards, in accordance with codes and NFPA standards.

We accept the **CORPORATE RESPONSIBILITY** necessary to provide a professional, non-political environment, where the" business" of fire protection is put aside, allowing 100% of the focus to be on gaining knowledge and developing skills. And we proudly wear the **SOCIAL IMPACT** we are making like a badge of honor, as we do our part in increasing the number of properly trained professionals in the field.

We all share the **GOAL** of protecting people and property, but every-day hazards change, technology develops, and the way we interact in the world evolves. The work we do saves lives, so we must all make the **COMMITMENT** to develop and evolve too.

Hear the Calling
Take the Challenge
Get Trained
Stay Trained



The Student Experience

Feel Your Vibe: You're in charge of the vibe you want to experience during training. Do you want to send one person to a general session course? How about sending a small group to create comradery amongst the team? On the other hand, what about a private session to combine technical training and teamwork? You are in charge, so you choose! Luckily, the more you send, the greater the discount!

Find Your Venue: If being at an FED Learning Center campus is important to you, select from one of our four campuses spanning the East Coast and the Midwest. Alternatively, off-site sessions may be better for your travel time.

Select Your Course: Our course catalog is always growing. Determine what your instructional needs are now and select from the courses available. Every effort is made to offer multiple product disciplines within a course week, so those who want to stay for multiple courses can do so.

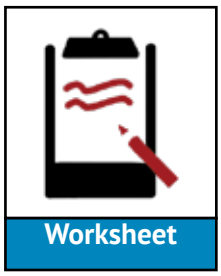
Secure Your Seats: When you're ready, log on to www.FEDLearningCenter.com and secure your seats through our super-simple registration process. Once registered, you will receive a confirmation email, receipt, calendar reminders, and course details for later reference. Don't worry if the venue you are looking for is full, put yourself on the wait list, and we'll do our best to get you in the course or create another course that matches your needs.

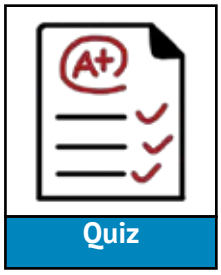
"Tell me and I forget,
teach me and I remember,
involve me and I learn."

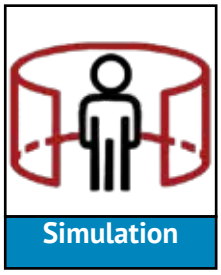
~ Benjamin Franklin

Instructional Design Variety

No two students learn the exact same way, so at the FED Learning Center, great care is given to ensure the instructional design offers something for everyone. It's our intent to offer a variety of styles and methods in course instruction, ensuring that all students have the opportunity to learn.







Course Objectives

Upon completion of this course, you will have learned:

- The hazards technicians may run into while working in Commercial Kitchens.
- Fire safety basics and the elements needed to create fire.
- The four things that must happen to extinguish a fire.
- The type of fires found in Commercial Kitchens.
- The Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- The Standard for Wet Chemical Extinguishing Systems.
- The Standard for Portable Fire Extinguishers.
- What "shall" and "should" mean within NFPA Standards.
- Who is responsible for enforcement of Standards within a jurisdiction.
- The timing of Standard adoptions within locations.
- An example of skilled workforce labor in the fire safety ecosystem.
- The importance of being properly trained to protect human life and property.
- What percentage of fires are caused by cooking equipment.
- What type of suppression systems that most Commercial Kitchens use.
- Why water should never be put on a grease fire.
- Why Commercial Kitchen Appliances should never be moved from the spot originally placed.
- What NFPA Manual and chapter addresses Commercial Kitchen Cooking Appliance location requirements.
- What two common violations a fire safety technician may see in the field.
- What Manual is referenced for nozzle placement and positioning.

Course Objectives (Cont-)

- What happens to the gas and electric power when a system activates.
- What process to reset shutoff devices before the fuel or power can be restored.
- Who is responsible for the protection of common exhaust ducts used by more than one tenant, and who is responsible for protection up to the point of common connection.
- What inspection means within NFPA Standards.
- What maintenance means within NFPA Standards.
- The actions that must be taken during a Semi-Annual Maintenance check.
- What is always required to be replaced in a Semi-Annual Maintenance check.
- What “red tagged” means.
- What Annual Maintenance means.
- What to do when it is the first maintenance visit for your company at a location.
- What tool is recommended for writing installation dates on cylinders.

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MAINTENANCE REQUIREMENTS

Commercial Kitchen Maintenance Requirements

Inspection (Performed by Owner) - A *Monthly* visual inspection, no training required (it can be done by anyone) (Quick Check). NFPA 17A 8.2.1.

Maintenance (Performed by Trained Technician) - Minimum *Semi-annual* service work, including, but not limited to, repair, replacement, and service performed to ensure that equipment operates properly.

- A service technician who performs maintenance on an extinguishing system shall be trained and have passed a written or online test that is acceptable to the authority having jurisdiction. NFPA 17A 8.3.1*.
- The service technician must possess a certification document confirming the requirements in 8.3.1 and issued by the manufacturer or testing organization that is acceptable to the authority having jurisdiction. NFPA 17A 8.3.1.1.
- At least semi-annually, and after, any system activation, maintenance shall be conducted in accordance with the manufacturer's design, installation, and maintenance manual. NFPA 17A 8.3.3*.

What Happens During System Maintenance?

1. Verification that the hazard has not changed or the agent distribution piping is not obstructed.
2. An examination of all detectors, the expellant gas container(s), the agent cylinder(s), releasing devices, piping, hose assemblies, nozzles, signals, all auxiliary equipment, and the liquid level of all non-pressurized wet chemical containers.
3. During system maintenance, wet chemical systems are tested.

    a) The testing includes the operation of the detection system signals and releasing devices, including manual stations and other associated equipment.

    b) The systems are not normally discharged at the time of system maintenance.
4. During the maintenance check, if the system containers show conditions, such as excessive corrosion, pitting, structural damage, or fire damage, the cylinders are either hydrostatically tested or replaced.

    a) The hydrotest test of a cylinder will reveal the need for replacement.
5. If the system reveals a condition that could cause impairment or failure of the system to operate, an evaluation is conducted by the service technician to remedy the situation.

NFPA, NFPA 17A 2024, *https://link.nfpa.org/free-access/publications/17a/2024.*

What Happens During System Maintenance? (Cont-)

6. Maintenance always includes replacement of fusible links, but sometimes involves the replacement of other parts.
7. If there is a delay in making necessary repairs, the system is tagged as being noncompliant, *"Red Tagged"*.

    a) The owner and the authority having jurisdiction are notified by the technician of the system impairment.

    b) Once the repairs are completed and the system has been restored to an operational condition, the technician notifies the owner and the authority having jurisdiction that the system is operational again.
8. A maintenance report is filed with the owner, indicating the services provided along with any recommendations.

    a) The owner must retain the maintenance report for a period of 1 year.
9. Each wet chemical system must have a tag or label securely attached, indicating the month and year the maintenance was performed.

    a) The tag identifies the service technician and the service company.

    b) Old maintenance tags must be removed, as only the current maintenance tag is permitted on the system.

12-Year Hydrostatic Testing

- Examine cylinder and hose assembly manufacture date or previous hydrostatic test date.
    - If any cylinder or hose assembly has aged 12 years since its manufacture date or previous hydrostatic test date, it must be hydrostatically tested to the factory marked pressure, per the requirements of NFPA-17A. (Refer to the label on the cylinder for hydrostatic pressure requirements).
- Subsequent to hydrostatic testing, the cylinders are to be recharged and the valve rebuilt in accordance with the Manufacturer's Manual.
- 3E Seamless Cylinders. A DOT 3E cylinder is a seamless steel cylinder with an outside diameter not greater than 2 inches nominal, a length less than 2 feet and a service pressure of 1,800 psig. Remember, on these actuation cartridges that are stamped "3E", these do not need to be tested due to the size.

KNOWLEDGE CHECK

Q: _____ [Performed by Owner]– A *Monthly* visual inspection, no training required (it can be done by anyone) (Quick Check).

A: Inspection

Q: _____ [Performed by Trained Technician]- Minimum *Semi-annual* service work, including, but not limited to, repair, replacement, and service performed to ensure that equipment operates properly.

A: Maintenance

MAINTENANCE CHECKLIST

Semi-Annual System Maintenance

Follow this ***Maintenance Checklist*** to ensure a thorough examination of the Kitchen Fire Suppression System.

- ❑ Touch base with the manager and/or business owner.
- ❑ Determine if there is a fire alarm monitoring system or if it is local to the business.
- ❑ Take the fire alarm and monitoring system out of service to avoid false alarm activation.
- ❑ The monitoring company should be called and informed of testing.
- ❑ Verify there are no indications the system has been activated or tampered with.
- ❑ Disconnect the copper tubing from the cylinder (if present).
- ❑ Remove the cover from the control head/Automan, and lock the system out by installing a lock bar/pull pin/lockout tool (check the manufacturer's manual for specific instructions).
- ❑ Remove the CO_2 cartridge(s) from the system (install safety cap).
- ❑ Verify the date and weight on the cartridge.
- ❑ Verify the system is installed in accordance with manufacturer's UL listing.
- ❑ Visually examine appliance locations to verify no changes have been made.
- ❑ Verify the number, type and location of each appliance with the as-built drawings or previous report. (Note any changes, in writing, to the owner, and file a copy of the notification. If appliances have been added or changed, the system will have to be redesigned by a certified technician.)
- ❑ Visually inspect kitchen hood is a minimum of 18" from cooking surface.
- ❑ Release the tension of the fusible link line.
- ❑ Replace the terminal link with a test link.
- ❑ Visually inspect that the detection line moves freely (at all corner pulleys), to ensure there is no grease build up throughout the detection line conduit.
- ❑ At the control head/Automan, reset/tighten the line back up (refer to the manufacturer's manual for this step).
    - ❑ Remove the lock bar/pull pin/lockout tool from the control head.
    - ❑ Light one or two range burners to verify that the gas valve shuts off.
- ❑ Test the mechanical function of the Control Head/Automan in response to the link line by cutting a test link or S-Hook (Fusible links must be changed twice a year per NFPA 96).
- ❑ Check to ensure the control module functioned properly:
    - ❑ Indicator shows the system has operated.
    - ❑ Gas valve closed.

Maintenance of systems may vary, based on system specifications.
Always refer to the manufacturer's manual for specific system guidelines.

Semi-Annual System Maintenance (Cont-)

- ❑ Pilot lights should have gone out.
- ❑ Micro switches functioned (all electrical functions performed).
- ❑ Make-up air should shut down.
- ❑ If satisfactory, reset the system to include the link line and the gas valve.

❑ Test the mechanical function of the control head/Automan in response to each manual pull station.

- ❑ If functioned properly, replace the tamper seal (or glass break rod) on each pull station.

❑ Reset the system and verify the following:

- ❑ Control head is back in the cocked position.
- ❑ Insert lock pin/bar.
- ❑ Detection line and fusible links are in the correct position.
- ❑ Manual pull station has been placed back in proper position.
- ❑ Gas valve has been reset.
- ❑ Electrical breakers have been reset.
- ❑ Appliances are back on line (re-light appliance pilot lights, verify electrically controlled equipment is running again, verify make-up is running….etc.).

❑ Visually examine appliance layout for appropriate nozzle coverage.

❑ All hazards should be covered with the correct nozzles and positioned correctly (aimed correctly at appliance surfaces, duct, and plenum).

❑ Piping and conduit securely bracketed and distribution piping is not obstructed.

❑ Examine the nozzles and piping to make sure they are clear of debris and grease.

❑ Per NFPA 17A, all distribution piping is required to be checked for obstruction at least semi-annually. Use nitrogen or dry air, and blow through the distribution piping to verify the air is flowing through the discharge nozzles.

❑ If nozzles are clogged, clear the obstruction, and then put a small amount of lubricant across the orifice opening, and reinstall the cap or protective cover.

❑ Replace any missing nozzle protective caps or covers (after putting a small amount of O-ring lubricant across the orifice opening).

❑ Hood penetrations are continuously welded or provided with UL listed sealing device.

❑ Examine agent container and mounting bracket.

❑ Examine cylinder pressure (stored pressure systems).

❑ Ensure the agent container has no corrosion, excessive pitting, structural damage, fire damage, or repairs by soldering, welding, or brazing.

quick TIP

At the beginning steps of maintenance, after disarming the system, remove nozzles and place them in a bucket of degreaser/water and soak the nozzles while working. Be sure to remember which nozzles go where when having to place them back on. Blow through the nozzle to ensure it is free and clear of debris, or use a paperclip to scrape out any residue, and run hot water and degreaser through it.

Semi-Annual System Maintenance (Cont-)

- ❑ If damage or repairs are found, hydrostatically test the agent container to the factory marked pressure, per NFPA 17A.

❑ Check pressure gauges for proper pressure.
- ❑ If the gauge shows a loss of pressure, indicated by the needle being below the green band, the cylinder should be removed and recharged per the instructions of the manufacturer's manual.

❑ Check the liquid level of all non-pressurized agent containers.

❑ After discharge, examine the entire system for mechanical damage.

❑ Check the manufacturers date/12-year hydrostatic test date.

❑ Re-install nitrogen or CO_2 cartridge.

❑ Verify the date, if date is not stamped, or if a new cartridge is installed, write the date on the cartridge when installing.

❑ Remove lock pin/bar.

❑ Replace cover to the control head/Automan.

❑ Reconnect the copper tubing/braided hose to the cylinder.

❑ Call the fire alarm monitoring agency to place the fire alarm system back in service.

❑ Verify the fire alarm system is placed back into operation.

❑ Complete and affix certification tag to pull station and control box, and include the date that new links were installed and their respective actuation temperatures.

Included in Semi-Annual Maintenance

❑ Proper separation between fryers and flame (steel or tempered glass plate is permitted in lieu of separation).

❑ Proper clearance from flame to filters.

❑ Exhaust fan in operating order.

❑ All filters are in place and any filter spacers installed.

❑ Fan warning sign on hood.

❑ Portable extinguishers available, accessible, and properly serviced.

❑ Class K portable extinguisher installed with warning placards.

❑ Check for system 12-year hydrostatic test dates.

Maintenance of systems may vary, based on system specifications.
Always refer to the manufacturer's manual for specific system guidelines.

New Account System Maintenance

New Account System Maintenance includes ALL Semi-Annual Maintenance steps as well as:

- ❑ Verify there are no indications the system has been activated or tampered with.
- ❑ Conduct all semi-annual/annual maintenance, as required by the manufacturer.
- ❑ Verify that tamper seals are installed and not broken.
- ❑ Make drawings of hood and appliance layout.
- ❑ Indicate all types and sizes of appliances.
- ❑ Make a diagram of all distribution piping with pipe length and number of fittings.
- ❑ Verify the total number of flow points used.
- ❑ If system has been discharged, inform the owner and add to maintenance report.
- ❑ Determine why the system discharged.
- ❑ If there was a fire, replace all components exposed to the fire.
- ❑ Flush all pipe.
- ❑ Blow the pipe dry with nitrogen or dry air.
- ❑ Discard any remaining agent from agent container.
- ❑ Use only the specific manufacturer's agent for recharging.
- ❑ Replace any spent nitrogen or CO_2 cartridges with new ones.
- ❑ Place the system back in service.

quick TIP If this is your company's first time servicing this system, do these additional steps!

Annual Maintenance Steps

Annual Maintenance includes ALL Semi-Maintenance steps as well as:

- ❑ Blow out the discharge pipe using dry air or nitrogen.
- ❑ Replace all rubber blow off caps and foil seals.
- ❑ Replace any nitrogen or CO_2 cartridges and O-rings as required.
- ❑ Mark the date of installation on cartridges.

quick TIP Use a permanent marker to write the date to ensure the ink sticks!

Final Maintenance Steps

Once ALL Semi-Annual, Annual*, and Additional New Account* Maintenance is complete then:

- ❑ Complete the inspection report, ensuring any discrepancies and repairs are documented, and leave a copy for the owner.
- ❑ Documentation should include:
  - ❑ New, properly marked service tag on equipment.
  - ❑ Notes of any repairs that were made.
  - ❑ Notes of any discrepancies that need to be addressed.
  - ❑ Send a copy to the AHJ, if required.
  - ❑ Verify distributor emergency contact information is on system.
- ❑ Answer any questions, and offer training of the system operation.

When required

Q: List at least 4 actions that must be taken during a semi-annual maintenance check.
A: Refer to the Semi-Annual System Maintenance section on pages 13-15

Q: Semi-annual maintenance of a system may require replacement of parts, but it ALWAYS requires replacement of _____.
A: Fusible Links

Q: What does "red tagged" mean?
A: The system is non-compliant due to a delay in making necessary repairs

Q: True or False. The annual maintenance visit requires actions beyond the semi-annual maintenance.
A: True

Q: True or False. If it is the first technician maintenance visit for your company at a location, additional measures to ensure compliance must be taken.
A: True

Q: What item has been proven effective to use for writing the installation date on cylinders?
A: Permanent marker

KNOWLEDGE CHECK

Maintenance of systems may vary, based on system specifications.
Always refer to the manufacturer's manual for specific system guidelines.

Building Fire Safety Inspection

Code compliance starts with a thorough fire safety inspection and correcting violations, but many building owners do not know the codes. Offer to check things while you are on regular Kitchen Suppression service calls.

To help you identify opportunities, start with these basic questions:

1. Are exit doors clearly marked, lighted, and free from obstructions?
2. Do the exit doors close and latch completely?
3. Are the directions to exits marked with visible signs?
4. Are exit signs provided for every exit door?
5. Are emergency exit signs properly illuminated?
6. Do the emergency lighting systems function properly if the power shuts off?
7. Are fire extinguishers provided in adequate numbers and types?
8. If there are flammable liquids, are the portable extinguishers appropriate for the hazard?
9. Are the flammable liquids stored in approved safety containers?
10. Are flammable liquid storage cabinets provided where required?
11. Are extinguishers mounted correctly, readily accessible, and mounted at the correct heights?
12. Are the locations of fire extinguishers properly marked?
13. Are extinguisher cabinets code compliant?
14. If required, are extinguisher cabinets equipped with approved glass panels and breaker bars?
15. If there is a fire sprinkler system, has it been tested in the last year?
16. Do all of the sprinklers have the appropriate clearance from obstructions?
17. Are the sprinklers provided with the proper guards or escutcheons?
18. Are sprinkler system standpipe valves and fire department connections marked appropriately?
19. If there is a fire alarm system, has it been tested in the last year?
20. Are fire detection systems (heat or smoke) periodically tested according to code?
21. Are detectors in proper working order and free from obstructions?
22. If there are hose systems, are they marked correctly?
23. If there are hose systems, are they being serviced according to code?
24. In commercial cooking areas, is the kitchen system serviced periodically according to code?
25. Has the kitchen exhaust hood and duct been cleaned according to code?

Glossary of Terms

- **Agent Tank** – The container of liquid agent connected to system piping.
- **AHJ** – Authority Having Jurisdiction.
- **Blow-Off Cap** – A cap which covers the nozzle and prevents grease from plugging the nozzle orifice.
- **Cartridge** – A sealed, steel pressure vessel containing nitrogen or carbon dioxide gas.
- **Detector** – A device, which includes the detector bracket, detector linkage, and fusible link, used for automatic operation of the fire suppression system.
- **Ducts** – A continuous passageway for the transmission of air and vapors.
- **Flow Number** – Term used in system design to describe the flow capacity of each nozzle used to determine the quantity of tanks needed to cover a certain group of hazards.
- **Fusible Links** – A form of fixed-temperature, heat-detecting device employed to restrain the operation of a mechanical control until its designed temperature is reached.
- **Gas Valve** – A device used to shut off the gas supply to the cooking equipment when the system is actuated.
- **Hood** – A device provided for cooking appliances to direct and capture grease-laden vapors and exhaust gases. It shall be constructed in a manner that meets the requirements of NFPA 96.
- **Nozzle** – A device designed to deliver the liquid agent with a specific flow rate and stream pattern
- **Plenum** – The space enclosed by filters, and the portion of the hood above the filters.
- **Pulley Elbow (Corner Pulley)** – A device used to change the direction of the wire rope, which runs between the regulated release mechanism and the detectors, the regulated release mechanism and the mechanical gas valve, and/or the regulated release mechanism and the remote manual pull station.
- **Regulator** – A device used to regulate the pressure from the nitrogen cartridge into the agent tank(s) when the system is actuated.
- **Remote Manual Pull Station** – A device that provides manual actuation of the system from a remote location.
- **Terminal Detector** – The last in a series of detectors, or the only detector used in a single-detector system. The detector is thus named, because it is the last point at which the wire rope ends or "terminates." There is only one terminal detector per detection system.
- **UL** – Underwriters Laboratories, Inc.
- **NFPA** – National Fire Protection Association.
- **ICC** – International Code Council.

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#FEDLC #FireFam
#GenerationTrained
#NFPA10 #FireSafety #NFPA
#OurWorkSavesLives #NFPA72
#NFPA17A #FireExtinguisher
#HandsOnTraining #FlameGame #NFPA101
#NFPA96 #KitchenSuppression #FireProtection

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