

DIVISION 13**SPECIAL CONSTRUCTION****FIRE PROTECTION AND FIRE DETECTION SYSTEMS**

13.1 General Information - This Division defines general criteria that apply to the design of fire protection systems and fire detection systems at DFW Airport. Division 1 should be consulted for specific Airport regulations and standards that also apply.

13.2 Fire Protection Systems - All equipment and materials shall be Underwriters' Laboratories (UL) or Factory Mutual (FM) approved and listed and shall bear the appropriate stamp or label.

13.2.1 Sprinkler Systems – The fire sprinkler system in airport passenger terminals and Board occupied, operated and maintained buildings shall be designed for a minimum ordinary hazard type occupancy.

13.2.1.1 All sprinkler pipes that penetrate masonry or concrete walls or floors shall be sleeved with schedule 40 steel pipe.

13.2.1.2 All sprinkler piping below 2-1/2" in diameter shall be Schedule 40 steel pipe.

13.2.1.3 Main drains and inspector test valves shall terminate to the exterior of the building. Discharge shall not be near any pits.

13.2.1.4 The system shall be calculated utilizing water supply test data obtained from flow tests conducted at the construction site by the consultant or fire protection contractor with the data, time and date of the test noted on the shop drawings. Method of testing shall include the use of at least one (1) pressure hydrant and one (1) flow hydrant.

13.2.1.5 Provide a Bypass around the check valve in the fire department connection line with a control valve in the normally closed position. The bypass is required for the performance of a full flow test of the system demand through the back flow preventer. Exception: If the main drain can achieve the flow demand of the system, no bypass is required.

13.2.2 Dry Pipe Sprinkler Systems – Piping and pipe fittings for dry pipe sprinkler systems shall be galvanized steel.

13.2.2.1 Each dry-pipe system shall have its own air pressure supervisory switch to monitor and report both high and low air pressure conditions. The switch shall be located between the air supply check valve and sprinkler alarm valve.

13.2.2.2 A manual shut-off valve shall be provided between the hi/low switch and the main air supply line leading to the compressor. The air compressor shall be hard wired directly to a lockable disconnect box or to a dedicated branch circuit.

13.2.2.3 Sprinkler pipes shall be thoroughly flushed each time the system is expanded or modified.

13.2.2.4 All concealed low point drains shall be visually identified and provided with a sign to identify system.

13.2.2.5 Air compressors shall be connected to the existing piping system via stainless steel mesh connectors and installed with no bends. All air compressors shall be installed on spring vibration isolation pads.

13.2.2.6 Sprinkler pipes shall be thoroughly flushed in accordance with NFPA 25 each time the system is expanded or modified.

13.2.3 Wet Pipe Sprinkler System - Use of heat tape on sprinkler system piping shall not be permitted.

13.2.4 Preaction Sprinkler Systems - System piping may be supervised with air. Piping shall be galvanized. Preaction valve assemblies shall not be installed in public areas or ceiling plenums. All pre-action system drains shall terminate to a suitable drain that can accommodate removal of system water.

13.2.5 Standpipe Systems – Fire hoses, where required, they shall be stored in a hose cabinet. Hose cabinets exposed to the weather shall be marine grade enclosures.

13.2.6 Fire Department Connections - All Fire Department Connections (FDC) shall be equipped with a four inch (4") "Hydro STORTZ" quick connect fitting with a 30 degree down angle.

13.3 Fire Alarm System – Fire alarm systems shall be provided, tested, and approved in compliance with NFPA 72, the Fire Code, and the Appendix attached to this division (DFW AIRPORT FIRE ALARM INSTALLATION SPECIFICATIONS). Fire alarm submittals are required and shall be reviewed and approved by the Fire Marshall.

13.4 Fire Prevention During Construction – Comply with Chapter 14 of the Fire Code - Fire Safety During Construction and Demolition for buildings under construction and NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations for non-building related construction.

13.4.1 Underground water mains and hydrants shall be installed and operational prior to proceeding with construction work above grade.

13.4.2 Access roads to buildings shall meet the requirements of the Airport Fire Code for Fire Apparatus Access Roads.

13.4.3 Where required, standpipes shall be installed and shall be accessible for fire protection as the work progresses.

13.4.4 Approved fire extinguishers shall be provided in clear view on each floor at each usable exit.

13.5 Special Considerations – The following special considerations shall be included in the project design where applicable:

13.5.1 Floor Penetrations for Conveyors – Where conveyors penetrate rated assemblies or floors, provide closely spaced sprinklers in combination with draft stops as follows:

13.5.1.1 The draft stops shall be located immediately adjacent to the opening, shall be at least 18" deep and shall be of noncombustible material that will stay in place before and during sprinkler operation. Sprinklers shall be spaced approximately 6 ft. apart and placed 6 to 12 in. from the draft stop on the side away from the opening. An area smoke detector shall be placed in the ceiling above the floor opening and wired to the fire alarm system.

13.5.1.2 Alternate for Floor Penetrations at Conveyors: Conveyor openings may be provided with fire/smoke shutters that can be manually closed or automatically closed by smoke detectors installed in accordance with NFPA 72 in lieu of method described above.

13.5.2 Baggage Conveyor Systems in Terminal Buildings – Baggage conveyor belts shall be protected with sprinklers spaced no closer than 6 feet and no farther than 8 feet on centers in above ceiling areas. Sprinkler heads shall clear baggage and other items. Sprinkler head guards shall be installed.

13.5.3 DFW Key Box System - A "safe" type box shall be provided for all facilities and buildings. The key box shall be mounted at 6 (six) feet above finished grade or above finished floor at the key box location. The Knox Company shall manufacture the key box. The key box can be connected to the fire alarm system for security, but shall not report as a fire alarm. With the approval of the Fire Marshal, buildings with electronic locking systems can utilize a key switch, which is keyed to the DFW key box system lock, for compliance with Section 506 of the Fire Code. Authorization/order forms are available at the Department of Public Safety Bureau of Fire Prevention.

-- END DIVISION --

APPENDIX**DFW AIRPORT FIRE ALARM INSTALLATION SPECIFICATIONS**

I. General – Buildings occupied, operated or maintained by the Airport Board and ALL buildings classified by the Airport Building Official to be “terminal buildings” (A3 under the 2000 International Building Code) shall require a complete manual and automatic fire alarm system which interfaces with the DFW central fire alarm system.

Terminal buildings built prior to September 2000 will comply with specifications as identified in Section 11.3.2.

Terminal buildings built after September 2000 will comply with specifications as identified in Section 11.3.3.

All other Airport Board occupied or maintained buildings will comply with specifications as identified in Section 11.3.4.

II. Fire Alarm Specification for Terminals completed prior to 9/2000.**A. System Operation.**

The installation shall be complete and operable, performing all functions as described below:

1. Report alarm condition to the Central Fire/Security System in the event of activation of water flow devices, supervisory devices, duct smoke detectors, manual stations, intelligent sensors, ancillary extinguishing systems, or other such functions. Audibly and visually annunciate at the local panel the alarm condition, the loop and physical device address.
2. Report trouble condition to the Central Fire Security system in the event of circuit faults in alarm system devices, intelligent sensors and modules, initiating, indicating, and intelligent loop circuits. Visually annunciate at the local panel the trouble condition, and the loop and physical device address.

B. Fire Alarm Panel

1. The fire alarm data gathering panel (DGP) shall function as the communication interface between the DFW Central Fire Security System and the Intelligent System devices. The DGP shall be intelligent, with its own microprocessor and memory. The DGP shall be UL listed independently as a Fire Alarm Control Unit as well as a critical component of a proprietary multiplex system.
2. The DGP shall supervise each initiating device, monitor module or control modules on an intelligent loop circuit such that alarm and trouble conditions are individually annunciated.
3. Up to 99 sensors and modules shall be supported on a single intelligent loop. Each sensor and module shall be capable of being operated in alarm condition simultaneously. The DGP shall provide all power necessary for intelligent devices connected to it.
4. The DGP is located in the DFW CCTV Monitor room at each terminal. The DGP is operated, maintained, and the property of the DFW International Airport.

5. The DGP shall communicate with the DFW Central Fire/Security system via fiber optic cable.
6. The DGP is a Honeywell FS-90 Plus fire alarm control panel.

C. Intelligent System Devices.

1. Each device shall be assigned a unique address via decade switches.
2. Devices shall receive power and communicate over the same pair of wires.
3. Devices shall be capable of being added to the intelligent loop circuit by tee tapping from any point in the circuit without affecting any existing device address or function.
4. Each device shall contain screw terminals on rising plates for positive termination of up to 12 AWG wire.

D. Sensors

1. All intelligent sensors shall mount on a common base to facilitate the changing of sensor type if building conditions change. The base shall be incompatible with conventional detectors to prevent the mounting of non-intelligent devices.
2. Each sensor shall contain a LED, which blinks each time the device is scanned by the DGP. If the device is in alarm, the LED shall remain on to indicate the alarm condition.
3. Each sensor shall contain a magnetically actuated test switch such that the device can be tested from the sensor location.
4. Each sensor shall be capable of being tested for alarm condition via command from the DGP.
5. Each sensor shall respond to the DGP poll for information with its device type identification to preclude inadvertent substitution of another sensor type. The DGP shall operate with the installed device but shall indicate a trouble condition until the proper type is installed or the programmed sensor type is changed.
6. Each sensor shall respond to the DGP poll for information with an analog representation of measure smoke density, particles of combustion or temperature.
7. Photoelectric smoke sensors shall contain an optical sensing chamber with a nominal sensitivity of 2.3 percent/foot obscuration. The photoelectric smoke sensor shall be a Honeywell TC806A.
8. Ionization smoke detectors shall contain a unipolar dual chamber configuration with a nominal sensitivity of 1.5 percent/foot obscuration. The ionization smoke sensor shall be a Honeywell TC807A.
9. Thermal sensors shall be Honeywell TC808A.
10. Duct smokes, and area smoke detectors will be provided with remote testing annunciators easily accessible from floor level.

E. Monitor Modules.

1. The intelligent monitor module shall provide an addressable input for normally open or normally closed contact devices, such as manual pull stations, water-flow devices, supervisory devices, door contacts, or other such alarm devices.
2. The Monitor module shall provide a supervised initiating circuit, able to connect to either two wire supervised or four wire fault tolerant circuits.
3. The Monitor module shall contain an LED, which shall blink upon DGP scan. The LED shall latch on upon determination of an alarm condition.
4. The Monitor module shall mount in a standard 4" X 4" deep electrical box.
5. The Monitor module shall be a Honeywell TC809A.

F. Control Modules.

1. The intelligent control module shall provide an addressable output for a separately powered alarm indicating circuit or control relay.
2. The Control module shall provide a supervised indicating circuit. An open circuit fault shall be annunciated at the DGP. The control module shall connect to either two wire or four wire fault tolerant circuits.
3. The control module shall provide a control relay. The relay shall have a SPDT form "C" contact, rated at two amps at 28 VDC.
4. The module shall have a LED, which shall blink on DGP poll. Upon activation of the module, the LED shall be latched on.
5. The control module shall mount in a 4" X 4" deep electrical box.

G. Intelligent Loop Circuits

1. The DGP shall have four intelligent loops. The loops are contained in 1" conduit located on level 1 of each terminal. A loop is provided for each terminal level. A separate loop is provided to supply 24 VDC to indicating devices. A 24" X 24" X 6" junction box is located at each column line wedge for access to the loops. Intelligent devices shall connect to the loop by means of tee tapping in the junction boxes.
2. Intelligent loop circuits shall be labeled at all junction locations by panel number and loop number.

H. Initiating Devices

1. Ionization Duct Smoke Detectors shall have two SPDT alarm contacts and one SPDT trouble contact, rated two amps at 120 VAC and be listed for applications involving air handling systems. Detector shall be installed in accordance with its listing.
2. Manual Stations shall be of rugged die cast metal construction designed for semi-flush mounting. Each manual station shall connect to a TC809A monitor module. The initiating circuit shall be wired Class 'A' fault tolerant.
3. Wet sprinkler systems shall have vane type sprinkler flow switches. Flow switches shall have retards adjustable up to two minutes. The device shall have a SPDT, which shall close upon water flow.
4. Dry sprinkler system alarm switches shall be pressure activated.

5. Supervisory switches for fire protection systems shall be installed in accordance with their listing. Lanyard type supervisory switches are not permitted.
6. Dry system air pressure switches shall be installed to monitor both high and low air pressure conditions.
7. Each initiating device shall connect to a separate TC809A monitor module. The initiating circuit shall be four wire fault tolerant.
8. Supervisory devices may be connected to a single monitor module when located in the same room. Supervisory circuit shall be two wire supervised circuits, with the appropriate end of line resistor installed at the last device on the loop.

I. Alarm Notification Devices

1. Notifications devices shall be installed on two wire supervised circuits with the appropriate end of line resistor mounted at the last device on the loop.
2. The notification device shall be audible visual type.
3. Notifications devices shall connect to TC810A control modules.

J. Wiring

1. Wiring shall be in accordance with the National Electric Code, these specifications and the approved wiring diagram.
2. No wiring other than detector and alarm circuits are permitted in fire alarm conduits. Wire shall be color-coded; minimum 14 AWG-THHN stranded copper wire, 600-volt insulation for device initiating and indicating circuits. Transposing or changing color codes is not permitted.
3. Wiring shall be completely installed; field connections made and tested for stray voltage, short circuits, and ground faults prior to connection to the intelligent modules. Stranded wires shall terminate at both the device and module with spade terminals sized to fit both the wire and screw terminal.
 - 1). Intelligent loop circuits shall be Honeywell AK3747B cable or exact equip. The Contractor shall coordinate the connection of branch intelligent loop circuits to the main loop circuits with DFW Facilities Maintenance Electronics.

- 2). Color-coding of device initiating fault tolerant loops shall be that two conductors are of one color and the other two conductors are of a different color. Colors shall be continuous throughout the entire loop. Where more than one initiating loop is routed in a single conduit, the colors associated with any loop contained in the conduit shall be different from the colors of any other initiating loop contained in the conduit.
4. Control and other panels shall be mounted with sufficient clearance and access for observation and testing. Fire alarm junction boxes shall be clearly marked for distinct identification.
5. All fire alarm junction boxes should be mounted in approved locations for ease of maintenance from floor level.
6. All junction boxes shall be made up in a uniformly and orderly manner.
7. Backbone termination boxes should be of sufficient size to allow for termination on to terminal strips.
8. All loop wiring shall be identified by ins and outs. (Ins meaning they are coming from the panel.)
9. Solid Red and Black are reserved for and must be used for 24-volt panel power and with the use of audiovisual circuits.
10. Wiring shall be in EMT conduit, minimum $\frac{3}{4}$ inch. The entire raceway shall be grounded. Conduits shall enter panels from the sides or bottom. Where flexible conduits are used to connect device loop wiring to alarm devices, the Contractor shall use $\frac{1}{2}$ inch flexible conduit.
11. Intelligent sensors shall be mounted in the ceiling of the protected area and not closer than four feet from any air conditioning register and installed in accordance with their listing.
12. Monitor modules connected to interior manual stations shall be mounted in the ceiling panel or wall surface immediately above the manual station.
13. Where manual stations are installed on the building exterior, the associated monitor module shall be mounted in transparent enclosure to maintain the environmental limitations of the module. The manual pull station shall be mounted in an approved enclosure in the immediate vicinity of the module.
14. Multiple monitor modules located in valve rooms shall be housed in a NEMA 4 enclosure with gland panel and sized to contain the required number of modules.

K. System Programming

1. Coordination with DFW Airport Facilities Maintenance Electronics is required for programming. Contact 972 574-6600 for information and additional programming requirements.
2. Contact 972 574-6600 for information and additional programming requirements.

III. Fire Alarm Specifications for Terminals built after 9/2000.

A. Operation and Fire Alarm Panel

1. The Fire Alarm Data Gathering Panel (DGP) shall function as an integral component of the DFW Central Fire/Security System and the Intelligent System devices referenced hereinafter. The panel shall be UL 864 UOJZ and UUKL listed.
2. The DGP shall supervise each individual device on an intelligent loop circuit such that alarm and trouble conditions are individually annunciated.
3. All panels should be made up in a uniformly and orderly manner.
4. A 120 VAC dedicated circuit shall power the fire alarm panel. A label will be affixed inside the fire alarm panel as to the panel designation and breaker number of the 120 VAC power source.
5. The panel shall contain batteries to provide stand-by emergency power, sized to maintain the local fire alarm system operational upon loss of primary power. The batteries shall have the capacity to operate the system under standby condition for 24 hours and under alarm conditions for a minimum of 5 minutes. Transfer from normal to battery power shall be automatic. When a transfer occurs the panel shall report a trouble alarm to the Central Fire/Security System. The panel shall provide float/equalizing charge for the batteries.
6. The panel shall provide ground fault detection for the panel and device initiating circuits and shall report ground faults to the Central Fire/Security System.
 - a. Initiating Device circuits shall be “four wire” whereby the circuits are supervised for opens and grounds and loop initiating will continue to operate with a trouble such as a single open or a single ground. Supervisory and indicated circuits shall be two wire supervised, with the appropriate end of line resistor installed at the last device on the loop.
7. Fire alarm panel shall not be used for junction boxes or pull boxes. There is to be absolutely no splicing inside the panel.
8. When terminating stranded wiring in the panel for all initiating and indicating devices “Sta-Kon” type lugs shall be used for the proper lug size and wire size.
9. The DGP is located as approved by DPS.
10. The DGP shall communicate with the DFW Central Fire/Security System via fiber optic cable.

B. System Devices.

1. Addressable Devices shall receive power and communicate over the same pair of wires.
2. Additional devices shall be capable of being added to the intelligent loop circuit by tee tapping from any point in the circuit without affecting any existing device address or function.
3. Each device shall contain screw terminals on rising plates for positive termination of up to 12 AWG wire.

4. Duct and area smoke detectors will be provided with remote test and reset panels when detector is not readily accessible from floor level.
5. No intelligent devices are allowed in confined spaces. Should a device be needed in a confined space a remote monitor module shall be provided in an approved location.
6. All intelligent device covers shall be labeled with device address and panel loop number. The type of module shall be identified as either a control module or monitor module.
7. Fire lock box shall be a two wire Class "B" security circuit. The EOL resistor should be protected against shorts.
8. All intelligent sensors shall mount on a common base to facilitate the change of sensor type if building conditions change. Base shall be incompatible with conventional detectors to prevent the mounting of non-intelligent devices.
9. Each sensor shall contain an LED, which blinks each time the device is scanned by the DGP. If the device is in alarm, the LED shall remain on to indicate the alarm condition.
10. Each sensor shall be capable of being tested for alarm condition via command from the DGP.
11. Each sensor shall respond to the DGP poll for information with its device type identification to preclude inadvertent substitution of another sensor type. The DGP shall operate with the installed device but shall indicate a trouble condition until the proper type is installed or the programmed sensor type is changed.
12. Each sensor shall respond to the DGP poll for information with an analog representation of measured smoke density, particles of combustion, or temperature.
13. Photoelectric smoke sensors shall contain an optical sensing chamber with a nominal sensitivity of 2.3 percent/foot obscuration.

C. Monitor Modules

1. The intelligent monitor module shall provide an addressable input for normally open or normally closed contact devices
2. The monitor module shall provide a supervised initiating circuit, able to connect to either two wire supervised or four wire fault tolerant circuits.
3. The monitor module shall contain an LED, which shall blink upon DGP scan. The LED shall latch on upon determination of an alarm condition.
4. The monitor module shall mount in a standard 4" X 4" deep electrical box.

D. Control Modules.

1. The intelligent control module shall provide an addressable output for a separately powered alarm indicating circuit or control relay.
2. The control module shall provide a supervised indicating circuit. An open circuit fault shall be annunciated at the DGP. The control module shall connect to either two wire or four wire fault tolerant circuits.
3. The control module shall provide a control relay. The relay shall have a SPDT form "C" contact, rate at two amps at 28 VDC.
4. The module shall have an LED, which shall blink on DGP poll. Upon activation of the module, the LED shall be latched on.
5. The control module shall mount in a standard 4" X 4" deep electrical box.

E. Initiating Devices

1. Ionization Duct Smoke Detectors shall have two SPDT alarm contacts and one SPDT trouble contact, rated two amps at 120 VAC and be listed for applications involving air handling systems. Detector shall be installed in accordance with its listing.
2. Manual stations shall be of rugged die cast metal construction designed for semi-flush mounting. The initiating circuit shall be four wire fault tolerant. Each manual station shall connect to a monitor module applicable to the DGP.
3. Wet sprinkler systems shall have vane type sprinkler flow switches. Flow switches shall have retards adjustable up to two minutes. The device shall have a SPDT, which shall close upon water flow.
4. Dry sprinkler system alarm switches shall be pressure activated.
5. Supervisory switches for fire protection systems shall be installed in accordance with their listing. Lanyard type supervisory switches are not permitted except as approved by DPS.
6. Dry system air pressure switches shall be installed to monitor both high and low air pressure conditions.
7. Each initiating device shall connect to a separate monitor module. The initiating circuit shall be four wire fault tolerant.
8. Supervisory devices may be connected to a single monitor module when located in the same room. Supervisory circuit shall be two wire supervised circuits, with the appropriate end of line resistor installed at the last device on the loop.

F. Wiring

1. Wiring shall be in accordance with the National Electric Code, these specifications, and the approved wiring diagram.
2. No wiring other than fire alarm indicator, indicating, low voltage power, and communications circuits are permitted in fire alarm conduit.
3. Wiring shall be completely installed, field connections made and tested for stray voltage, short circuits, and ground faults prior to connection to the intelligent

modules. Stranded wires shall terminate at both the device and module with spade terminals sized to fit both the wire and screw terminal.

4. Color-coding of device initiating fault tolerant loops shall be: two conductors are of one color and the other two conductors are of a different color. Colors shall be continuous throughout the entire loop. Where more than one initiating loop is routed in a single conduit, the colors associated with any loop contained in the conduit shall be different from the colors of any other initiating loop contained in the conduit.
5. All loop wiring shall be identified by ins and outs. Ins is defined as coming from the panel.
6. Red and Black must be used for 24-Volt panel power.
7. No voltage supply from any other source than the primary power 120 VAC and the panel 24 VDC power supply shall be utilized.
8. Intelligent loop circuits should be labeled at all junction locations by the panel number and loop number.
9. Intelligent loop circuits shall be provided with adequate junction boxes be expandable and provide a means for connecting to the loop in the junction box.
10. Control and other panels shall be mounted with sufficient clearance for observation and testing. Fire alarm junction boxes shall be clearly marked for distinct identification.
11. Wiring shall be in EMT conduit, minimum $\frac{3}{4}$ inch. Flexible conduits, mounting boxes, junction boxes and panels shall be securely fastened with appropriate fittings to insure positive grounding throughout the entire system. Conduits shall enter the panels from the sides or bottom. Where flexible conduits are use to connect device loop wiring to alarm device, the contractor is permitted to use $\frac{1}{2}$ inch flexible conduit. Refer to Division 16- ELECTRICAL for additional requirements for conduit.
12. All fire alarm junction boxes should be mounted in approved locations for ease of maintenance from floor level.
13. Backbone termination boxes should be of sufficient size to allow for termination.
14. All junction boxes shall be made up in a uniformly and orderly manner.

F. Device Installation

1. Intelligent sensors shall be mounted in the ceiling of the protected area and not closer than four feet from any air conditioning register. Contractor shall define actual device locations in accordance with the manufacturer recommendations and NFPA approved methods.
2. Monitor modules connected to internal manual stations shall be mounted in the ceiling panel or wall surface immediately above the manual station.
3. Where manual stations are installed on the building exterior, the associated monitor module shall be mounted in a transparent enclosure to maintain the environmental limitations of the module. The manual pull station shall be mounted in an approved enclosure in the immediate vicinity of the module.

IV. Other buildings occupied or maintained by the DFW Airport Board.

A. Operation

1. Activation of any initiating device shall report to the DFW Central Fire/Security System.
2. Audibly annunciate the alarm condition and light a pilot light on the local fire alarm panel pinpointing the zone in alarm.
3. Activation of supervisory alarms or trouble indications shall report to the DFW Central Fire/Security System and light a pilot light on the local fire alarm panel.
4. Notification devices shall be provided and notify the occupants in the event of an alarm.

B. Fire Alarm Panel

1. The Fire Alarm Data Gathering Panel (DGP) shall function as an integral component of the DFW Central Fire/Security System. The panel shall be UL 864 UOJZ and UUKL listed.
2. The panel shall be modular; factory wired; of dead front construction using solid-state components. The panel shall communicate with the Central Fire alarm system using voice grade dual, full duplex Telephone data circuits or fiber optic cables.
3. The panel shall be capable of monitoring and controlling fire alarm and security zones as required. Space within the panel shall be provided to allow for installation of equipment to accommodate zone expansion by 25%.
4. All panels should be made up in a uniformly and orderly manner.
5. Fire alarm panels shall not be used for junction boxes or pull boxes. No splicing is permitted inside the panel
6. Wiring terminations in the panel from all initiating and indicating devices shall use "STA-KON" type lugs sized for the proper screw size and wire size.
7. The fire alarm panel shall be powered by 120 VAC dedicated circuit. A label shall be affixed inside the fire alarm panel as to the panel designation and breaker number of the 120 VAC power source.
8. Initiation device circuits shall be "four wire" whereby the circuits are supervised for opens and grounds and all loop initiating devices will continue to operate with a trouble such as a single open or a single ground.
9. The panel shall contain batteries to provide stand by emergency power sized to maintain the local fire alarm system operational upon loss of primary power. The batteries shall have the capacity to operate the system under standby condition for 24 hours and under an alarm condition for a minimum of 5 minutes.
10. The panel shall provide ground fault detection for the panel and device initiating circuits and shall report ground faults to the Central Fire/Security System.
11. Where the panel is located in a facility remote from the Central Utility Tunnel, the panel shall transmit data to the Central Fire/Security System by circuits leased by the owner from the Local Telephone Service. The contractor shall arrange for installation of these circuits by coordinating with DFW Airport Maintenance Electronics, 972 574-9482.

12. Where the panel is located in a facility accessible to the Central Utilities Tunnel the panel shall transmit data to the Central Fire/Security System by proprietary data cable furnished by the contractor and connected to the existing fire alarm fiber optic cable in the Central Utilities Tunnel.
13. The contractor shall obtain from DFW Energy & Utilities Services the necessary addressing information to properly address the fire alarm panel. The contractor shall provide to DFW Energy & Utilities Services the correct programming information for the Airport's a minimum of ten (10) days prior to the expected check out of the system.
14. No voltage supply from any other source than the primary power 120 VAC, the panel 24 VDC power supply, or approved Notification Appliance Power Supplies shall be utilized.

C. Initiating Devices.

1. Ionization Duct Smoke detectors shall be installed in accordance with their listing. The detector shall have two (2) SPDT alarm contacts and one (1) SPDT trouble contact, rated minimum two (2) amperes at 120 volts AC. The amplifier switching circuit shall be entirely solid-state and operate with a detector line voltage of 24 VDC.
2. Area Smoke Detectors shall be photoelectric type and be installed in accordance with their listing and NFPA 72. Detectors shall be equipped with a functional test device circuit capable of simulating a minimum acceptable amount of smoke for alarm. The test device circuit shall provide individual local test of all components of the detector and shall not require generation of actual smoke within the building.
3. Duct smoke and area smoke detectors will be provided with remote testing and reset when the detectors not readily accessible from floor level.
4. Detectors shall mount on a standard 4" octagon or 4" square outlet box.
5. Detectors shall operate on a line voltage of 24 VDC. A means shall be provided to supervise the 24 VDC detector power for each zone.
6. Manual Pull Stations shall be of rugged die cast metal construction designed for semi-flush mounting. Manual Station shall be installed in accordance with their listing.
7. Sprinkler Alarms on wet type sprinkler systems shall have vane type sprinkler flow switches. Flow switches shall have retards adjustable up to two minutes, and be furnished with one normally open switch that will close upon water flow. Dry System alarm switches shall be of a pressure activated type.
8. Valve supervisory devices shall be installed in accordance with their listing. Lanyard type supervisory switches are not permitted unless approved.
9. Dry system air pressure supervision shall be a pressure switch and installed to monitor and report both high and low air pressure conditions
10. Each device shall contain screw terminals on rising plates for positive termination of up to 12 AWG wire.
11. Fireman lock box shall be a series security circuit. EOL resistor should be protected against shorts.

D. Notification Devices

1. Notification appliances shall be installed in accordance with their listing and per NFPA 72.

E. Wiring

1. Wiring shall be in accordance with the National Electric Code, these specifications and the approved wiring diagram.
2. No wiring other than fire alarm loop, initiating, indicating, power, and communications circuits are permitted in fire alarm conduits. Device wire shall be color-coded, minimum 14 AWG THHN copper wire, 600-volt insulation for initiating and indicating circuits. Transposing or changing color-coding of wires is not permitted.
3. Wiring shall be completely installed; field connections made and tested for voltage and stray signals before final connections to the remote panel is made. Wires shall terminate both at the pane and the devices with spade type insulated "STA-KON" lugs sized to fit both the wire and screw terminal.
4. Color-coding of device initiating fault tolerant loops shall be: two conductors are of one color and the other two of a different color. Colors shall be continuous throughout the entire loop. Where more than one initiating loop is routed in a single conduit, the colors associated with any loop contained in the conduit shall be of different colors than any other loop in the conduit.
5. All loop wiring shall be identified by ins and outs. (Ins meaning they are coming from the panel).
6. Solid red and black are reserved for and must be used for 24-volt panel power with the use of audiovisual circuits.
7. Control and other panels shall be mounted with sufficient clearance and access for observation and testing. Fire alarm junction boxes shall be clearly marked for distinct identification.
8. Wiring shall be in EMT conduit, minimum $\frac{3}{4}$ inch. The entire raceway shall be grounded. Conduits shall enter panel from the sides or bottom only. Where flexible conduits are used to connect device loop wiring to alarm devices, the contractor shall use $\frac{1}{2}$ inch flexible conduit.
9. All fire alarm junction boxes should be mounted in approved locations for ease of maintenance from floor level.
10. All junction boxes shall be made up in a uniformly and orderly manner.
11. Backbone termination boxes should be of sufficient size to allow for termination on to terminal strips.

V. Documentation and Acceptance Testing for All Systems

A. Documentation

1. Upon completion, provide a complete point to point wiring diagrams of the installation. One copy shall be furnished to DFW Facilities Maintenance Fire Alarm Section for inclusion in Facilities Maintenance records.
2. All final as-builts shall show conduit routing, junction boxes as well as termination boxes. Wire flow and EOL resistors shall be cledarly marked at device and on the print.

B. Acceptance Test

1. Following completion of the wiring and prior to termination of devices, an installation inspection is required. Contact 972 574-3333 to request inspections.
2. Upon completion, the contractor in the presence of DFW Airport maintenance fire alarm technician, DFW Airport Fire Prevention representative and appropriate DFW Airport Development representatives shall conduct such test and inspections necessary to verify the installation is complete and fully operational to the given intent and has been installed in accordance with the specifications and approved drawings.
3. All equipment and materials necessary to conduct these tests shall be furnished wholly by the contractor.
4. The following device keys shall be provided by the contractor upon completion and acceptance.
 - a. One key for each duct smoke detector installed.
 - b. One key or tool for each manual pull station installed.
 - c. One key or tool for each water flow device installed.
 - d. One key for each supervisory device installed.
 - e. One key or tool for each panel installed.
5. Following completion of the installation and progressively during the course of installation, the contractor shall remove all trash, debris, and surplus material occasioned by this operation so that at all times the environment presents a safe, neat, and orderly condition conducive to other activities.

-- END OF APPENDIX --