FIRE ALARM SYSTEM CHECK LIST

BUILDING NAME:_____ LOCATION:_____

DESIGNER:_____ INSTALLER:_____

INSPECTION BY:_____ DATE: _____

Preparation for Acceptance Test

- ☐ Fire authorities have been notified of the system test. Also notify any location where alarms are transmitted. DO NOT ROLL FIRE TRUCKS BY ACCIDENT. All building occupants have been clearly notified of the system test.

All required documents are on site for the SCO inspection and review.

- ☐ A copy of the project plans and specification
- ☐ A copy of the contractor's approved shop drawings including:
  - ○ cut sheets
  - ○ plans
  - ○ battery size calcs
  - ○ Voltage drop calcs
  - ○ Matrix
  - ○ Training Certificates

- ☐ A copy of the Fire Alarm system "as built" drawings showing the routing of circuits installed
- ☐ Final NFPA 72 "Fire Alarm System Record of Completion" form
- ☐ A copy of the System Operation Matrix, giving the FACU response for each initiating device input, has been provided by the fire alarm installer to facilitate testing.
- ☐ A copy of the sensitivity report
- ☐ A copy of the printout generated by the 100% device testing

NFPA 72 "Record of Completion"

- ☐ **NFPA 72 "Record of Completion" Form, filled out, with all signatures and at FACU**
- ☐ Appropriate year of form is used per year of Building Code permit

- ☐ The manufacturer's authorized distributor (the "installer") who made final connections at the FACU and programmed the system gave the owner and AHJ advance notice of the required 100% operational tests, so they could elect to attend.
  NOTE: The required 100% testing cannot properly be done by a single technician without a helper, even if the FACU has Walk-Test or an equivalent feature. Query the tech on how testing was performed. Signatures on the form must match the typed/printed names and each section must be complete. Do not accept a company name in place of the responsible individual. The individual must have a certificate. For State Projects, the electrical designer is, by contract, SCO's representative as AHJ. For Community College Projects, the local code official is the AHJ.
- ☐ Verify the technician who programmed the alarm system was trained and certified by the manufacturer, for the specific FACU model being installed, within the past 2 years. (A copy of the cert. should have been submitted with the Shop Drawings.) NICET Level III certification will extend this to 36 months.

REVIEW THE FOLLOWING ITEMS FROM THE SHOP DRAWING SUBMITTAL:

- ☐ Contractor has submitted battery calculations to the designer, verifying the system meets applicable capacity requirement of NFPA 72. The minimum endurance is 24 hours plus 5 minutes of alarm load. In State buildings, 60 hours of standby is required unless the fire alarm system and all power supplies for the system are on standby or emergency power.
- ☐ Battery sizing calculations verifying adequate Amp-Hour rating, indicating that the worst-case NAC voltage on battery is within alarm notification appliance listing, and that NAC alarm load voltage drop at EOL does not exceed **14%** of battery voltage.
- ☐ Notification Appliance Circuit (NAC) calculated current draw, demonstrating that none exceed 80% of rated module output.
- ☐ If system is the Emergency Voice/Alarm type, amplifier load calculations.
- ☐ Copy of factory training certificates for technicians who programed the system.

REVIEW THE FOLLOWING ITEMS FROM 100% Test:

- ☐ **System Status and Programming Report, which includes the following 3 elements:**

- ☐ Program settings for each alarm initiating device
- ☐ Current sensitivity reading of each smoke detector
- ☐ System operational matrix, giving response for each alarm input

☐ **If building has smoke purge system, an HVAC balance report in purge mode**

☐ **Two bound copies of the following information on the system (may be combined):**

- ☐ Manufacturer's technical literature (cut sheets) on system components
- ☐ Required maintenance schedule on system, to comply with NFPA 72
- ☐ As-built drawings with loop #'s, device addresses, equipment terminals

COMPARE DOCUMENTS TO INSTALLATION

	Shop drawings calcs:	Installed size is:
FACU batteries	____AHr___@___V each	___AHr___@___V each
NAC batteries	____AHr___@___V each	____AHr___@___V each
DACT batteries	___AHr___@___V each	____AHr_@_____V each_
SLC loops	_____class_____	_____class_____ _____class_____
NAC Circuits	_____class_____	_____class_____ _____class_____

Check Fire Alarm Control Panel(s)

☐ **VERIFY SYSTEM IS IN TEST MODE AND THE FIRE TRUCKS WILL NOT ROLL**.

☐ Operating instruction summary is framed and mounted at the FACU.

☐ Green grounding wire is bonded to FACU cabinet and connected to designated terminal on motherboard (if any).

☐ AC Power

- Branch circuit to FACU does not share conduit with 24vdc alarm initiating circuits or notification appliance circuits.
- Circuit breaker(s) serving FACU (and associated equipment) have lock on clips and red dot beside breakers. (Do not paint the circuit breaker)
- Placard on the FACU gives the following info on this circuit: ***Panelboard location, panelboard identification, and branch circuit number (***The same applies to SNAC panels and any other system cabinets or power supplies)
- Surge arrestor model listed in project spec (feed-through type with "pi" configuration) is installed at electrical panelboard, on the 120vac branch circuit to FACU. Arrestor leads are trimmed as short as practical. See attached wiring diagram for more info.

☐ Fire alarm control unit (FACU) is powered up and clear of alarms, supervisory signals, and trouble conditions.

☐ Have ground fault put on any alarm initiating or notification appliance (horn-strobe) circuit. FACU must indicate "ground" and general "trouble."

☐ Record battery size and verify date of installation is marked on each battery (Marking of the date of manufacture of the battery is a code requirement – so you will find 2 dates)

☐ Have technician disconnect a battery lead and verify the FACU indicates a local trouble signal within one minute of that action.

☐ Reconnect battery, ***then*** turn off 120vac. Batteries should measure approx. 13 volts and differ **≤** 0.4 volt. (Also check batteries in any booster power supplies.)

☐ Have technician confirm FACU is programmed to send an AC power failure trouble signal to Remote Supervising Station if power loss continues for 1 hour minimum to 3 hours maximum.

- ☐ The FACU and any transponders, sub-panels, DACT and "ADA" booster power supplies must be protected by a smoke detector within 15 feet of their location, measured horizontally, as required by Code (NFPA 72).

- ☐ Addressable loop circuits are Class “A”, with isolation modules at FACU on the outgoing and return loop, after each 20 addressable devices (max) on the loop, and (if ≤ 20 devices) at midpoint.
  - Have the technician apply a short circuit on the SLC loop. This will force two isolation modules to clamp. The test is to verify their operation and device count between the two that clamp.
  - With AC power off, there will be multiple troubles on the system. The total count will increase during this test. Exclude the count prior to the short.
  - On retrofit and repair work where the AHJ has approved the use of a class B SLC wiring design the isolation modules will not be installed.
  - Verify the number of devices between Isolation modules meets the specification requirement.

- ☐ While on battery power, initiate Alarm. Batteries should remain at 12+ volts each but dropping slowly. Let alarm continue during next step.

- ☐ Verify the Notification Appliance Circuit (NAC) voltage drop at the EOL is **≤** 3 volts. Do this separately for each NAC. Look at the shop drawing to find the worst-case scenarios when spot checking at a final.

- ☐ Silence the alarm and verify that any Remote Supervising Station has received a fire alarm signal. Reset the FACU and verify the Station receives a subsequent "restore" signal, indicating the alarm condition has been cleared.

- ☐ Verify requirements on wire type and gauge were followed and that the color code for circuits is proper throughout the system. (Review specifications and shop drawing requirements.).

- ☐ Have installing technician demonstrate that the system is programmed so all ***spot- type*** smoke detectors have automatic drift compensation and FACU will indicate when prescribed sensitivity limits are reached or exceeded.

- ☐ If system has provisions for “alarm verification" algorithm, arm it only if needed for the environment. Do ***not*** apply it to multi-sensor or multi-criteria smoke detectors, elevator capture detectors, or duct smoke detectors.

- ☐ If any addressable control relays are installed, verify their contact ratings are suitable for connected load. (Some are rated for resistive loads only.) Also, if they require separate 24vdc power for operation, verify the circuit is electrically supervised. Compare their installed location to the design intent.

- ☐ All field wiring in the system has wire markers where landed at the FACU and in the terminal cabinet(s) on each floor of multistory buildings.

- ☐ If system uses an LED “zone” annunciator to provide a quick visual overview of the fire scenario for responding public safety personnel (general fire area and type of alarms), a framed directory or typed/engraved LED labels provide clear information on "zone" (area) boundaries and the type(s) of alarms (i.e., smoke, waterflow, etc.)

- ☐ During the walk through of the site verity that there are **no** splices in the system wiring other than at terminal blocks which are installed in identified terminal cabinets. "Wire nuts" and butt splices are not permitted on new work.

- ☐ All circuits are properly and securely terminated. Approved terminal fittings are used for any stranded wire terminations at screw posts that lack pressure connectors.

☐ Each fire extinguishing system, such as in a kitchen hood, is connected to give building fire alarm. Have contractor demonstrate that this functions properly, by manually operating the monitored switch, without releasing extinguishing agent.

NOTE: Kitchen hood fire extinguishing system activation must shut off the gas, if used, and, for wet chemical type also operates a shunt trip breaker to shut off the electric power to all protected appliances under the hood. The exhaust fan(s) keep running but the make-up air must shut down. These functions are to be done directly by fire extinguishing system, rather than the FACU, since it is not appropriate to cut off the gas supply or to operate the shunt trip for other types of alarms not involving the kitchen hood extinguishing system (e.g., smoke detectors, fire alarm boxes, etc.).

☐ Verify that fire alarm system monitors power to any fire suppression system shunt trip breakers. (Look for kitchen hood systems and sprinklered elevator spaces.)

☐ If remote alarm annunciator in building, verify proper operation, including the audible “Trouble” signal. Check its "Lamp Test" and “Trouble Silence” features, if provided.

☐ If a Fire Pump is part of the sprinkler system – verify that NFPA 20 certification was provided and testing has been successfully completed

OTHER SUPPRESSION SYSTEMS

☐ Pre-action suppression system – If installed and if it has an independent control panel it will require a separate NFPA 72 certificate from the building Fire Alarm Panel

☐ Dry Chemical suppression system – If installed and if it has an independent control panel it will require a separate NFPA 72 certificate from the building Fire Alarm Panel

PROPER INSTALLATION OF DEVICES

☐ Verify all dust covers have been removed. If still installed how was the 100% test done?

☐ Spot type smoke detectors shall not be located within 3 feet of a supply or return air diffuser, nor in a strong air stream from a supply diffuser at any distance.

☐ Wall-mounted smoke detectors must be installed between the ceiling and 12 inches below from the ceiling (measured to the nearest edge of the detector), as required by NFPA 72.

☐ Wall mounted detectors shall not have wall-mounted luminaires or other obstructions below.

☐ All smoke detectors are analog addressable model(s) having a separate plug-in head, concealed locking device, and terminal strips for circuit connections.

NOTE: Snap-ring mounted models with removable terminal strip plug for connection to loop conductors do not comply with the intent of this requirement and typically do not have a locking device to deter tampering.

☐ Verify that the isolation modules and addressable initiating device interface and relay modules are in a conditioned space (not attics, boiler rooms, unheated warehouses, damp locations, outside corridors, parking decks, etc.). Exception: Any devices that are specifically listed for the ambient conditions expected (or likely) in the area where installed.

☐ Verify that all detectors, modules and pull stations installed outside or in non-conditioned spaces are listed for use at the both ends of the expected temperature. (e.g. Typically, addressable pull stations are not listed for use in parking decks because the low end is 32 degrees.)

☐ Verify that any strobes in walk-in coolers or freezers are listed for that environment or provided with heated Lexan enclosures for which they are specifically listed.

☐ Check any outside alarm bells and strobes for operation. Verify outside strobe is the weatherproof type with at least 100cd output, double flash, with clear lens.

DUCT SMOKE DETECTORS

☐ Intake tube has its holes /slots facing into the air stream, and a stopper installed to seal its far end.

☐ If the tube is over 36 inches long, the far end must be supported for stability. If support is provided by extending the intake tube through the far side of HVAC duct (best for inspection, cleaning, testing), the duct penetration must be sealed.

☐ Initiate alarm on a representative sample of devices by operating manual fire alarm box, blowing smoke into detector, flowing water from sprinkler system inspector's test station, etc., except do not test any non-restorable, fixed temperature heat detector. (get total counts from 72 form)

☐ Photo smoke ____/____ ☐ Duct smoke_____/____ ☐ Heat detector____/____
☐ Ionization smoke____/____ ☐ Other detector_____/____ ☐ Flow switch_____/____
☐ Pull Station ____/____ ☐ tamper switch_____/____ ☐ _____/___

☐ For each device tested have FACU operator read out the FACU display and the LED display. (Radios are very helpful at this point.) There should be a clear indication of device type, device number and location for each device tested.

- Individual detectors of all types shall be identified on their bases (Loop # **--** Device #), in sequence on the loop from the FACU

☐ While spot testing devices in the facility verify operation of audible-visible alarm notification appliances.

- Audible alarm devices must be 15 dBA above normal ambient sound level in all occupiable areas of building. (Use meter if in doubt.)
- Indoor strobes must flash 60-120 times/minute and those installed in a single space (room, corridor, etc.) must be synchronized and remain synchronized throughout the test.

☐ Also verify HVAC shutdown and closure of (any) smoke doors. These functions must be done by the FACU, rather than by integral smoke detector relay contacts.

- Shutdown must occur within 20 seconds, except gas pack units can be arranged for up to 60 seconds delay before the fan stops, to prevent heat exchanger damage.
- After verifying the HVAC shutdown is operational it is acceptable to activate the HVAC bypass to avoid excessive restarting of large air handler systems.

ELEVATORS

☐ Elevator control key and technician must be on site for the following tests to take place
☐ Elevator lobby detectors must be within 21 feet of each elevator door
☐ Test detector(s) located at elevator lobby that will initiate elevator recall
  - Verify recall to a primary floor
  - Verify recall to alternate floor
  - Verify illumination of “Fire Hat”
☐ Test detector(s) located in shaft & elevator machine room
  - Verify recall to designated floor
  - Verify flashing illumination of “Fire Hat”
☐ Heat Detectors installed in a shaft or machine room and used for shunt trip activation shall be located within 2 feet of each sprinkler head. (Verify the power source for the shunt trip breaker is supervised and reports a supervisory alarm) (Verify heat setting is less than sprinkler setting per code req.)

SPRINKLER SYSTEMS

☐ If a sprinkler system is present, check the operation of the waterflow alarm switches by flowing water from Inspectors Test connection(s), unless dry pipe system. Alarm sounds in 20-45 seconds and any outside water motor gong rings properly in ≤ 300 seconds.

☐ Inspectors Test Connection flow is limited to 1/2" stream (or actual orifice size of the sprinklers in the system, if different) by a valve or sight glass marked accordingly, or by a sprinkler head (minus deflector) mounted at discharge. NOTE: If a pipe union with an internal restrictor plate is used for this purpose, have the sprinkler contractor take at least one apart for inspection, to verify the orifice size.

☐ Close any electrically supervised sprinkler control valves to verify supervisory alarm at FACU within 2 turns of control wheel or, for Post Indicator Valve (PIV), within 1/5 of valve control mechanism’s travel

distance. Then reopen to verify “restore” signal. (Completely close the PIV and verify that the supervisory alarm does not restore for the full travel distance. It should only restore when the valve is open)

☐ If dry pipe or pre-action sprinkler system, have contractor demonstrate waterflow alarm functions, and that both high and low air pressure are supervised as required.

☐

☐ Each duct smoke detector has a Remote Alarm Indicator Light (RAIL) in nearest corridor or other public space. (Because addressable, test switch is **not** required.)

☐ At each duct detector a 12”x12” minimum access door, hinged or latched type, is provided to facilitate sampling tube inspection and cleaning.

☐ Air flow direction is permanently indicated on the duct by stencil or decal, to help assure the sampling tubes are installed and maintained in the correct orientation.

ALARM COMMUNICATION TRANSMISSION

☐ **Transmission Verification:** Verify communication pathways are present and supervised per NFPA 72.
☐ Verify that transmission means are connected and functioning properly, to transmit fire alarm, supervisory, and trouble signals as separate, distinct events.
☐ Verify two transmission means are present and labeled when sprinkler is installed.
☐ Verify that transmission means are programmed for 24-hour silent test call to the supervising station.
☐ Verify each type of signal is properly received and coded at the receiving station. (Supervisory signals include sprinkler valve tamper, fire pump off-normal, hi-low air pressure, etc.)
☐ Verify transmission means have backup power per NFPA 72.

PRINTER

☐ The specification should require that systems with more than 100 addressable points, or in a building that exceeds 3 occupied floors or 60,000SF, an event printer is to be provided which uses ordinary non-thermal paper. In a high-rise building, the printer must be FACU-monitored and on a generator-supported circuit.
    - NOTE: Printer does not have to be adjacent to FACU and, except for high rise buildings, does not have to be electrically supervised.

OTHER SYSTEMS

☐ For dormitories and residence halls, there will be special testing required for the sounder bases and the handicapped notification which uses higher candela strobes. Even if system is dual event it must dial out on 1st alarm.
☐ For institutions check for keys to the lockable pull stations if they are installed.
☐ Where smoke “sniffer” systems are used - create a test procedure with the help of the designer.
☐ Where beam detectors are used, verify they are not on walls subject to movement and are not subject to direct sunlight.
☐ Where smoke evacuation &/or AHU bypass is used verify that the panel can be locked, and operation limited to qualified people.
☐ Mass Notification systems require special procedures and testing to verify proper operation.

TRAINING ETC

☐ Verify that the Owner's designated personnel have received training in system operation: How to interpret, silence, and reset FACU signals, how to obtain service, etc.

☐ Verify that when required by specification, owner's personnel have received more thorough, detailed training in system troubleshooting and repair, plus installation manuals and other documentation, as applicable. (This is standard for the UNC-Chapel Hill campus.)

☐ Contractor has provided electronic copy of system's site-specific programming. (CD, flash drive)

☐ Contractor has provided spare parts in accordance with the specification for the project.

REFERENCE INFORMATION TO ASSIST SYSTEM INSPECTION

After the required 100% system operational test the contractor submits a “final” copy of NFPA 72* "Fire Alarm System Record of Completion" form. This form is to verify the proper operation of all (restorable) alarm initiating devices, audible and visible notification appliances, and other system functions including HVAC control, closure of smoke doors and dampers, pressurization fans, remote signaling, etc.
*****Use only the NFPA form, or an identical reprint. The NFPA 72 form will vary with the year the project was permitted. The year required should be listed in the project specification.

NC Building Code, Chapter 16 Referenced Standards set the NFPA 72 version requirements

Projects permitted under NC Building Code 2002 - NFPA72 1999
Projects permitted under NC Building Code 2006 - NFPA72 1999
Projects permitted under NC Building Code 2009 - NFPA72 2002
Projects permitted under NC Building Code 2012 - NFPA72 2007
Projects permitted under NC Building Code 2018 – NFPA72 2013

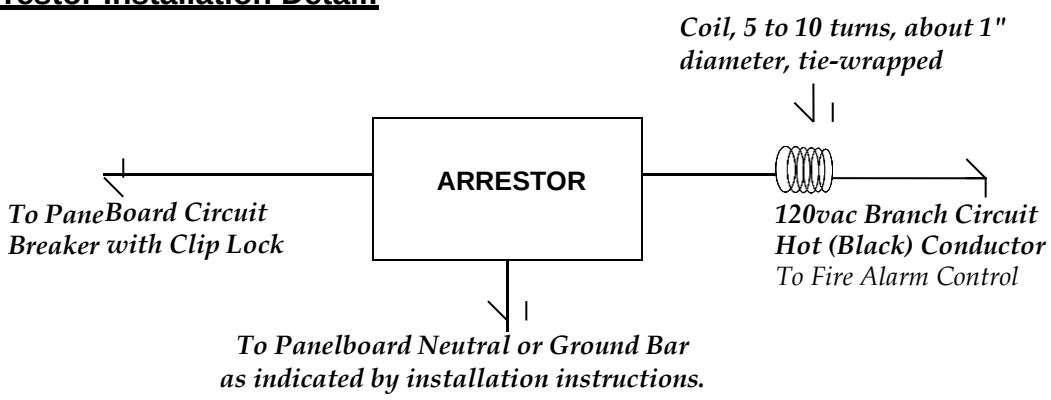
NFPA 72 Chapters (note they vary by version year)

(1999) Chapters: 1-Fundamentals, 2-Initiating Devices, 3- Protected Premises, 4-Notification Appliances, 5- Supervising Station FA system, 6- Public FA reporting systems, 7-Inspection and Testing, 8-FA for Dwelling units, 9-Reference publications

(2002) Chapters: 1- Administration, 2-Referenced Publications, 3- Definitions, 4- Fundamentals, 5- Initiating Devices, 6- Protected Premises, 7- Notification Appliances, 8- Supervising Station FA system, 9- Public FA reporting systems, 10- Inspection and Testing, 11- Single and Multiple Station & Household

(2007) Chapters: 1- Administration, 2-Referenced Publications, 3- Definitions, 4- Fundamentals, 5- Initiating Devices, 6- Protected Premises, 7- Notification Appliances, 8- Supervising Station FA system, 9- Public FA reporting systems, 10- Inspection and Testing, 11- Single and Multiple Station & Household

Transient Arrestor Installation Detail:



NOTE: Securely mount transient arrestor in accessible junction box or other proper metal enclosure adjacent to the electrical panelboard, and provide engraved label indicating its location

REFERENCE INFORMATION TO ASSIST SYSTEM INSPECTION

Wiring: All addressable system wiring shall be color coded in accordance with following scheme, which must be maintained throughout system, without color change in any run:

- Addressable Loop Controller Circuits**:** Cable per spec, with Red Jacket
- One-way Voice/Alarm and Two-way (Fireman's Telephone)**:** Wire per specifications

The following circuits use THHN / THWN conductors, of the size and color indicated:

- Alarm Notification Appliance Circuits**:** AWG 14 or 12, Blue (+) and Black (-) conductors
- AHU Shutdown, Elevator Capture, other control functions**:** These are now done by addressable control relays on the loop. The relays may require separate power circuits, in which case use AWG 14 conductors, with Yellow (+) and Brown (-) color code. **NOTE: Check any power circuits to addressable relays for electrical supervision by disconnecting 1 lead.**
- Circuits that power door magnets from the FACU or SNAC panels**:** AWG 14, Orange
- Circuits from ZAM's to normally open contact initiating devices**:** AWG 14, Red (+), White (-)
- NOTE: Most manufacturers either require or recommend low capacitance, twisted, shielded pair cable for Signaling Line Circuits (addressable loops). All shielded cable must have the grounded "drain" wire maintained continuously around the loop. If unshielded cable was used, verify that the manufacturer's installation instructions require or state a preference for use of unshielded cable. For addressable system retrofit when a non-addressable system had previously been in service, if existing single-conductor wiring from the old system was used (sometimes done if in fine condition, properly color coded, with terminal strips, etc.), verify that the manufacturer's SLC modules are listed using straight-lay cable.

Spares: Provide the following spare parts with the system, each individually packaged and labeled. For multi-building project calculate separately for each building with FACU:

- Fuses (If Used).....2 of each size in system
- Manual Fire Alarm Boxes.....2% of installed quantity
- Addressable Control Relays.....4% of installed quantity
- Indoor Horns/Speakers with Strobes Lights.....4% of installed quantity
- Indoor Strobe-only Notification Appliances.....4% of installed quantity
- Monitor Modules (Addressable Interface).....4% of installed quantity
- Isolation Modules / Isolation Bases.....4% of installed quantity
- Addressable, Electronic Heat Detectors.....4% of installed quantity
- Spot-Type Smoke Detectors / Sounder Bases.....6% of installed quantity

NOTE: Increase decimal quantities of all spare parts to next higher whole number when calculating.
NOTE: No spares are required for projected beam, air sampling, or duct type smoke detectors