NC State University Design and Construction Guidelines
Division 26 Fire Alarm Systems

1.0 Purpose

A. The following guideline provides the minimum standards and requirements for fire alarm systems.

2.0 Procedural:

A. The NC State design project manager shall schedule a meeting with the NC State Facilities Operations Electronic Systems team prior to initiating design.

B. The Engineer of Record shall insure continuous alarm protection when designing fire alarm systems where upgrading, modifying or phasing of work is required. Fire alarm protection shall be maintained in occupied areas at all times. The Engineer of Record shall prepare a construction phasing plan to be included in the bid documents.

3.0 General Requirements

A. The Fire Alarm System design and installation shall comply with requirements of the latest edition of NC State Construction Office (SCO) design and testing guidelines titled Fire Detection and Alarm Systems http://www.ncsco.com/documents/guidelines/2011FireAlarmGuidelines.pdf and NC SCO Electrical Guidelines and Policies http://www.ncsco.com/documents/guidelines/2011_Electrical_Guidelines.pdf

B. Fire Alarm Systems shall be installed by an approved manufacturer certified by the manufacturer. http://www.ncsu.edu/ncsu/facilities/con_guidelines/pdfs/Division00_Preferred_Manufacturers_List.pdf

C. Engineer of Record shall design a complete fire detection system with total smoke detector coverage.

D. The Designer shall witness 100% test and provide a copy of the verified NFPA 72 Record of Completion Form 1-6.2.1 to NC State.

E. The installation shall meet NFPA 72, chapter 6 Requirements for Notification Appliances for Fire Alarm Systems. A performance specification may be used to ensure compliance with all applicable codes, however the minimum quantity of notification appliances shall be as shown on plans and risers. A performance specification may be used to ensure the required audible signal levels are achieved.

F. The Fire Alarm Control Panel (FACP) or annunciator, shall be mounted at the building's designated emergency entrance . Annunciation of all building alarms shall occur in one central location. This includes fire, ventilation failure, and gas monitor alarms.

G. Prior to accepting the fire alarm shop drawing package, the Designer shall conduct a mandatory fire alarm review meeting to review the fire alarm shop drawing package with NC State.

H. The Contractor shall conduct a mandatory pre-construction meeting with the electrical contractor, the fire alarm contractor and NC State.

I. The contractor shall submit shop drawings of the fire alarm system to NC State for review. The plan drawing showing devices, system riser, system interconnection drawings, and manufacturer's specification sheets shall be included. Drawings shall include design ambient sound level, audible alarm device sound power and alarm sound level for each space. Additional devices required while verifying the system shall be at contractor's expense.

J. Prior to final inspection:

a) the Fire Alarm Contractor shall demonstrate 100% compliance with plans, submittals, specifications and NFPA 72 to NC State.

b) Designer shall provide fully completed ***NC State Fire Alarm System Checklist for Addressable Systems*** to NC State. Form is available as attachment to this guideline.

4.0 Materials and Standards

A. The fire alarm system design shall include at a minimum:

1. A dual contact time-delay relay (minimum 60 seconds capability) installed at the main FACP to delay system trouble signals to the Emergency Communications Center.

2. Compression type fittings for all conduit with insulated throats.

3. If duct smoke detectors and/or linear beam smoke detectors are installed, a Remote Alarm Indicating Light (RAIL) that includes a test switch mounted at 8'-0" AFF shall be provided.

4. Magnet test capability for all smoke detectors.

5. Pull stations with keyed locks for resetting purposes. Allen key type locks are unacceptable. Two (2) keys for each pull station shall be supplied to NC State.

6. Three (3) isolation modules for each addressable loop; two (2) at the FACP and one (1) midway through the loop address scheme.

7. Devices for addressable systems to match the brand of FACP installed. These devices shall be addressable analog devices.

8. The following bypass switches must be programmed into the system:
   c) Audio/visual bypass
   d) Tamper switch bypass (programmed as non-latching)
   e) Waterflow bypass (silenceable only)

9. Wiring color codes shall be white/red, 14 gauge stranded, THHN for conventional initiating circuit. The color code for door holders shall be orange+/grey-, 14 gauge stranded, THHN.

10. CO/Freon gas alarms that require monitoring shall tie directly to the DAC.

11. Air Handing Units 15,000 cfm or larger require duct detectors on the supply and return sides of the unit.

12. Duct detectors in laboratory buildings shall shut down air handlers only when smoke is detected at the duct detector. General alarm shall not shut down these units.

13. A minimum of one addressable loop shall be provided per building floor.

14. All fire alarm system devices located on any exterior building surface shall be weatherproof as defined by the National Electric Code.

15. Systems installed in building additions or renovations shall be U.L. listed, matching existing devices or approved compatible devices for use with the existing fire alarm control panel (FACP)

B. All devices for fire alarm systems shall be U.L. listed, matching existing devices or approved compatible devices for use with the existing FACP.

C. The Contractor shall provide any special equipment, tools, and programming devices required for the operation, maintenance or repair of the installed fire alarm system.

D. Costs for modifying the existing FACP shall be included in the contract.

E. Approved Contractor and Vendors

1. Fire alarm systems shall be fully serviceable and programmable by NC State and shall be U.L. certified as installed.

2. Fire Alarm Contractor shall specialize in fire alarm system installation, be factory trained and certified, with a minimum of five (5) years documented experience installing and maintaining fire alarm system for similar installations.

F. One annual preventive maintenance (PM) test shall be performed on the entire fire alarm system between six (6) and twelve (12) months after NC State's acceptance. All system deficiencies found shall be documented and corrected. This PM shall include all items to be annually tested as defined by the edition of NFPA 72 enforced at the time of system acceptance, in addition to the following:

1. A complete software backup.
2. A fifteen work-day notice of testing scheduled by the Contractor through NC State. Testing shall be witnessed by a representative designated by NC State.
3. A report consisting of the NFPA Inspection and Testing Form furnished by the contractor, to the Engineer of Record and NC State within two (2) days after completion of this test.

G. Training Requirements

1. On-site training shall include:
   a) variable changes
   b) programming changes
   c) report creations and changes
   d) system functional changes
2. Contractor shall provide 16 hours of on-site owner training to NC State personnel. Training to include hardware repair and maintenance of all building panels and devices, including but not limited to, diagnostic procedures, system expansion, and maintenance techniques.
3. Contractor shall provide a factory sponsored certified technical training for system installed. This training shall certify two (2) technicians to maintain, service, and program installed system and receive direct manufacturer's technical support for these systems, to include software updates if applicable. All expenses to include tuition, transportation, and lodging for this training, shall be the responsibility of the contractor.

H. Labeling Requirements

2. Junction box covers shall be labeled as to their contents using an electronic labeling system with black letters on white background.
3. Contractor shall label all wires terminating in junction boxes and riser boxes. These labels shall be self-sticking wire numbers.
4. All device labels shall be made using an electronic labeling system with black letters on white background. Write-on labels are prohibited. Contractor shall provide a typed legend for all junction boxes and riser boxes corresponding to these labels. Legend shall be mounted in riser boxes. If system does not have riser boxes, contractor shall provide legend to NC State at time of NC State acceptance.

5. All initiating devices for conventional systems (not addressable) shall be labeled with their zone and sequence number.
6. All initiating devices and modules for Intelligent Point Identification Device (P.I.D) systems shall be labeled with their addresses, including loop and point number.

I. Programming and Software Requirements

1. Contractor shall provide all software, hardware, interfaces, adapters, and cables required for all programming and maintenance functions.
2. If the contractor would normally use a laptop to program the system, a similar computer shall be supplied even if programming from the FACP keypad is available.
3. Contractor shall provide all software required for full system maintenance and upgrades to fire alarm system including any device changes, additions, or deletions.
4. Contractor shall provide all software updates during the warranty period and upgrades to software following the warranty period that address system operating failures or defects during the life of the system.
5. Contractor shall provide all levels of password access with documentation.

J. Digital Alarm Communicator/Transmitter (DACT) Communication

1. The fire alarm system DACT shall communicate separate signals for Fire Alarm (zone 3), Fire Alarm Trouble (zone 4), Sprinkler Alarm and Sprinkler Waterflow Alarm (zone 5), and Sprinkler Supervisory Trouble (zone 6). All other zones/signals required for specific installations shall be coordinated and approved by NC State before installation and programming.Digital communications shall be via 10 channel dialer complete with battery back-up.
http://www.ncsu.edu/ncsu/facilities/con_guidelines/pdfs/Division00_Preferred_Manufacturers_List.pdf
2. The DACT shall be mounted in an adjacent or nearest mechanical or electrical room to the FACP. Installation in a telecommunications equipment room or a housekeeping closet is prohibited.
3. The Contractor shall install conduit from a location next to the DACT for connection of the dialer to the main telecommunications room. A minimum 4x4x2.5 inch deep hinged enclosure shall be installed within one (1) foot of the DACT and connected by a one (1) inch conduit. Cable termination will be performed by NC State.

K. A minimum of two levels of security shall be required at the FACP for addressable systems.

L. Install equipment per manufacturers environmental requirements.

M. Power for the FACP, DACT and all remote power supplies and printer shall be from the emergency power panel. Each shall be served by a dedicated circuit.

N. All signal appliances, shall be field selectable ANSI S3.41, three-pulse temporal pattern. Audible signal level shall be field adjustable, with 101 dbA high level and 96 dbA low level. Sound level based upon anechoic dBA at 10 feet.

O. System outages for occupied buildings

1. The Contractor shall notify NC State prior to any work to contacts/interface with any alarm detection devices (smoke detectors, pull stations, horns, panels, etc.). If any disabling, disconnection, reconnection of fire alarm system equipment is necessary, the Contractor shall notify NC State at least five (5) working days prior to proposed work. Work cannot proceed until contractor receives written approval from NC State.
2. Disabling or disconnection shall be limited to one (1) working day per outage. The Contractor shall be liable for any costs, direct or indirect, due to false alarms resulting from Contractor's work.

P. Air handling units controlled by FACP shall be de-energized directly by the FACP during alarm shutdowns. Fire alarm device relays and Building Automation Systems shall not be used for alarm shutdowns of air handling systems.

Q. Rolling fire doors shall be equipped with electric motor controls interfaced with the FACP.

R. Spare Parts

1. The following spare parts shall be provided to NC State prior to final acceptance of system:
    a) Fuses- two (2) of each size used in the installed system..
    b) MPS- w/ monitor modules – Minimum one (1) or 2% of total installation.
    c) Audio-visual devices – Minimum one (1) or 4% of total installation.
    d) Indoor strobe only devices – Minimum one (1) or 4 % of total installation.
    e) Exterior indicating devices – Minimum one (1) or 2% of total installation.
    f) Spot Smoke Detectors – Minimum one (1) or 6% of total installation.
    g) Spot heat/thermal detectors – Minimum one (1) or 6% of total installation.
    h) Spot detector bases – Minimum one (1) or 2% of total installation.
    i) Spot detector sounder bases – Minimum one (1) or 6% of total installation.
    j) Relay modules – Minimum one (1) or 4% of each total installation.
    k) Monitor modules – Minimum one (1) or 4% of total installation.

l) Isolation modules – Minimum one (1) or 4% of total installation.

S. Documentation provided shall be complete and provided to NC State at the time of acceptance, and shall include all necessary information to support the above stated functions. Manuals shall be bound, and published, consisting of the following:

1. Installation Manual
2. Operator/User's Manual
3. Technical Manual
4. Programming Manual

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NC STATE UNIVERSITY

FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems

Building Name/Location: _____

Installing Company: _____

Observation By: _____ **Date:** _____ **Time:** _____

PRIOR TO INSPECTION

		YES	NO	N/A
1	Building Occupants, Authorities and Alarm Monitoring Co Have Been Notified	☐	☐	☐
2	FACP Manufacturer and Panel is Approved for NCSU Campus	☐	☐	☐
3	Installer/Programmer Has Been Certified Within the Last (2) Years to Install the FACP	☐	☐	☐
4	Battery Calculations Have Been Submitted	☐	☐	☐
5	Received NFPA 72 Certification Inspection and Testing Form from Fire Alarm Installer	☐	☐	☐
6	Received Printer Print Out of 100% Device Test with Addresses	☐	☐	☐
7	Received Sensitivity Test for Each Smoke Detector	☐	☐	☐
8	Received Copy of Contractor Sysem Response Matrix	☐	☐	☐
9	Received Copy of Contractor Layout System Mapping (EST Only)	☐	☐	☐
10	Program was Downloaded to Disk and Reinstalled from That Disk	☐	☐	☐
11	Installer/Programmer Shall be NICET Level 2 (Minimum)	☐	☐	☐
12	Company Shall be NICET Level 4	☐	☐	☐

If Any of the Above Items Have Not Been Obtained, the Observation Cannot Proceed

Fire Alarm System Installation and Configuration

OBSERVATION

Conduit and Wiring:

		YES	NO	N/A
1	Insulated Throat Connectors and All Conduits are 3/4 Inch	☐	☐	☐
2	No Set Screw Raceway Connectors	☐	☐	☐
3	No PVC Conduits (Interior or Exterior)	☐	☐	☐
4	All Junction Boxes Covered and All Screws are in Place	☐	☐	☐
5	All Junction Boxes, Extension Rings and Metal Covers Painted RED	☐	☐	☐
6	Each Conduit Length is Securely Fastened in Place at Least every 10'. In Addition, Each Conduit Shall Be Securely Fastened Within 3' of Any Box or Cabinet	☐	☐	☐
7	Boxes Containing a 120V Circuit has Green Ground Wire and is Bonded to an Unpainted Surface Grounding Terminal	☐	☐	☐
8	Conductor for Signal and Notification Circuits are Continuous Runs (No Splices)	☐	☐	☐
9	All Field Wiring in the System is Labeled Where Attached at the FACP, AND in Each Terminal Cabinet & Legend on Terminal Cabinet Door on Every Floor	☐	☐	☐
10	All Circuits are Properly and Securely Terminated. Termination Blocks are Approved for the Number and Size of Wires Connected at Each of it's Terminals. Approved Wire Connector Connectors. Terminal Strips are Securely Attached to the Junction Box; No Floating Strips	☐	☐	☐
11	The Feed and Return Loops are Class 'A' Circuits in a Separate Conduit for Each End of Line Notification Circuit. Do Not Combine Loop Notification Conductors into Same Conduit Except Where Permitted by the Specifications	☐	☐	☐
12	The Supply and Return Conduits Shall have (3) Feet of Separation Between Them	☐	☐	☐
13	There are (2) Hinged and Labeled FATCs Per Floor	☐	☐	☐

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14	All AC, FACP, Communicator, SNAC, Etc Circuits are Fed from Emergency Circuits (If Available)	☐	☐ ☐
15	All Wiring Color Codes per DOI Specifications. No More than 360o Bend in Conduit	☐	☐ ☐

Pull Station, Smoke/Heat Detectors and Audio/Visual Devices:

		YES	NO	N/A
1	Confirm All Devices are Located as per Approved Fire Alarm Shop Drawings	☐	☐	☐
2	A/V Devices are Installed within 15' Max of each End of Same Corridor	☐	☐	☐
3	A/V Devices Do Not Exceed 100; Between Devices (Regular Shaped Corridor)	☐	☐	☐
4	A/V Candela Ratings Match Approved Fire Alarm Shop Drawings	☐	☐	☐
5	Label Each Device and End of Line Notification Devices, Label with the Circuit Number	☐	☐	☐
6	Confirm all Devices are Labeled per NCSU Guidelines to Include All Characters Necessary to Disable/Enable Devices.	☐	☐	☐
7	Smoke/Heat Detectors are Installed within 15' Max of Each End of Same Corridor	☐	☐	☐
8	Smoke Detectors are Installed Approximately 30' OC, Do Not Exceed 30'	☐	☐	☐
9	Smoke Detectors are Not Located within 3' of a Supply or a Return Air Diffuser or Further if The Air Flow is Affected	☐	☐	☐
10	Smoke Detectors are Located within 5' of Both Sides of a Corridor Fire Door	☐	☐	☐
11	Wall-Mounted Smoke Detectors are Located Between 4" and 12" from Ceiling	☐	☐	☐
12	All Strobe Flashes are in Synch (Entire Building)	☐	☐	☐
13	Pull Stations are Located at each Place of Natural Egress and within 5' of Exit	☐	☐	☐
14	Smoke Detectors are Installed within 15' of FACP, Boosters and Sub-Panels	☐	☐	☐
15	Smoke Detectors (With the Exception of Duct and Elevator Smokes) have a Maximum 30 Second Alarm Verification Enabled	☐	☐	☐
16	Smoke Detectors Shall Not Have a Pre-Alarm Feature	☐	☐	☐
17	Pull Station Shall be at a Height that Complies with ADA	☐	☐	☐
18	All Addressable Devices Shall Be Installed in a Conditioned Space, Not Above Ceiling and with LEDS Visible from Floor.	☐	☐	☐

Duct Detectors:

		YES	NO	N/A
1	Confirm All Devices are Installed as Per Approved Submittals and Detail Drawings	☐	☐	☐
2	Confirm All Devices are Labeled (Loop #, Device #)	☐	☐	☐
3	Confirm Each Duct Detector Intake Tube has it's Holes Facing into the Air Stream and A Stopper in the End of the Tube. If Tube is Over 36', it Will Have Rear Supports. If the End Penetrates through the Duct, the Duct Shall be Sealed	☐	☐	☐
4	Confirm at each Duct Detector, A 12"x12" Minimum Access Door is Provided for Cleaning and Inspecting the Tube. Verify Air Flow Direction is Permanently Indicated on Duct	☐	☐	☐
5	Confirm each Duct Detector has a Remote Alarm Indicator Light (RAIL) and Key Test Switches in the Nearest Corridor or Public Space @ 80" AFF, Unless this is Above Ceiling, Must be In Air Conditioned Space	☐	☐	☐
6	Confirm Return Side Device in Units Greater than 2,000 CFM	☐	☐	☐
7	Confirm Supply Side Device in Units Greater than 15,000 CFM	☐	☐	☐
8	No Duct Detectors Installed on Roof	☐	☐	☐
9	Duct Detectors Shall be Mounted Upstream from or Before Humidifier	☐	☐	☐

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For Addressable Systems

Electrical Panel TVSS for FACP:

	YES	NO	N/A
1 Each Circuit that Powers Fire Alarm Equipment (FACP, Communicator, SNAC, Etc) Shall Have a Surge Protector. The Surge Protector Should be a Series Type as Prescribed by DoI Guidelines	☐	☐	☐
2 Confirm Surge Protector has 5-10 Loops on the Load Side Power Circuit per DOI	☐	☐	☐
3 Confirm Panel has a Green Ground Wire and it is Bonded to an Unpainted Surface on a Grounding Lug in the Box	☐	☐	☐
4 Confirm Fire Panel Circuit is Labeled in Panel and a Breaker Lock-on Device is Installed and that the Breader Handle is Painted Red	☐	☐	☐
5 Each Circuit that Powers Fire Alarm Equipment (FACP, Communicator, SNAC, Etc) Shall have a Lock-on Device Installed on it's Breaker	☐	☐	☐

TVSS for DC Circuits that Extend Outside the Building:

Note: Requirements Similar to those Above are also Required for PIV Monitoring, Etc, as Noted in DOI Guidelines, Surge Protection, Caulk Entry Pipe into Bldg Behind Devices	☐	☐	☐

Digital Alarm Communicator:

	YES	NO	N/A
1 Cabinet is Labeled with 'DAC' on an Engraved Plastic Laminated Sign on Front Exterior of Panel	☐	☐	☐
2 Panel is Labeled Outside of Door with Room #, Panel #, Circuit #	☐	☐	☐
3 Is 120V Present Inside of Communicator. If Yes, the Hinged Door and Panel Box Enclosure Shall be Grounded from the Power Source. DO NOT use the Circuit Board Chassis as a Central Grounding Point Provide a Separate Ground ALL PAINT MUST BE REMOVED AT ALL GROUNDING POINTS ON METAL SURFACES	☐	☐	☐
4 Confirm all Wiring and Phone Lines are Labeled	☐	☐	☐

Fire Alarm Control Panel, SNAC Panel & Battery Cabinet:

	YES	NO	N/A
1 The Door and Panel Box Shall be Grounded from the Power Source. DO NOT use the Circuit Board Chassis as a Central Grounding Point Provide a Separate Ground ALL PAINT MUST BE REMOVED AT ALL GROUNDING POINTS ON METAL SURFACES	☐	☐	☐
2 Cabinet Labeled as Appropriate with an Engraved Plastic Laminated Sign on Front Exterior of Panel	☐	☐	☐
3 Confirm Power Circuit is Labeled Outside on Panel Door	☐	☐	☐
4 Confirm Separation of SLC, NAC and 120V Circuits.	☐	☐	☐
5 Confirm all SLC, NAC 120V, Telephone Line 1 and 2 are Labeled per Manufacturer's Specs	☐	☐	☐
6 Confirm All Conduit Connectors in Panel are Insulated Throat Type	☐	☐	☐
7 Confirm Batteries are Dated	☐	☐	☐
8 Confirm Operation Instruction Summary is Framed and Mounted at the FACP and Annunciator Panel	☐	☐	☐
9 Confirm Zone Directory is Framed and Mounted at the FACP and Annunciator Panel	☐	☐	☐
10 Confirm Smoke Detector & SNAC Panels are Located within 15' of the FACP and in the Same Room as Panels	☐	☐	☐
11 Building with 100 or more Addressable Devices or with (3) or More Occupied Floors Shall have a Printer Installed on Approved Shelf or Table Confirm There is a Printer Installed on an Emergency Circuit	☐	☐	☐

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12 Is There a LED Annunciator Installed ☐☐☐
13 On New & Existing AHU Confirm Defeat Switch Provided at the FACP (Which Causes a Trouble on the FACP When Abnormal) ☐☐☐

Fire Alarm Testing and Operation:

	YES	NO	N/A
1 Is FACP in Normal Operation Mode with No Troubles	☐	☐	☐
2 Perform an LED Lamp Test. Do All LED Lamps Light up?	☐	☐	☐
3 Disconnect Each Telephone Line One at a Time to Verify Line Failure Alarm to Monitoring Company Within One Minute **Reconnect Line After Each Test, Clear Trouble from Panel Before Proceeding**	☐	☐	☐
4 Request Contractor to Unscrew Each End of Line Device from the Wall in Each NAC Circuit for Verifying Battery Voltages During Test, Per Test Procedures Below	☐	☐	☐
5 Disconnect Battery to FACP; Verify Trouble on Panel Within One Minute **Reconnect Batter to FACP**	☐	☐	☐
6 Perform Batter/Current Test, (2) Digital Meters are Required (1) to Measure Current (1) to Measure Voltage	☐	☐	☐
7 All Troubles Activate the DAC after a One (1) Minute Delay	☐	☐	☐

NAC Test Procedure AV Devices

Turn off A/C Power. While on Battery Power Initiate an Alarm Condition. Test Battery Voltages at FACP is Approximately (13) Volts and Not Differ more Than (0.4) Volts Between Each Battery

Install (1) Digital Meter to Read in-line Currents
Provide (1) Digital Meter to Read Voltages

STARTING VOLTAGE AND CURRENT TEST

FACP			End of Line Device
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC #			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC #			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC

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Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC # ___			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC # ___			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

Batteries Shall Not Exceed Voltage Drop of (3) Volts from the NAC Card Output Terminal to the End of Line Device for Each Loop. If Voltage Drop is More Than (3) Volts the Test Will Stop, and the System Fails.

(30) MINUTE VOLTAGE AND CURRENT TEST

			End of Line Device
FACP			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC # ___			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC # ___			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC

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FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems

Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC # ___			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
SNAC # ___			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

Batteries Shall Not Exceed Voltage Drop of (3) Volts from the NAC Card Output Terminal to the End of Line Device for Each Loop. If Voltage Drop is More Than (3) Volts the Test Will Stop.

Test Procedure Continuation

	YES	NO	N/A
1 Request Mapping Chart Layout to Test Isolation Modules, Modules Shall be Installed After a Maximum of (25) Devices in Each Addressable Loop	☐	☐	☐
2 Confirm Addressable Loop Controller Circuits are Class 'A' Type with Contractor	☐	☐	☐
3 Confirm Isolation Modules are Installed at the FACP on Both the Outgoing and Return Conductors of Each Loop (Minimum of (3) Per Loop)	☐	☐	☐
4 Confirm Each Isolation Module is Labeled as 'Isolation Moldule' and State it's Loop #.	☐	☐	☐
5 If Speakers are Installed, are all Shields Tested Free of Grounds & Continuity Good from One End to the Other.	☐	☐	☐
6 Request Contractor to Reconnect 120V Power Source to FACP and Reset Panel to Normal Status	☐	☐	☐
7 Request Contractor to Place an 'Open' in the '+' and '-' SLC/NAC, to Test the Power Supervision. Panel Should Indicate a Trouble in Each. This Shall be Performed Between Each Isolation Module in Each Loop, Minimum of (2) Locations, Maximum Determined by ISO Quantity	☐	☐	☐
8 Request Contractor to Place an 'Short' in the '+' and '-' SLC/NAC, to Test the Power Supervision. Panel Should Indicate a Trouble in Each. This Shall be Performed Between Each Isolation Module in Each Loop, Minimum of (2) Locations, Maximum Determined by ISO Quantity	☐	☐	☐
9 Request Contractor to Place a 'Ground Fault' in the '+' and '-' SLC/NAC, to Test the Power Supervision. Panel Should Indicate a Trouble in Each. This Shall be Performed Between Each Isolation Module in Each Loop, Minimum of (2) Locations, Maximum Determined by ISO Quantity	☐	☐	☐

NC STATE UNIVERSITY

FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems

10 Request Contractor to Reset Panel to Normal ☐☐☐

SLC Test Procedures, Smoke, Heat, Duct Detectors, Pull Stations, Etc

	YES	NO	N/A
1 Initiate Alarm on Devices By Operating Pull Stations, Blowing Smoke in Detectors (No Magnets), Smoking Duct Detectors and Flowing Water to Trip Flow Switches, and Tampers	☐	☐	☐
2 Confirm Each Address, Device Descriptor Type and Location is Correct on the Contractor Zone Map and on the FACP Display for Each Device Being Tested	☐	☐	☐
3 Confirm During Test, Operation of Audible-Visual Alarm Notification Appliances. Audible Must be 15dBA Above Normal Ambient Sound Levels in All Occupiable Areas of the Building	☐	☐	☐
4 Indoor Strobes Must Flash (60) to (120) Times per Minute	☐	☐	☐
5 Sounder Base Detectors. Request Contractor to Place an 'open' in the '+' and '-' to Test the Power Supervision. Panel Should Indicate a Trouble in Each	☐	☐	☐
6 Request Contractor to Place a 'Short' in the '+' and '-' to Test the Power Supervision. Panel Should Indicate a Trouble in Each	☐	☐	☐
7 Request Contractor to Place a 'Ground Fault' in the '+' and '-' to Test the Power Supervision. Panel Should Indicate a Trouble in Each	☐	☐	☐
8 Confirm During Test, Operation of HVAC Shutdown and Also Closure of Fire Doors. (A) HVAC Shutdown Must Occur Within (20) Seconds, Except for Gas Packs that Must be Arranged for up to (50) Seconds to Protect the Heat Exchanger	☐	☐	☐
9 Confirm Any Outside A/V Appliances for Operation & That they Silence on Panel Silence Command. Also, these Devices Sync with the Building A/V's	☐	☐	☐
10 Place an Open in the '+' and '-' of Any Auxiliary (24) Volts that Power any External Equipment such as Beam Detectors, (4) Wire Duct Detectors, Etc to Verify Proper Supervision. Panel Should Indicate Trouble	☐	☐	☐

Sprinkler System

	YES	NO	N/A
1 Confirm Operation of Waterflow Alarm Switches by Flowing Water from Inspectors Test Connection(s). Alarm Latches Within (20-45) Seconds, and Any Outside Motor Water Gong Rings in Less Than (15) Seconds	☐	☐	☐
2 Inspector Test Discharge Flow is Limited to a (1/2") Stream by Using a Sprinkler Head Minus the Deflector	☐	☐	☐
3 Request Contractor to Close any Supervised Control Valve, to Verify Supervisory Signal at the FACP within (2) Turns. Reopen to Verify 'restore' Signal.	☐	☐	☐
4 Request Contractor to Close Post Indicate Valve (PIV), to Verify Supervisory Signal at the FACP within 1/5 (2) Turns of the Valves Mechanical Traveling Distance. Reopen to verify 'Restore' Signal	☐	☐	☐
5 If Dry Pipe of Pre-Action System, Request Contractor to Demonstrate that the Waterflow Alarm Functions by Flowing Water Throught the Test Valve to Activate the Water Gong	☐	☐	☐
6 Request Contractor to Place Air Pressure Pump in Low (PSI) and High (PSI) to Verify Supervisory Signals to FACP	☐	☐	☐
7 Is Design Data Plate Mounted on Riser System Identifying all Pressures and Flow Information	☐	☐	☐
8 Is Sprinkler Drawing Holding Tube (3" Round Diameter) Mounted on the Wall. Plans Must be Easily Removed Without Obstructions & Include the DOI Approval Letter	☐	☐	☐
9 Does PIV Have a Lock Installed	☐	☐	☐

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FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems

10 Does PIV Monitoring Circuit have a Surge Protection device, that Meets DoL Guidelines, Installed. Surge Protector must be Grounded per Manufacturer's Instructions ☐☐☐
11 Does the Exterior Hotbox have a Heater Installed ☐☐☐
12 The Heater Circuit and the Low Temp Circuit are in (2) Separate Conduits ☐☐☐
13 Does the Exterior Hotbox have a Low Temperature Alarm ☐☐☐
14 The Low Temperature Circuit Goes Straight to the DAC with N.O. Contacts ☐☐☐
15 The Fire Alarm Devices are Liquid Tight and Mounted Up and Out of the Way of any Water Spray-Specifically Area by Backflow Testing Connections. ☐☐☐

Pre-Action System

1 The PAS is Installed in the Same Manner as the Main FACP ☐☐☐
2 The Pumps Associated with the System are on an Emergency Circuit with Lock ☐☐☐

Fire Extinguishing System
Commercial Kitchen Hood

1 Each Fire Extinguishing System, on a Commercial Kitchen Hood is Connected to the FACP to Activate the Fire Alarm System. Request the Contractor to Demonstrate that this Functions Properly, by Manually Operatin the Monitoring Switch Without Releasing the Extinguishing Agent ☐☐☐

Note: If the Extinguishing System is a Wet Type, the Fire Alarm Activation must Shut Off the Gas if Present and Also Operate a Shunt Trip Breaker to Shut off ALL Electric Power to the Appliances Under the Commercial Kitchen Hood. The Exhaust Fan(s) Keep Running But the Make-up Air Must Shout Down. These Functions are to be Done Directly from the Fire Extinguishing System, Not the FACP ☐☐☐

Fire Extinguishing System
Single Range Residential Kitchen Hood

	YES	NO	N/A
1 The Fire Extinguishing System on a Residential Kitchen Hood is Connected to the FACP to Activate the Fire Alarm System if Equipped with a Local Suppression System. Request the Contractor to Demonstrate that this Functions Properly by Manually Operating the Monitoring Switch, without Releasing the Extinguishing Agent	☐	☐	☐

Note: If the Extinguishing System is a Wet Type, the Fire Alarm Activation Must Shut Off the Gas if Present and also Operate Shunt Trip Breakers to Shut off the Stove/Range and the Hood Fan. These Functions are to be Done Directly from the Fire Extinguishing System, Not the FACP.

Note: If the Stove/Range is Equipped with Low Heat Elements No Protection is Required ☐☐☐