# **Nittan SPERA** NETWORK FIRE ALARM/ DETECTION SYSTEM SPECIFICATION

### Notes about this specification

- These specifications are intended to provide guidance to the A&E community for fire alarm system design using NITTAN products.
- It is not intended that these specifications be used without a thorough review by an architect or a professional engineer.
- Nittan and its representatives take no responsibilities for any errors or omissions that may be present in the sample specification.
- Contact your local Nittan branch for assistance.

# PART 1 – GENERAL

### Definitions

- 1.01 NFPA: National Fire Protection Association. Definitions in NFPA 72
- 1.02 UL: Underwriters Laboratories
- 1.03 NICET: National Institute of Certification in Engineering Technologies

#### Scope

- 1.04 This specification describes an addressable fire detection and alarm signaling system. The control panel(s) shall include all required hardware, software and site specific system programming to provide a complete and operational system.
- 1.05 The control panel and all devices supplied shall in full compliance with all applicable codes and standards.
- 1.06 The features and capacities described in this specification are required as a minimum for this project.

# **Design Performance Requirements**

- 1.07 The control panel(s) shall be multi-processor based systems suitable for standalone or networked applications.
- 1.08 Each panel shall be capable of functioning independently should it be disconnected from the network providing true Style 7 riser performance.
- 1.09 Each Panel shall support up to 3556 addressable points.
- 1.10 Each Panel shall support both addressable and conventional circuits.

- 1.11 Each Panel shall support up to 7 remote annunciators.
- 1.12 Each Panel shall support up to 14 SLC circuits, with up to 254 Addressable Points per SLC.
- 1.13 The system shall support up to 224,028 addressable points.
- 1.14 The system shall capable of support up to 63 panels.
- 1.15 The system shall employ a proven Arcnet network technology.
- 1.16 The system shall be fully supervised, and shall monitor the integrity of all field wiring circuits and conductors and device placements.
- 1.17 The system shall provide multiple level passwords and flexible assignment of functions per password level.
- 1.18 The system shall have a built-in walk test feature.
- 1.19 The system shall be manufactured by an ISO 9001:2008 certified company.
- 1.20 The control panel(s) shall include all required hardware, software and site specific system programming to provide a complete and operational system. The control panel(s) shall be designed such that interactions between any applications can be configured, and modified using software.
- 1.21 The control panel operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.
- 1.22 Each Network Panel shall incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
- 1.23 The system shall be capable of downloading programming using Windows-based software while the system is fully operational, thus eliminating fire watch.
- 1.24 There shall be provision to store up to three different configurations in the system non-volatile memory. Hot-Swapping between configurations shall be possible through menu operations from the front panel.
- 1.25 The system shall be capable of downloading programming for the entire network by connecting a laptop computer into any panel in the system.
- 1.26 The system can be configured in groups which allow the panels display to show all network activity, a group of panels or individual panel activity.
- 1.27 The system shall provide an RS 232C port for a printer. A configurable supervision option shall allow the supervision of the device connected to this port.
- 1.28 The system shall provide an Ethernet Port through a standard RJ-45 receptacle. It has provision for a connection to WAN using TCP/IP protocol.

- 1.29 Network Communications Circuit Serving (E3 Broadband) Network Nodes: Wired using single twisted non- shielded 2-conductor cable or connected using approved fiber optic cable between nodes in Class A configuration (Style 7).
- 1.30 Each Panel shall have built-in BACnet support.
- 1.31 Each Panel shall have a built-in Ethernet port.
- 1.32 Each Panel shall be capable storing Two Event History Logs; 1000 event Alarm history log and a 6000 event log for All events.
- 1.33 Each Panel shall be capable of accommodating LCD display of up to 640 characters.
- 1.34 Each Panel shall be capable of XML based system device reporting.
- 1.35 An optional 3D graphical Monitoring and Control package shall be available.
- 1.36 Signals and zones selection shall be performed automatically in response to events as configured in the system.

### System Operation

1.37 In normal mode, the Control Panel(s) alpha-numeric display will indicate "normal condition".

# Alarm Operation

- 1.38 If an alarm is initiated in any area of the building by the operation of a manual station, an automatic fire detector, or a sprinkler flow switch, the system shall initiate the following Alarm sequence of operations:
  - a) Indicate the point of alarm (zone/device description) on the LCD display of the Control Panel(s).
  - b) Sound an audible buzzer at the Control Panel(s).
  - c) The Control Panel(s) buzzer can be silenced by pressing the Alarm acknowledge.
  - d) An LED's associated with the alarm zone shall be illuminated on the Control Panel(s).
  - e) Indicate the alarm condition by lighting the "COMMON ALARM" red LED at the Control Panel(s).
  - f) Every audible signal appliance shall sound in "general alarm" mode at a temporal rate until manually silenced.
  - g) All alarm visual signals shall flash (i.e. strobes).
  - h) If silenced, the "SIGNAL SILENCE" light on the Control Panel(s) will illuminate.
  - i) If silenced, a subsequent alarm will re-activate the signals.
  - j) Type, location, time and date of alarm condition shall be recorded in the Alarm Event History.
  - k) Event shall be printed on the system printer, where applicable.

- 1) All designated fans shall be automatically turned off.
- m) All designated smoke control fans shall be automatically turned on.
- n) Doors normally held open through magnetic door holders shall be released.
- o) Doors normally locked by magnetic locking devices shall be released.
- p) Initiate Emergency Elevator Recall.
- q) If alarm is initiated by an automatic detector on the floor of recall, activate Alternate Floor recall relay, where required by code.
- r) Activate connection to monitoring system (by others) to transmit a signal to fire department or approved central station.
- s) An alarm in the Elevator Shaft or Elevator Machine Room shall activate a relay connected to the Elevator Controller.
- t) An Alarm can be reset by pressing the "RESET" button on the Control Panel(s).

# **Supervisory Operation**

- 1.39 If a supervisory signal is initiated in any area of the building by the operation by sprinkler/fire pump supervisory device, guest unit smoke or CO detector, duct smoke detector or elevator shunt trip, the system shall initiate the following Supervisory sequence of operations:
  - a) Indicate the supervisory point (zone/device description) on the LCD display of the Control Panel(s).
  - b) Sound an audible buzzer at the Control Panel(s).
  - c) The Control Panel(s) buzzer can be silenced by pressing the supervisory acknowledge switch.
  - d) Indicate the supervisory condition by lighting the "COMMON SUPERVISORY" amber LED at the Control Panel(s).
  - e) Type, location, time and date of supervisory condition shall be recorded in the System Event History.
  - f) Event shall be printed on the system printer, where applicable.
  - g) Activate connection to monitoring system (by others) to transmit a signal to fire department or approved central station.
  - h) An LED's associated with the supervisory zone shall be illuminated.
  - i) Activation of any Guest Suite smoke or CO detector shall be displayed on the panel(s) main LCD display individually as a supervisory and activate the sounder base(s) within the Guest Suite.

# **Trouble Operations**

- 1.40 If a trouble signal is initiated in any area of the building by an open/short /ground circuit fault, battery/power failure, communication failure, or any removal of the systems panel/remote annunciator component, the system shall initiate the following Trouble sequence of operations.
  - a) Indicate the type of trouble on the LCD display of the Control Panel(s).
  - b) Sound an audible buzzer at the Control Panel(s).
  - c) The Control Panel(s) buzzer can be silenced by pressing the trouble acknowledge switch.

- d) Indicate the trouble condition by lighting the "COMMON TROUBLE" amber LED at the Control Panels.
- e) Type, location, time and date of trouble condition shall be recorded in the System Event History.
- f) Event shall be printed on the system printer, where applicable.
- g) Activate connection to monitoring system (by others) to transmit a signal to fire department or approved central station.

### **Submittals**

Prior to installation, submit fabrication drawings, material lists and equipment submittals (shop drawings) for approval in accordance with the following:

- 1.41 Complete description (manufacturer's cut sheets) data indicating UL listing, EN approval or JP approval for all network components including the Control Panel(s).
- 1.42 Complete sequence of operation of system.

# Equipment References and Standards

- 1.43 The equipment and installation shall comply with the provisions of the following codes and standards unless the authority having jurisdiction has adopted an earlier version:
  - A. National Fire Protection Association (NFPA):
    - 1. NFPA 70 National Electrical Code (NEC).
    - 2. NFPA 72 National Fire Alarm Code.
    - 3. NFPA 101 Life Safety Code.
    - 4. NFPA 5000 Building Construction and Safety Code.
  - B. Underwriters Laboratories (UL):
    - 1. UL 268 Standard for Smoke Detectors for Fire Alarm Signaling Systems.
    - 2. UL 521— Standard for Heat Detectors for Fire Alarm Signaling Systems.
    - 3. UL 864 Standard for Control Units and Accessories for Fire Alarm Systems.
    - 4. UL 1971 Standard for Signaling Devices for the Hearing Impaired.

#### APPROVALS:

A. The system shall have proper listing and/or approval from the following internationally recognized agencies:

UL	Underwriters Laboratories, Inc
FM	Factory Mutual
EN	European Norm
JP	Japan Fire Equipment Inspection Institute

# PART 2 – PRODUCTS

# Acceptable Manufactures

2.01 The system specified herein is based on equipment and design of Nittan Company Limited SPERA series network fire alarm system.

# Main Network Board (Model MD-817A-NIT)

- 2.02 The control panel shall provide three dry contacts for the reporting of common trouble, common alarm and common supervisory conditions.
- 2.03 Dry contacts shall provide form C (SPDT) connection and be rated at 1A at 24VDC.
- 2.04 The control panel shall have one SLC interface supporting up to 254 addressable fire detection devices and addressable input or output modules.
- 2.05 The system shall provide one 24 VDC @ 1.7A special applications output for auxiliary equipment. This auxiliary equipment output shall be power limited and equipped with an auto-resettable over-current protection.
- 2.06 The system shall provide a 24VDC, 400 mA output for devices and equipment such as four wires detectors. This output shall be shut down when the reset button shall be activated.
- 2.07 Where additional power is required, the Nittan NFU-PS-10A power supplies shall be used.
- 2.08 The control panel shall provide four NAC lines capable of 1.7 amperes each at 24VDC.
- 2.09 The control panel shall provide connectors for Class A or Class B connection for each NAC output.
- 2.10 Each control panel shall have a capacity of up to 16 conventional input/output adder modules.

# Main Display (Model NK-DISP-1640)

- 2.11 The display shall be a 16 line by 40 character backlit LCD display or optional 4 lines by 20 character backlit LCD display.
- 2.12 The following panel status shall be indicated by individual LEDs:
  - a) System Power (green LED). Illuminated when main AC power is within specs.
  - b) Alarm queue (red LED). Flashes when a new alarm has been received.
  - c) Supervisory queue (yellow LED). Flashes when a new supervisory event has been received.
  - d) Trouble queue (yellow LED). Flashes when a new trouble has been received.
  - e) Monitor queue (yellow LED). Flashes when a new trouble has been received.

- f) Ground Fault (yellow LED). Illuminated when a ground fault has been detected.
- g) CPU Fault (yellow LED). Illuminated when processor is unable to perform its tasks.
- 2.13 The queues LED shall turn to steady ON when all related events have been reviewed by the system user through the queues navigation switches.
- 2.14 The following functions shall be controlled by dedicated switches:
  - a) Alarm Silence.
  - b) Fire Drill.
  - c) Alarm Acknowledge ("automatic Alarm signal cancel").
  - d) Alarm Reset.
  - e) Trouble Silence.
  - f) Lamp Test.
  - g) On screen menu key.
  - h) Menu Navigation keys (left, right, up and down screen scroll).
  - i) Info key for getting more information on displayed event.
  - j) OK key to accept menu items.
  - k) Cancel key to exit menu items.
  - 1) Queue navigation and acknowledge keys (one for each queue).

# Programmable Input Switch Display Adder (Model NK-IPS-24)

2.15 The input switch adder module shall be used to provide 24 programmable switches for functions such as Zone bypass. Each switch shall be equipped with a yellow LED for indicating a trouble condition and with a dual color LED (red and yellow) to indicate an active condition. Active LED color shall be configurable according to the requested function. It shall have on-site labelling capacity for each switch.

# Programmable LED Display Adder (Model NK-TZDS-48A)

2.16 The LED display adder shall be used to provide 48 programmable pairs of LED indicators, one yellow and one red with on-site labelling capability.

# Programmable Fan Damper Adder (Model NK-FDX-8)

2.17 The Fan Damper display adder shall be used to provide fan damper control. Each adder shall provide 8 switches with three non-momentary positions: OFF - AUTO - MAN control. LEDs should be provided to indicate the state of each fan controlled by a switch and to report eventual trouble condition if the fan system has proving capability. Model NK-FDX-8K adder shall be used where one key-switch activated zone is required.

# Network Interface Module (Model NK-FNC)

- 2.18 The control panel shall have provision for the installation of a network interface card. This shall enable up to 63 control panels to work together in a peer to peer high speed network. Using the recommended wiring, the network shall work with distances of up to 1200 m (4000 ft) between control panels.
- 2.19 Overall connection between panels must be selectable to be open ended (Class B) or looped back (Class A).
- 2.20 On Style 6 or 7 (Class A) Configurations: Single ground fault or open circuit on Signaling Line Circuit shall not cause system malfunction, loss of operating power, or ability to report alarm. When multiple wiring faults result in isolation of sections of the network, each individual section shall continue to operate normally without compromising alarm detection and annunciation in the related zones.

# SLC Modules (Model NK-LDC-3)

- 2.21 Additional SLC circuits shall be supported through adder loop controller modules. Each module shall have a dedicated central processor unit (CPU) and shall support two fully loaded SLC lines.
- 2.22 A list of acceptable devices is provided in the section covering initiating devices.
- 2.23 Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class A (Style 6) or Class X (Style 7).

# **Control Panel Conventional Adder Modules**

- 2.24 Conventional input devices can be support by the conventional input circuit adder modules (model NK-DM-8A) mounted inside the control panels. Each module shall provide four Class A detection or eight Class B circuits. Up to 128 conventional Class B circuits can be connected to a control panel.
- 2.25 Additional NACs circuits can be support by the NAC circuit adder modules (model NK-SGM-4A) mounted inside the control panels. Each module shall provide four outputs with connectors for Class A or Class B wiring of each circuit. Notification Appliance Circuits (NAC) Serving Strobes and Horns: Wired Class A (NFPA Style Z).
- 2.26 Programmable dry contact relays can be support by the relay circuit adder modules (model NK-RM-8A) mounted inside the control panels. Each module shall provide 8 form C (SPDT) contacts rated at 1A at 24VDC and shall be individually programmable.

# Polarity Reversal/ City Tie Module (Model PR-300)

- 2.27 The polarity reversal/city tie module provides the system with a supervised city tie connection (24VDC/200mA max) and a polarity reversal connection (24VDC (open circuit),8mA max (shorted) )It shall be compact and shall be mounted inside control panel.
- 2.28 The control panel shall have provision for disabling the unit for system testing.

# UDACT Communications Module (Model NK-AD-300)

2.29 The UDACT digital Communication Module allows the system to transmit addressable point information to a central station. It shall be compact and shall be mounted inside control panel.

# Main Power Supply

- 2.30 The control panel main power supply shall be capable of operating from either 120VAC 60Hz or 240VAC 50Hz and shall have over-current protection.
- 2.31 The quality of the AC power shall be monitored by the control panel. There shall be an automatic transfer of power to the back-up power source when AC voltage falls under a level where panel performance is compromised.

# Standby Power

- 2.32 Sealed lead-acid batteries shall be used to provide 24VDC standby power.
- 2.33 The batteries shall be sized according to system requirements calculated in the installation manual of the control panel.
- 2.34 The battery charger shall provide full recharge of the selected batteries as per UL requirements.
- 2.35 The battery charger shall be monitored for integrity and a trouble shall be indicated if battery charging is no more possible or if the battery is disconnected.

# Enclosures

- 2.36 The enclosures back-boxes and doors must be made of heavy gauge steel. They must be suitable for flush or surface mounting.
- 2.37 All enclosures doors must be equipped with a key lock. On all enclosures where user access is allowed, a dead-front cover must be used for protection.

# Printer (Model NFU-PRT)

- 2.38 A printer shall be provided to record events and status logging. It shall be a dot matrix type with continuous tractor feed and internal menu driven program.
- 2.39 It shall be provided with a RS-232C serial interface suitable for 9600 bps data rate.

# Remote Annunciators (Model NK-AN-LCD or NK-AN-LCDG)

- 2.40 The control panel shall have the provision to support up to 7 remote annunicators, without the need of additional hardware.
- 2.41 The remote annunciators shall provide the same display, controls and indicators as the control panels main display.

- 2.42 The remote annunciators shall use the same NK-IPS-24 and NK-TZDS-48A display adder modules as the control panels to provide programmable switches and LED indicators.
- 2.43 The remote annunciators shall be able to accommodate the same paging microphone modules and master telephone modules used on the control panel.
- 2.44 Remote annunciators' enclosures shall be made of heavy gauge steel with a lockable door. They shall be suitable for recessed or surface mounting as applicable.

# Global Event Graphical Workstation (NFU-GM)

#### General:

- 2.44 The global event graphical workstation shall run the Nittan Graphic Monitor (NFU-GM) software package.
- 2.45 The monitoring and control graphical workstation shall communicate with the fire alarm network(s) via supervised Ethernet port using IP communications protocol with full command and control capability.
- 2.46 NFU-GM is UL 864 listed for control when installed on a UL certified computer.
- 2.47 NFU-GM is password protected to operate common control functions from the Workstation including acknowledging, silencing, and resetting of fire alarm functions.
- 2.48 Capable of generating reports in multiple formats with ability to filter by building/area, event type, and/or activation type.
- 2.49 Capable upon receipt of any event to activate an audio WAV file over the workstation speakers alerting the operator to an event, and providing detailed textual instructions on a 'per device' basis. Additionally, a visual graphical indication color coded for the event type shall appear for the affected device.
- 2.50 Support multiple fire alarm Networks Systems via Ethernet using IP protocol communications. Networks can be monitored independently and all information shall be stored locally in a database format. Events can be filtered based on trouble and/or alarm activations.
- 2.51 Shall be able to activate preset switches on the FACP to perform operations related to fire system control and maintenance.
- 2.52 Graphical screens shall be provided to select a virtual switch.
- 2.53 Must allow for master node for control and slave nodes for auxiliary monitoring.

#### **Operator interface:**

- 2.54 The operator interface shall manage and configure the different screen (window) layouts for the operator System Control to be display simultaneously on the screen.
- 2.55 The operator interface shall provide support for dual monitor mode.
- 2.56 It shall be possible to limit functions to access groups so that they load when a user from that access group logs in.
- 2.57 User authentication shall be provided using access groups with defined permissions and with support of multiple user accounts per access group.

#### **Event list display:**

- 2.58 All events shall be displayed in the order of priority and remain until they are acknowledged.
- 2.59 Each event and notification shall be color-coded.
- 2.60 The event type, description, location, date and time and count information shall be displayed for each event in columns on each tab.
- 2.61 Once the event has been acknowledged, a visual indicator showing the event has been acknowledged shall be presented to the operator and logged to the database.
- 2.62 The current events tab shall display all of the events that have taken place in the system up to a maximum of 1,000 events.
- 2.63 All other events shall be stored in the database and accessible via a separate "event log" window. Extensive event logging up to 500,000 events with status notations for report customization.
- 2.64 The following colour Coding of events and notifications shall be used:
  - a) Red Mass Notification or Fire Alarms,
  - b) Orange Supervisory or Security Alarms,
  - c) Yellow Troubles,
  - d) Blue Monitor Points or Security Points,
  - e) Green Restored to normal.

#### Workstation Event Logging and Reports Print Filter:

- 2.65 Filters shall be made available through configuration for events to be printed or reported from the workstation. The following filters shall be provided:
  - a) Alarms,
    b) Supervisory,
    c) Monitor,
    d) Troubles,
    e) Date,
    g) Device Address.

#### The following pre-programmed reports shall be available:

- 2.66 Alarm Report Print only Alarm events.
- 2.67 Alarm and Supervisory Report Print only Alarm and Supervisory events.
- 2.68 Maintenance Report Print all events.
- 2.69 Location Report Print all events of a specific building.
- 2.70 Time Period Report Print all events from a date range.

#### **Facility 3D Event Management Interface:**

- 2.71 The 3D event management interface shall display facilities organized by building, floor, and device. Upon event activation it shall:
- 2.72 Provide the opportunity to display the device custom take action message with a minimum of 450 characters. The custom message shall provide instructions to the operator on what to do, information on the event/device and possible hazards.
- 2.73 Provides 3D visual representation of new device status.

#### **On Screen Controls:**

- 2.74 The system shall provide on-screen buttons for;
  - a) Acknowledge,
    b) Signal Silence,
    c) Buzzer Silence,
    d) Fire Drill,
    e) Total Evac,
    f) Reset,
    g) Silence Workstation,
    h) Network View,
    i) 3D View,
    j) 2D View.

#### **Facilities rendering:**

- 2.75 The system shall display site plan vector rendering of campus, building or facility, with optional vector rendering of building profile and every level of building floor plan map. Operator shall be able to zoom to any desired level without pixilation when a vector based input file is used for the campus, building or floor.
- 2.76 The buildings of the campus shall be presented as a set of stacked 2D floor plans to create a transparent 3D image of the building.
- 2.77 Devices shall be visible through the transparent floors when looking "through the top" of a building in birds eye view camera position.

2.78 Device activation animations shall also be visible through the transparent floor plans as above from 'birds eye view' camera position.

#### **Optional browser window:**

2.79 The software shall have the ability to customize each Access Level with the ability to limit system restrictions and shall be password protected. It shall provide a minimum of 128 users with access levels.

#### Graphical maps and floor plans:

- 2.80 It shall be possible to import graphical floor plans from several different graphic file formats.
- 2.81 Drawing display shall allow for zoom out to full floor view or zoom in to individual device location. It shall be possible for the operator to manually zoom down, using the PC mouse or multi-touch, to any portion of a vector-based graphic without aliasing, artefacts, or pixilation of the image. Systems using a static two picture method for zooming are unacceptable.
- 2.82 Preset-only zoom levels shall not be considered equivalent.
- 2.83 It shall be possible to place buildings in their respective geographic location on the campus layout plan.
- 2.84 The system must have available floor plan legend to identify locations on floor plan key view.
- 2.85 There shall be toggle buttons on screen for all drawing levels that allow instant migration to the previous and next building compared to the building currently being displayed on screen.
- 2.86 There shall be toggle buttons on screen for all drawing levels that allow instant migration to the previous and next floor compared to the floor currently being displayed on screen.
- 2.87 The system shall provide the following Floor Plan features:
  - a) All Exterior and Interior Walls furnished as per architectural drawings,
  - b) Door swings,
  - c) Window locations,
  - d) Room number and designation of occupancy,
  - e) All initiating device locations.

#### **PC requirements:**

- 2.88 Operating software shall be Microsoft Windows 7 Professional, 64 bit.
  - a) Intel<sup>©</sup> CoreTM i7-4790Processor.
  - b) 16GB RAM 1600 MHz DDR3.
  - c) AMD Radeon 2 GB R7 250.

d) Audio sound.
e) 10/100/1000 Ethernet Port.
f) 500GB Hard Drive.
g) 24X DVD-R/W, DVD+RW, CD-R/W.
h) Computer hardware for Control shall be UL864 listed.

#### Video display requirements:

- 2.89 The video display shall be 19 inches or more LCD display monitor with built-in audio speakers and touch screen control with multi-touch operation.
- 2.90 Touch-screen Video display for Control shall be UL 864 listed.

#### **Power supply requirements:**

2.91 The workstation and display shall be connected to a UPS System sized to provide back-up support for \_\_\_\_ (minutes) (hours) of operation.

# NAC Booster Power Supply (Model NFU-PS-10A)

- 2.92 It shall have an AC power input rated for either 120VAC 60Hz or 240VAC 50Hz operation.
- 2.93 The batteries shall be sized according to system requirements calculated in the installation manual.
- 2.94 The battery charger shall provide full recharge of the selected batteries as per UL requirements.
- 2.95 The battery charger shall be monitored for integrity and a trouble shall be indicated if battery charging is no more possible.
- 2.96 The NAC booster power supply shall provide five power-limited outputs rated at 2.5A @ 24VDC. Outputs shall be selectable to be used for NAC (active during alarms) or power supply duty (active at all time).
- 2.97 Outputs configured as NAC shall be configurable for Steady, Temporal Code, California Code and March Time rates.
- 2.98 The outputs configured for NAC duty shall also be controllable by analog ON/OFF inputs.
- 2.99 The NAC booster power supply shall have built-in protocols for industry-standard devices such as horns and strobes from Nittan, Gentex, System Sensor and Wheelock.
- 2.100 Configuration of the NAC booster shall be done through DIP switches only.
- 2.101 Notification Appliance Circuits (NAC) Serving Strobes and Horns: Wired Class A (NFPA Style Z).

# Addressable Spot-Type Fire Detector (Nittan EVA Series) General requirements:

- 2.102 The Detectors shall be intelligent and addressable devices and shall connect with two wires to the FACP's Signal Line Circuit (SLC) loop.
- 2.103 Up to 254 detectors shall be connected to a single loop.
- 2.104 The Detectors shall operate on a digital Frequency Shift Key (FSK) protocol loop to give reduced power consumption.
- 2.105 Loop isolation capability shall be available in the form of an SCI base, on which to mount the detector.
- 2.106 The Detectors shall have a self-test function to send a trouble signal to the FACP when any trouble occurred on the device.
- 2.107 The Detectors shall be ceiling-mounted using a twist-lock type fitting base. There shall be a Locking grub-screw on the base to ensure they cannot be removed without the appropriate tool.
- 2.108 Functional Bases with relays or built-in sounder shall be available where required.
- 2.109 The Detectors shall be Soft addressed using a hand held Programming tool, which is capable of displaying the address by 7 segment LED's. Because of the possibility of installation error, systems that use rotary switches, binary jumpers or DIP switches to set the detector address are not acceptable.
- 2.110 Each detector head shall occupy any one of 254 possible addresses on the SLC loop.
- 2.111 The Detectors shall provide an Omni-view indicating ring, illuminated by Red and Green LED's, so it may be seen from any angle. This will allow the detector base to be installed in any orientation.
- 2.112 The Omni-view ring shall indicate device Alarm status in steady Red and also indicate in flashing Green that the Detector is operational and in regular communication with the FACP.
- 2.113 The color for the indication of normal operation shall be Green to comply with NFPA 79, in order to prevent occupants from misrecognition the status as Alarm or Trouble.
- 2.114 If required, the flashing mode operation of the Detector LED's shall be controlled to turn off through the FACP configuration.
- 2.115 An output connection shall also be provided in the base to connect an external remote alarm LED.

#### Addressable Smoke Detector:

- 2.116 Smoke Detectors shall use the photoelectric (light-scattering) principle to measure smoke density and shall, on command from the FACP, send data to the panel digitally representing the analogue level of smoke density.
- 2.117 The Detector sensitivity shall be set through the FACP configuration.
- 2.118 Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.
- 2.119 The Detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.
- 2.120 Smoke Detectors shall have a chemically etched, stainless steel insect screen to prevent ingress of insects and airborne contaminants, which may cause false alarms.

#### Addressable Heat Detector:

- 2.121 Heat Detectors shall use a thermistor element to measure thermal conditions caused by a fire and shall, on command from the FACP, send data to the panel representing the analogue or digital level (the temperature) at the detector.
- 2.122 The Detectors shall be a combination rate-of-rise and 57 °C (135 °F) fixed temperature heat detector, in order to react quickly in the event of a fire situation. Or for high temperature applications, the Detectors shall be 83 °C (181 °F) fixed temperature heat detector.
- 2.123 The combination heat detector shall initiate an alarm when either the rate of ambient temperature increase exceeds an 8.3 °C (15 °F) per a minute or the ambient temperature reaches up to a 57 °C (135 °F) fixed temperature.
- 2.124 The fixed temperature heat detectors for high temperature application shall initiate an alarm when the ambient temperature reaches up to a 83 °C (181 °F) fixed temperature.
- 2.125 The high temperature heat detector shall be used only for the installation where the maximum expected ambient ceiling temperature exceeds 47 °C (115 °F).

#### Addressable Combination Smoke and Heat Detector:

- 2.126 The Detector shall be comprised of two sensing elements, including a photoelectric (light-scattering) smoke sensor and a thermistor heat sensor.
- 2.127 The Detector shall be able to indicate distinct smoke and heat alarms.
- 2.128 The Detector shall include the ability via the FACP's configuration to combine the signal of the photoelectric signal with the heat sensing element in order to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition.

- 2.129 Smoke detection portion shall be able to measure smoke density and shall, on command from the FACP, send data to the panel digitally representing the analogue level of smoke density.
- 2.130 The smoke sensitivity shall be set through the FACP configuration, and shall be automatically adjusted by the panel on a time-of-day basis.
- 2.131 The smoke detection portion shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.
- 2.132 The smoke detection portion shall have a chemically etched, stainless steel insect screen to prevent ingress of insects and airborne contaminants, which may cause false alarms.
- 2.133 Heat detection portion shall, on command from the FACP, send data to the panel representing the analogue or digital level (the temperature) at the detector.
- 2.134 The heat detection portion shall be a combination rate-of-rise and fixed temperature heat detector, in order to react quickly in the event of a fire situation.
- 2.135 The heat detection portion shall initiate an alarm when either the rate of ambient temperature increase exceeds an 8.3 °C (15 °F) per a minute or the ambient temperature reaches up to a 57 °C (135 °F) fixed temperature.

#### Addressable Dual Photoelectric Smoke and Heat Detector:

- 2.136 Addressable Dual Photoelectric Smoke and Heat Detector shall be used in areas prone to steam and dust, including hotels, hospitals and other areas of multiple occupancy.
- 2.137 The Detector shall use an Infra Red and Blue LED (light-scattering principle) and a specialized algorithm to measure smoke density and actual particle size.
- 2.138 The Detector shall also incorporate a thermistor sensor to accurately measure the temperature to certainly detect the real fire risk.
- 2.139 The Detector shall effectively discriminate between the presence of Steam, Aerosol and dust particles within the chamber, in order to provide increased immunity to false alarm, whilst maintaining the earliest warning of real fire condition.
- 2.140 The Detector shall be able to indicate distinct smoke and heat alarms.
- 2.141 The Detector shall include the ability via the FACP's configuration to combine the signal of the photoelectric signal with the heat sensing element in order to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition.

- 2.142 The smoke detection portion shall be able to measure smoke density and shall, on command from the FACP, send data to the panel digitally representing the analogue level of smoke density.
- 2.143 The smoke sensitivity shall be set through the FACP configuration, and shall be automatically adjusted by the panel on a time-of-day basis.
- 2.144 The smoke detection portion shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.
- 2.145 The smoke detection portion shall have a chemically etched, stainless steel insect screen to prevent ingress of insects and airborne contaminants, which may cause false alarms.
- 2.146 Heat detection portion shall, on command from the FACP, send data to the panel representing the analogue or digital level (the temperature) at the detector.
- 2.147 The heat detection portion shall be a combination rate-of-rise and fixed temperature heat detector, in order to react quickly in the event of a fire situation.
- 2.148 The heat detection portion shall initiate an alarm when either the rate of ambient temperature increase exceeds an 8.3 °C (15 °F) per a minute or the ambient temperature reaches up to a 57 °C (135 °F) fixed temperature.

# Projected Beam-Type Smoke Detector (Model Fireray50RU/100RU)

- 2.149 The projected beam type smoke detector shall be a 4-wire 12/24 VDC device to be used with a Nationally Recognized Testing Laboratory's Listed separately supplied 4-wire control panel.
- 2.150 The Detector shall be listed to U.L. 268 and shall consist of an integrated transmitter and receiver.
- 2.151 The Detector shall operate between a range of 5m to 100m (16.5 ft. to 330 ft.).
- 2.152 The operating temperature range of the detector shall be  $0^{\circ}$ C to  $38^{\circ}$ C ( $32^{\circ}$ F to  $100^{\circ}$ F).
- 2.153 The Detector shall feature automatic gain control which will compensate for gradual signal deterioration from dirt accumulation on the lenses.
- 2.154 The unit shall include a wall mounting bracket.
- 2.155 Testing shall be carried out by using a calibrated obscuration test filter.
- 2.156 The Detector shall provide a means of test where it is possible to simulate an alarm condition from ground level.

2.157 The Reflective beam type smoke detector shall be a Nittan 50RU (50m/160 ft.) or 100RU (100m/330 ft.).

# Addressable Sounder Base (Model EVA-S6 Base)

- 2.158 The Sounder Base appliance shall be Nittan model EVA-S6 Base.
- 2.159 The Sounder Base shall be listed to UL 268 and UL 464.
- 2.160 The Sounder Base shall operate on a digital Frequency Shift Key (FSK) protocol loop to give reduced power consumption.
- 2.161 Up to 127 bases shall be connected to a single loop.
- 2.162 Each Sounder Base shall occupy any one of 254 possible addresses on the SLC loop.
- 2.163 The Sounder Base shall be Soft addressed using a hand held Programming tool, which is capable of displaying the address by 7 segment LED's. Because of the possibility of installation error, systems that use rotary switches, binary jumpers or DIP switches to set the detector address are not acceptable.
- 2.164 The Sounder Base shall be able to switch its sound pattern between a temporal three-pattern, temporal four-pattern, non-temporal (continuous) or march time pattern.
- 2.165 The Sounder Base shall be a ceiling-mounted, twist-lock type base. There shall be a Locking grub-screw on the base to ensure the detector on the base cannot be removed without the appropriate tool.
- 2.166 The sound pressure level at 3 m (10 ft.) from the sounder shall be over 85 dBA.
- 2.167 The alarm current shall not exceed 20 mA at 24VDC.
- 2.168 The Sounder Base shall operate up to 95% relative humidity.

# Manual Pull Stations (Model EVCA-MS-S10K, EVCA-MS-F01)

- 2.169 Pull stations shall be conventional and be connectable to addressable input devices.
- 2.170 Pull stations shall be made of die-cast metal or constructed of extruded aluminium, and be compatible with standard single gang back boxes.
- 2.171 Pull stations shall be available in either single or double action configurations with SPST contacts and terminal strip connections.

- 2.172 Single action pull stations shall be activated by pulling a handle marked "PULL HANDLE" or "PULL OUT". Double action pull station shall require pushing a bar or pulling up a lever first to free the handle. Bar shall be marked "PUSH BAR".
- 2.173 The pull stations shall require a CAT-30 key or a screwdriver to restore the handle the normal position. In case of using a key, the key shall be compatible with the control panel's key.

# Addressable Loop Modules (Nittan EVA Series) General Requirements:

- 2.174 The Loop Modules shall be intelligent and addressable devices and shall connect with two wires to the FACP's Signal Line Circuit (SLC) loop.
- 2.175 Up to 127 Loop Modules shall be connected to a single loop.
- 2.176 The Loop Modules shall operate on a digital Frequency Shift Key (FSK) protocol loop to give reduced power consumption.
- 2.177 Loop isolation capability shall be available in the form of a built-in SCI for Class X (Style 7) operation, in order to ensure the operational capability continuing past a single open or short on the SLC. Short-circuit shall be automatically detected and isolated. The Loop Module shall restore loop connection upon removal of fault.
- 2.178 The Loop Modules shall be Soft addressed using a hand held Programming tool, which is capable of displaying the address by 7 segment LED's. Because of the possibility of installation error, systems that use rotary switches, binary jumpers or DIP switches to set the detector address are not acceptable.
- 2.179 Each loop module shall occupy any one of 254 possible addresses on the SLC loop.
- 2.180 The Loop Modules shall provide three colored status indicators, illuminated by Red, Yellow and Green LED's.
- 2.181 The LED's shall indicate device Activation status in steady Red, SCI Trouble status in steady Yellow and also indicate in flashing Green that the device is operational and in regular communication with the FACP.
- 2.182 The color for the indication of normal operation shall be Green to comply with NFPA 79, in order to prevent occupants from misrecognition the status as Alarm or Trouble.
- 2.183 If required, the flashing mode operation of the Loop Module LED's shall be controlled to turn off through the FACP configuration.

#### Addressable Zone Monitor Module (Model EVA-ZMU-SCI):

- 2.184 Addressable Zone Monitor Modules shall be provided to interface one supervised input circuit of Conventional Detectors to the SLC loop. An Alarm indication from the Initiating Device Circuit (IDC) shall raise an alarm at the FACP.
- 2.185 A range of Conventional devices, including Pull Stations, Optical Smoke, Heat and Flame Detectors, shall be available.
- 2.186 The IDC shall be able to be wired for Class A (Style D & E) and Class B (Style B & C) operation.
- 2.187 The IDC power shall be provided by the SLC loop connection from the FACP. Additional connections for power are not acceptable.
- 2.188 The Zone Monitor Module shall be capable of selecting the IDC monitoring mode depending on the wiring style, including the mode for connecting Normally Closed Contact devices, enabling Open Circuit detection, enabling Short Circuit detection and enabling Priority Interrupt Communication.
- 2.189 The IDC monitoring mode selection shall be set through the FACP configuration.

#### Addressable Dual Input Module (Model EVA-DIP-SCI):

- 2.190 Addressable Dual Input Modules shall be provided to respectively interface two input circuit of conventional Alarm Initiating Devices (any volt free contact device) to the SLC loop. An Alarm indication from either the Initiating Device Circuits (IDC) shall raise an alarm at the FACP. When two Alarm indications occur from both of the IDCs, the two Inputs shall be seen by the FACP as two individual alarms.
- 2.191 The Input Module shall provide a volt free input to monitor the conditions of Pull stations, Key switches, Flow switches, Sprinkler valves etc.
- 2.192 The IDC shall be able to be wired for Class A (Style D & E) and Class B (Style B & C) operation.
- 2.193 The Input Module shall be capable of selecting the IDC monitoring mode depending on the wiring style, including the mode for connecting Normally Closed Contact devices, enabling Open Circuit detection, enabling Short Circuit detection and enabling Priority Interrupt Communication.
- 2.194 The IDC monitoring mode selection shall be set through the FACP configuration.
- 2.195 For difficult to reach areas, the Input Module shall be available in a miniature package and shall be no larger than 70 mm (2.75 inch) x 38 mm (1.5 inch) x 19 mm (0.75 inch). This version need not include Style D, built-in SCI or LED indicators. This module shall be model EVA-MiniIP.

#### Addressable Dual Output Module (Model EVA-DOP-SCI/ EVA- DOP-AC240V- SCI):

- 2.196 Addressable Dual Output Modules shall be provided to respectively interface two Relay outputs for controlling the operation of fan shutdown and other auxiliary control functions.
- 2.197 The Output Module shall provide two volt free Relays with 30 VDC, 2 Amp rated Form-C contacts. For high voltage AC controls, the High Voltage Output Module equipped with two volt free Relays with 250 VAC, 4.8 Amp rated Form-C contacts shall be available.
- 2.198 The status of each output shall be monitored and controlled by the FACP, respectively. The two Outputs shall be capable of being individually controlled by the FACP.

#### Addressable Sounder Control Module (Model EVA-SCM-SCI):

- 2.199 Addressable Sounder Control Modules shall provide supervised control and operation of one conventional alarm indicating circuit of compatible, 16 to 30 VDC powered, polarized audio/visual indicating devices.
- 2.200 Audio/visual power shall be provided by a separate supervised power circuit from the FACP or from a supervised, UL listed remote Power supply.
- 2.201 The Sounder Control Module shall monitor for the presence of the external power.
- 2.202 The indicating circuit of the Module shall be capable of powering a maximum of 2 Amps of Resistive audio visual signaling equipment.
- 2.203 The indicating circuit shall be able to be wired for Class A (Style Z) and Class B (Style Y) operation.

# Signalling Devices:

- 2.204 Signalling devices other than speakers shall be compatible with the system as per Nittan SPERA system brouchure and document LT-1023.
- 2.205 Strobes intended for Fire-Alarm signalling, shall have a clear lens and shall have a red housing with white "FIRE" lettering. Lights used for fire alarm signaling only or to signal the intent for complete evacuation shall be clear or nominal white.

# **Control Panel Programming**

- 2.206 Programming of the system shall be executed by an authorized technician.
- 2.207 Update firmware to latest available version at project completion.
- 2.208 The system shall be expandable and reprogrammable at any time up to system's maximum capacity.

2.209 Operating system shall be field programmable for program changes and shall not require any factory modifications.

# PART 3 EXECUTION

### Installation-General

- 3.01 The fire alarm system shall comply with recommendations and requirements in the Documentation" section of the "Fundamentals" chapter in NFPA 72.
- 3.02 Install and connect fire alarm system components as shown on drawings and as required to fire protect the building.
- 3.03 Review with the system manufacturer and designated local fire inspector the requirements for wiring installation methods, sequence of operation of system, CACF annunciator requirements including nomenclature and any other pertinent requirements, and advise Consultant of any requirements that contradict or deviate from the Contract Documents. Review also the requirements for interconnections to other building systems, as applicable.
- 3.04 The sequence of operation provided in this specification is an outline for tendering, with exact requirements to be confirmed and programmed to the requirements of the fire plan, authority having jurisdiction, and Consultant.
- 3.05 The system shall be installed and wired by persons qualified and certified to perform the installation of fire alarm systems.
- 3.06 Provide suitable raceway system and wiring for complete system.
- 3.07 Install all components per manufacturer's recommendations, and co-ordination with the installation schedule.
- 3.08 Connect flow switches and supervisory switches for sprinkler, standpipe, and fire pump to fire alarm system (switches supplied by Fire Protection contractor).
- 3.09 Connect duct smoke detectors (supplied by this division, installed by HVAC contractor).
- 3.10 Where the duct smoke detector is not readily visible, mount duct smoke detector remote indicator in a visible and accessible location.
- 3.11 Remote Indicator and Remote Test Stations shall have an identifying label attached to the front of the cover plate listing the device served.
- 3.12 Where fire alarm devices are installed outdoors or in damp locations, they shall be protected from moisture and direct water spray, or designed for outdoor applications.

- 3.13 Where the control panel and/or associated equipment is located in a sprinklered room, the cabinet shall be provided with protection against flow from sprinkler heads to the satisfaction of the Electrical Inspection Authority.
- 3.14 All boxes and cabinets shall be listed for their intended purpose.
- 3.15 Devices installed during construction shall be protected from dust, dirt, and paint.
- 3.16 Dust protection shall be removed upon completion of the verification.

### Wiring

3.17 Use solid copper conductors and size wiring to in accordance with manufacturer's recommendations and local regulations/guidlines. Protect from mechanical damage or other conditions such as moisture, excessive heat or corrosive action to Class 1 requirements.

# **Factory Testing**

- 3.18 Manufacturer shall factory assemble and test all Network Panels and Annunciators, LCD Annunciators prior to delivery to site.
- 3.19 The Owner's representative will be notified in writing for witness testing to confirm the correct operation as per the Plans and Specifications prior to release for shipment to site, at the option of the Owner's Representative.

### Testing, Inspection

- 3.20 Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- 3.21 Shall include a complete inspection of all components installed to ensure the following:
  - a) That the system is complete in accordance with Specifications.
  - b) That the system is connected in accordance with Manufacturer's recommendations.
- 3.22 Adjust system and components as required to ensure complete system operation.
- 3.23 Where partial occupancies occur, the fire alarm system for the area to be occupied (including control units, annunciators, etc.) shall be tested and meet the requirements noted above.
- 3.24 After the testing and inspection is completed, and all deficiencies rectified, notify the Engineers and representatives of the Fire/ Building Department and demonstrate the proper functioning of the system.

# Training

- 3.25 The manufacturer shall offer the Owner in factory training, or on Site sessions for the Owner's designated personnel (up to 10 people each session) on the operation and maintenance procedures with regards to the respective systems.
- 3.26 The manufacturer shall allow for training sessions of four (4) hours each.
- 3.27 Schedule for training shall be agreed between the Manufacturer and Owner at least thirty days in advance.
- 3.28 Training shall be based on the Operation and Maintenance Manual.

# **Operating Instructions**

3.29 Provide printed, simple operating instructions, acceptable to the Engineer, framed and mounted adjacent to the FACP.

End of Section