Jefferson County School District No. R-1
Support Services

TECHNICAL GUIDELINES

DIVISION 28 – August 19, 2005

Electronic Safety and Security

28 05 00 Common Work Results for Electronic Safety and Security - August 19, 2005

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Design engineer for systems in this Division is restricted to consultants approved by Jefferson County School District, R-1 Fire and Security Systems Specialist.
- See Data, Communications, and Alarm Diagram
- Install manual station with operating handle at 48 inches above finished floor.
    1. For retrofit applications, mount the operating handle at no lower than 42” and no higher than 54” above finished floor.
    2. Install audible and visual signal devices per NFPA and ADA Guidelines.
- Use #18/4 AWG minimum size stranded conductors for security device initiating loop circuits.
- Plenum rated cable.
    1. Cable routing shall be perpendicular to or parallel to structural building members, and shall utilize a ring type support system attached to structural building members only.
    2. Mounting cable to other building systems (fire protection, electrical conduit, mechanical ductwork, etc.) or running cable in any fashion other than described, is prohibited.
- Do not exceed 40% fill rate in raceways and back boxes.
    1. For retrofit applications, conduit and box fill shall be assessed and approved by the Engineer and District.
- Minimum size for back boxes shall be 4 inches x 4 inches x 2 1/8 inches.
    1. The use of extension rings on new construction shall be approved on a “case by case basis” by the Engineer and the District
- Junction boxes for new or retrofit construction that have more than eight (8) wire splice connections, shall have mounted terminal blocks, in lieu of wire nuts.
- Provide metal wiremold or raceway in all areas or ceilings that are exposed in public areas.
    1. Paint to match existing wall or ceiling finish, unless approved by the Engineer and District.
- Support boxes by All-Thread or other approved box support device; or bolt directly to building structural members.
- Provide red breaker locks for all building power circuits that feed fire alarm or security equipment panels.
- Mount end-of-line device in box with last device.
- Mount outlet box for electric door holder to withstand 80 pounds pulling force.
- Make conduit and wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper switches, duct smoke detectors, smoke/fire dampers, HVAC units, and other applicable devices, furnished under other Sections.
- Automatic Detector Installation: Conform to NFPA 72.
- Automatic Duct Detector Installation: Conform to NFPA 90A.

- Label each initiating device with device ID address (L1D1 format), and control module or monitor module with device ID address and circuit function (L1-M1, Strobes format).
    1. Use Kroy lettering machine with black lettering on clear background, unless alternate labeling approved by the District.
- Label each remote duct detector or beam detector test station with device ID address and associated HVAC unit or beam detector designation (L1-M1 RTU-1 format).
    1. Label location of the device associated with the test station, if the test station is not in the direct vicinity of the associated device (L1-M1 RTU-1 Classroom 201 format).
    2. Use Kroy lettering machine with black lettering on clear background, unless alternate labeling approved by the District.
- Label each concealed device location with device ID address and circuit function (L1-M1 Door Holder format) at the adjacent ceiling tile grid T-Bar.
    1. Use plastic laminate with engraved ¼" red lettering on white background, unless alternate labeling approved by the District.
- Open cabling shall be installed in a neat and workmanlike manner, and shall be run perpendicular or parallel to building structural members.
    1. Diagonal routing of cable is not acceptable. Remove and reinstall.
- Open cabling shall be routed away from other building cabling and equipment, and shall be routed to and from the device in a vertical or horizontal manner.
    1. Maintain cabling at the same level where possible.
    2. Cabling that is not dropped vertically to the device or routed horizontally straight to the device is not acceptable.
    3. Cabling that is routed through, over, under or around other equipment, when a straight horizontal or vertical path is available is not acceptable and shall be removed and be reinstalled.
- Open cabling shall be supported at a minimum of every 4 to 5 feet to building structural members utilizing 2½ inch metal bridle rings Caddy 4BRT32 for up to 10 cables and Caddy CableCat Wide Base Cable Supports sized for proper # of cables for major trunk runs or other PRE-APPROVED Jeffco supporting devices. Follow Manufactures installation instructions for all installations.
    1. Cabling that is secured to sprinkler piping, HVAC ductwork, electrical conduit or other non-structural building member shall not be acceptable and shall cause the cable to be re-installed and re-supported in a proper manner.
- Conduits and device back boxes shall have appropriate plastic plenum rated wire bushings where open cable routing occurs.
    1. Do not use Romex type connectors.
- Conduits shall be utilized for all separation (wall, ceiling, fire separation barrier, etc.) penetrations.
- Firestopping per 07 80 00
- Miscellaneous Control Circuit: Black (Negative), Red (Positive), with Red Jacket.
- See 05 50 00devices in a gymnasium.

- Safety and Security Wire and Cable Color Code
  1. Device Signaling Loop Circuit: (SLC) #16/2 Solid, red no stripe Label "SLC"
  2. Initiating Device Circuit (IDC): #16/2 Solid, Red w/ Black Stripe
  3. 24 VDC Power Circuit; #14/2 Solid, Red with Purple Stripe
  4. Notification Appliance Circuit (NAC): #14/2 Solid, Red w/Green Stripe
  5. Miscellaneous Fire Circuit: #18/4 Solid, Red w/Yellow Stripe
  6. DACT Transmitter Circuit: #22/10 Solid, Red w/White Stripe
  7. Metasys (LAN) Interface Circuit: Belden 9575 #16/4 x 2, Red w/ Blue Stripe
  8. Security Circuit: #18/4 Stranded, Red w/ Orange Stripe
  9. Conductor sizing and numbers subject to equipment manufacturer recommendations.
- Field Quality Control
  1. Test in accordance with NFPA 72, District, State, and Authority Having Jurisdiction (AHJ) fire department requirements.
  2. Provide forty-eight (48) hours prior notice to the Engineer and District personnel for rough inspection, prior to installing ceiling tiles or drywall.
  3. Provide seven (7) day prior notice to the Engineer and District personnel for scheduled contractor pre-testing of the system.
  4. Provide three (3) day prior notice to the Engineer and District personnel for the scheduled Authority Having Jurisdiction (AHJ) testing of the system.
  5. Provide three (3) original copies of the NFPA 72 - Certificate of Completion Form.
     a. One for the District, one for the Authority Having Jurisdiction (AHJ), and one for the facility's Fire Alarm System Logbook.
     b. Voltage and current values must be true measured values not estimates.
  6. Provide two (2) detailed records of the pre-testing of the system.
     a. One for the District and one for the facility's Fire Alarm System logbook.
     b. Pre-testing record must contain a minimum of the device ID, proper annunciator description, proper functionality of the device (audible/visual signaling, shutdown, etc.), and date of the testing.
     c. Utilize the standard District form available on the District website, or provide Contractor equivalent form approved by the District in advance of the system pre-test.
  7. Careful coordination is required between General Contractor and controls contractor for Metasys interface circuits.

- Manufacturer's Field Services
  1. Prepare and start systems.
  2. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.
  3. Provide two (2) hard copies and two (2) electronic copies of the final system programming.
     a. One set to be delivered to the District Project Manager for the District Central Reporting System (Metasys) programming.
     b. One set to be left inside the facility's Fire Alarm System logbook.
- Demonstrate normal and abnormal modes of operation, and required responses to each.
- Provide the services of a factory-certified service representative to demonstrate the system and train Owner's maintenance personnel as specified below:
  1. On-Site Training:
     a. Provide a minimum of two (2) hours of on-site training of the facility's school staffing in the basic operations and functionality of the fire alarm system panel, annunciator, and field devices.
     b. Review field panel locations, typical device locations, and 120vAC power locations (panels, breakers, and circuits). Demonstrate the various system responses to the field off-normal conditions.
     c. Simulate alarm conditions, supervisory conditions, security conditions, trouble conditions, and ground fault conditions of the various field devices.
     d. Demonstrate how to reset various building systems (HVAC units, fire doors, security gates, etc.).
     e. Provide written instructions of basic system operating instructions behind clear, framed Lexan, located adjacent to the fire alarm control panel.
     f. On-Site System training shall be completed within six (6) days of completion of the system and Authority Having Jurisdiction (AHJ) test.
  2. Off-Site Training:
     a. Provide a minimum of eight (8) hours of off-site training of the District's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, programming, and preventive maintenance of the system.
     b. The off-site training shall be conducted in a classroom type setting, with the content approved by the District in advance.
     c. Provide maintenance, service, and programming manuals of the various components of the system.
     d. Provide a working (panel and field devices) system demonstration unit; whereby the various system troubleshooting and servicing procedures can be adequately performed in a 'hands-on" scenario.
     e. Off-site System training shall be completed within thirty (30) days of completion of the system and Authority Having Jurisdiction (AHJ) test, unless the District specifically directs an alternate training schedule.
  3. Schedule on-site training with the District at least three (3) days in advance. Schedule off-site training with the District at least fourteen (14) days in advance.

END SECTION 28 05 00

28 13 00 Access Control - August 19, 2005

- Work in this section is restricted to specific products of specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
    1. Identicard Series 9000 Control Panel for 4 door control plus:
        a. 4 door expansion card for high schools only
        b. Net link converter
        c. AlarmSaf power supply with Fire Alarm interface for Maglock shunt
        d. AWID card reader (Rough in for Single Gang Vertical mount)
        e. Lock hardware shall be based on Door Hardware Schedule and shall be 24VDC by listed Manufacturers ONLY
            (1) Electric Strike: are HES or Von Duprin to match Section 08 71 00 door hardware schedule
            (2) Schlage electrified Locksets, Hagar Ball Bearing electric hinge
            (3) Maglocks: Locknetics
        f. Plenum rated cable sufficient for anti-passback Card readers (2) #22/6, cables, REX #22/6, Wide gap recess door contacts #22/2, Lock Hardware #18/2, and Cat5e spare.
- Cards
    1. Elementary school: 15 cards
    2. Middle : 20 cards
    3. High: 40 cards

END SECTION 28 13 00

28 16 00 Intrusion Detection - August 19, 2005

- Work in this section is restricted to specific products of specific manufacturers that have been previously approved by Jeffco Public Schools, R-1 Facilities Services Department.
- See Data, Communications, and Alarm Diagram.
- Key Pad
    1. International Electronics, Inc. Model 212i
    2. Remote security keypad that contains an integral alphanumeric keyboard with symbols arranged in ascending ASCII code ordinal sequence.
    3. Contact output
    4. Interface with the Metasys central station reporting equipment.
    5. Turn keypad over to District security personnel for programming, prior to installation.
    6. One keypad, located in the Facility Manager’s office.
- Microwave-Passive Infrared Dual Detection Motion Sensor:
    1. Intelli-Sense model DT640STC, DT660STC, DT6100STC, or DT6360STC,
    2. Set to “medium”, unless otherwise directed by District security personnel.
    3. Provide a separate addressable monitor module for each motion sensor.

- Alternates
  1. Able to detect an intruder in a long-sleeved shirt, slacks and shoes, which weighs 100 lbs or less, and is 5 feet tall or less
  2. Standard intruder movement is defined as any movement such as walking, running, crawling, rolling, or jumping through a protected zone in the most advantageous manner for the intruder.

END SECTION 28 16 00

28 23 00 Video Surveillance - August 19, 2005

- Work in this section is restricted to specific products of specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
- High School and Middle School: 16-channel 500 GBDVR: Pelco DX8000-500 Series
- Elementary: 8-channel 250 GBDVR: Pelco DX8000-250 Series
- Power supply camera: MCS 16-20B 20 amp 16 out w/breakers
- Dome camera: SD53C22-PG-E0 Pelco Spectra III SE Clear Dome
- Parapet mount adapter for Spectra III: Pelco PP450 or other District and manufacturer approved mounting systems.
- Camera power supply for Spectra III: Pelco WCS 1-4
- ICS Series HiREZ color mini dome Smoke 3-8mm AI
- 17 inch flat panel LCD monitor

END SECTION 28 23 00

28 31 00 Fire Detection and Alarm - August 19, 2005

- Work in this section is restricted to specific products of specific manufacturers that have been previously approved by the Jefferson County School District, R-1 Facilities Services Department:
  1. Notifier
  2. Simplex-Grinnell.
- At the time of bid, all exceptions taken to these Guidelines, any variances to the contract drawing design, and any non-conformance to the operating capabilities called for in this guideline, shall be listed in writing and forwarded with the bid. Any such exception, variance, or non-conformance, which was not listed at the time of bid, and is identified in the submittal, shall be grounds for rejection.

- The work covered by this Section of the Technical Guideline shall include all labor, equipment, materials, and services to furnish and install a complete fire alarm, security, and detection system of the non-coded, general alarm type. It shall be complete with all necessary hardware, software, and memory specifically tailored for this installation. The system shall consist of, but not be limited to, the following:
  1. Fire alarm control panels.
  2. Annunciator panels.
  3. Addressable manual fire alarm stations.
  4. Analog/Addressable automatic initiating devices.
  5. Security monitoring devices.
  6. Fire alarm signaling devices.
  7. Auxiliary fire alarm equipment and connections.
  8. Interface to the District Central Reporting System (Metasys).
- Related Work
  1. Division 08 Door Hardware
  2. Division 14 Conveying Equipment
  3. Division 21 Fire Suppression
  4. Division 23 HVAC
  5. Division 26 Electrical
  6. CAUTION: Use of this Section without including effect of Section 26 05 19 will result in omission of basic requirements.
  7. See Data, Communications, and Alarm Diagram
- All equipment shall be listed and classified by Underwriter's Laboratories, under the applicable editions of following standards:
  1. UL 38 – Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems
  2. UL 228 – Door Closers-Holders, With or Without Integral Smoke Detectors
  3. UL 639 – Intrusion – Detection Units
  4. UL 268 – Smoke Detectors for Fire Protective Signaling Systems
  5. UL 268A – Smoke Detectors for Duct Applications
  6. UL 464 – Audible Signal Appliances
  7. UL 521 – Heat Detectors for Fire Protective Signaling Systems
  8. UL 864 – Control Units for Fire-Protective Signaling Systems
  9. UL 1076 – Proprietary Burglar Alarm Units and Systems
  10. UL 1971 – Signaling Devices for the Hearing Impaired.
  11. FM P7825a – Approval Guide Fire Protection
  12. NFPA 70 - National Electrical Code
  13. NFPA 72 - National Fire Alarm Code
  14. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems
  15. IFC - International Fire Code
  16. IBC - International Building Code
  17. IMC – International Mechanical Code
  18. ANSI S3.41 – Audible Emergency Evacuation Signals.
  19. EIA ANSI/EIA/TIA-232-3 – Interface between Data Terminal Equipment and Data Circuit Terminating Equipment employing Serial Binary Data Interchange.

20. IEEE C62.41 – Surge Voltages in Low Voltage AC Power Circuits
21. Division 01 – General Requirements.
22. State and Local Authority Having Jurisdiction (AHJ) code and requirements.

- Submittals
  1. Shop Drawings: Provide shop drawings of annunciator layout and system wiring diagrams showing all equipment, device placement, and wiring connection required.
  2. Product Data: Provide manufacturer's data sheets showing product appearance, electrical characteristics, and connection requirements.
  3. Load Calculations: Provide load calculations for all visual indicating appliance circuits, audible indicating appliance circuits, system power supplies, and battery standby systems.
  4. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use, as stipulated by the product-testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and start-up of products.
  5. Exceptions: Provide a detailed listing of any and all exceptions, variances, and non-conformances to the specifications and contract design drawings. Failure to disclose any such items shall be grounds for immediate disapproval of submittals without comment.
  6. Samples: Provide samples of various items, when requested.
- Project Record Documents
  1. Record as-built locations of all system components, initiating devices, signaling appliances, and end-of-line devices. Include as-built conduit routing and wire counts. The contractor red-line construction drawing set, with mark-ups, shall be furnished to the District. Red-lines shall be made weekly at the job site and documented on the revision block of the construction print by the installing contractor.
- Operation and Maintenance Data
  1. Operational Data: Provide operating instructions, detailed for the specific project.
  2. Maintenance Data: Provide maintenance and repair procedures for each type of equipment provided, as applicable. Include any specific requirements particular to the project.
  3. Servicing Data: Provide service manuals for each type of equipment provided, as applicable. Include any specific requirements particular to the project.
  4. Equipment Data: Provide manufacturer data sheets or catalog sheets for each type of equipment provided.
  5. Spare Parts Data: Provide manufacturer's recommended spare parts list, including quantity, and any equipment replacement schedules, as applicable.
  6. Supplier Data: Provide system manufacturer and local service organization information. Include contact, phone numbers, and addresses, as applicable.
  7. Warranty Data: Provide system warranty information, including all material and/or labor terms.

- Qualifications
  1. Manufacturer: Company specializing in manufacturing the products specified in this section with a minimum three (3) years documented experience, and pre-qualified and approved by the District, with service facilities within fifty (50) miles of the project.
  2. Installer: Company specializing in installing the products specified in this section with a minimum three (3) years documented experience, and pre-qualified and approved by the District as a fire alarm installer. The installer shall employ NICET Level Two technicians or engineers to install or supervise the installation of the products specified in this Section.
- Warranty
  1. The manufacturer shall guarantee the system equipment for a minimum period of two (2) years from the date of final acceptance of the system. Any additional warranty periods shall be listed in the Operation and Maintenance Data manuals. Any defective equipment, material, or software shall be replaced at no cost to the Owner during this warranty period.
  2. The installing contractor shall guarantee all wiring and raceways to be free from mechanical or electrical defects for a minimum period of two (2) years from the date of final acceptance of the system. Any defective material and/or labor shall be replaced at no cost to the Owner.
- Maintenance Service
  1. Furnish warranty service and maintenance of the fire alarm system for two (2) years from the date of final acceptance of the system:
  2. Basic Services: Systematic, routine maintenance visits, as required; at times coordinated with the Owner. In addition, respond to service calls within 24 hours of notification of system trouble. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.
  3. Additional Services: Perform services within the above two (2) year period, not classified as routine maintenance or as warranty work, when authorized in writing by the Owner. Compensation for additional services shall be agreed upon in writing, prior to performing any additional services.
  4. Provide extra materials within 30 days of project acceptance by the AHJ and District, as follows:
     a. Two (2) analog/addressable manual station.
     b. Two (2) of each type of automatic analog/addressable smoke or heat detector.
     c. Two (2) of each type of smoke or heat detector base.
     d. Two (2) of each type of addressable control module.
     e. Two (2) of each type of addressable monitor module.
     f. Two (2) of each type of audible, visual, or audible/visual signaling appliance
     g. A minimum of six (6) of each type of key.
     h. Two (2) hard copies of all system programming (software).
     i. Two (2) electronic copies of all system programming (software).
     j. Contractor red-line construction drawing set, with mark-ups.
     k. Two (2) hard copies of As-Built record drawing set.
     l. One (1) reproducible copy of As-Built record drawing set.
     m. One (1) electronic copy of As-Built record drawing sets; on CD format.

n. Special test equipment, filters, test leads, cords, etc. required to test the system.

- Control Panel
  1. Base panel, system power supply, and battery charger, with optional modules suitable to meet the requirements of these specifications.
  2. Incorporate all control electronics, relays, necessary modules, and components in a mounted cabinet with operating controls and zone/supervisory indicators behind a locked door with view panel(s); with keys made available for the Fire Department and other authorized operating personnel.
  3. Supervised, site programmable, and of modular design with expansion modules to provide a minimum of two (2) analog addressable loop modules, configurable to either Class A or Class B wiring, with capacity to serve up to 180 system detectors and 180 addressable modules.
  4. 25% expansion capability to accommodate additional analog addressable loop module(s).
  5. Separate analog addressable loop module, dedicated for monitoring and control functions for the security devices in the system.
  6. Store all basic system functionality and job specific data in non-volatile memory, and capable of surviving a complete power failure intact.
  7. Capable of automatic system programming, which shall provide a minimum default alarm system operation with support of alarm silence, trouble silence, drill, lamp test and reset common controls.
  8. Allow downloading of job specific custom programming, and shall support programming of any input point to any output point, or using initiating events to start actions and sequences.
  9. Utilize full digital communications to supervise all addressable loop detectors and modules for proper operation.
  10. UL Listed Detector Sensitivity test feature
  11. Support 100% of all remote detectors, remote alarm indicators, and modules in alarm at any one time.
  12. Supervise all system modules for placement
  13. Digital display for reporting system status and abnormal conditions.
  14. Provide common control indicators (normal, alarm, monitor, ground fault, supervisory, trouble), common control switches (reset, alarm silence, trouble silence, and drill), and zone alarm and trouble LEDs, as required for the system zoning requirements.
  15. Provide system function keys for status, reports, enable, disable, activate, restore, program and test.
  16. RS-232 communications port to facilitate connection to system peripherals: such as systems printers, video display terminals (VDUs), and other user annunciation devices.

- Power Supplies:
  1. Switch mode type with line monitoring to automatically switch to batteries upon power failure or brown out conditions, and adequate to service all control panel modules, all fire alarm system powered smoke sensors and modules, remote annunciators, control relays, and all fire alarm signaling appliances.
     a. Integral battery charger capable of recharging the standby batteries per NFPA 72 requirements, and provide battery supervision for placement and low voltage.
  2. The security system power supply shall be similar to the fire alarm power supply, but shall provide 12vDC power to the security system devices.
  3. Provide booster power supply panels as required to meet project requirements.
     a. Activate via dry contact from the fire alarm control panel.
     b. Generate a fault condition at the main fire alarm control panel, when any fault condition occurs on circuits connected to the booster power supply, or a trouble condition occurs at the booster power supply panel.
     c. Integral battery charger capable of recharging the standby batteries per NFPA 72 requirements, and provide battery supervision for placement and low voltage.
     d. Provide a separate dedicated booster power supply panel(s) for the Temporary Classrooms signaling appliance load.
  4. Do not locate any power components above finished ceilings.
- Standby Batteries:
  1. The secondary power source shall be standby batteries.
  2. Batteries shall be sealed lead acid type, with a minimum life expectancy of five years
     a. Facility with Life Safety Generator shall require four (4) hours of normal standby operation and five (5) minutes of normal alarm signaling condition. (Subject to AHJ requirements)
     b. Facilities without Life Safety Generator shall require (24) hours of normal standby operation and five (5) minutes of normal alarm signaling condition. (Subject to AHJ requirements).
  3. Batteries shall be dated with month and year of installation in the system.
  4. Locate dedicated battery cabinets below the fire alarm control panel.
     a. Do not locate above finished ceilings.
- System Design Parameters:
  1. Each power supply, initiating device circuit, audible signaling appliance circuit, visual signaling appliance circuit, power supply and standby battery system shall have a minimum 25% spare capacity included.
  2. Each analog/addressable device initiating loop circuit shall have a minimum 25% spare capacity included.
  3. Class B Device Loops: Each analog/addressable device initiating loop circuit shall incorporate isolation detector bases and/or loop fault isolation modules, placed at a minimum of every thirty (30) devices on the device loop, and whenever the device loop leaves or enters the Main Building from the Temporary Classrooms.
  4. Class B Device Initiating Loop Circuits:
     a. The analog/addressable device loop circuit shall be power limited, electronically supervised and shall be monitored for active (short), trouble (open), and ground fault conditions.

   b. The analog/addressable loop circuit shall provide all power, signaling and polling communications to the analog detectors and addressable modules connected to it, and shall monitor all sensors for their analog values, environmental compensation levels, and maintenance conditions. The analog/addressable device loop circuit shall monitor all devices for trouble and alarm conditions, and shall be capable of allowing branch circuits (T-Taps).
   c. Occurrence of a single ground condition shall place the circuit in trouble mode; but shall not disable any device from initiating an alarm or trouble signal to the fire alarm control panel.
   d. The analog/addressable device loop circuit shall be Class B (Style 4) type.
5. A separate analog addressable device initiating loop circuit is required for the security monitoring and control devices in the system.
   a. Originate from a loop module board that is separate and isolated from the fire alarm device initiating loop circuit module boards.
6. Class B Signaling Appliance Circuits:
   a. The alarm signaling appliance circuits shall be power limited, electronically supervised, and shall be monitored for trouble (open and/or short) and ground fault conditions.
   b. Occurrence of a single ground condition shall place the circuit in trouble mode, but shall not disable that circuit from signaling the alarm condition (audible or visual) to the field signaling appliances.
   c. The alarm indicating appliance circuits shall provide all power for the audible and visual signaling appliances, and shall by Style Y (Class B).
7. Audible and Visual Signaling Appliance Circuits:
   a. Provide audible and visual signaling appliance circuits, such that the visual signaling appliances continue to flash until the fire alarm control panel has been reset, even though the audible signaling appliances have been silenced.
8. Duct smoke detectors shall be intelligent sensors and shall report Supervisory Condition not alarm.
9. All Fire Alarm systems shall be programmed to disable horns and strobes with Z99 on small systems and Z231 on larger system. This will not affect dialer signals.

- Fire Alarm System Sequence of Operation
  1. Alarm Sequence of Operation: Operation of any alarm initiating devices shall automatically:
     a. Sound local audible signal and display red common alarm LED.
     b. Sound audible signaling appliances throughout the building.
     c. Flash visual signaling appliances throughout the building.
     d. Indicate the device in alarm on the fire alarm control panel and remote annunciator.
     e. Indicate the location of alarm zone on fire alarm control panel and remote annunciator.
     f. Transmit alarm signal to Metasys and central station receiver.
     g. Release door hold open devices throughout the building.

h. Shutdown HVAC units throughout the building, where applicable. This operation does not occur on a manual station alarm signal.
i. Transmit signal to building elevator control equipment to initiate return to main floor or alternate floor, when applicable.
j. Manual acknowledge function at the fire alarm control panel silences local audible alarm. Visual alarm condition is displayed until alarm condition is restored and panel is reset.

2. Waterflow Alarm Sequence of Operation: Operation of any waterflow alarm initiating devices shall automatically:
   a. Sound local audible signal and display red common alarm LED.
   b. Sound audible signaling appliances throughout the building.
   c. Flash visual signaling appliances throughout the building.
   d. Indicate the device in alarm on the fire alarm control panel and remote annunciator.
   e. Indicate the location of alarm zone on fire alarm control panel and remote annunciator.
   f. Transmit waterflow signal to Metasys and central station receiver.
   g. Release door hold open devices throughout the building.
   h. Shutdown HVAC units throughout the building, where applicable.
   i. Sound/flash dedicated exterior mounted waterflow sprinkler horn/strobe.
   j. Manual acknowledge function at the fire alarm control panel silences local audible alarm. Visual alarm condition is displayed until alarm condition is restored and panel is reset.
3. Supervisory Sequence of Operation: Operation of any sprinkler valve tamper or other supervisory type device shall automatically:
   a. Sound local audible signal and display yellow common supervisory LED.
   b. Indicate the device in supervisory on the fire alarm control panel and remote annunciator.
   c. Indicate the location of supervisory zone on the fire alarm control panel and remote annunciator.
   d. Transmit supervisory signal to Metasys and central station receiver.
   e. Manual acknowledge function at the fire alarm control panel silences local audible alarm. Visual supervisory condition is displayed until supervisory condition is restored.
4. Duct Smoke Detector Sequence of Operation: Operation of any duct smoke detector shall automatically:
   a. Sound local audible signal and display yellow common supervisory LED.
   b. Indicate the device in supervisory on the fire alarm control panel and remote annunciator.
   c. Indicate the location of supervisory zone on the fire alarm control panel and remote annunciator.
   d. Transmit supervisory signal to Metasys and central station receiver.
   e. Shutdown HVAC unit(s) associated with the duct smoke detector.
   f. Close smoke/fire damper(s) associated with the specific HVAC system ductwork.

g. If the duct smoke signal is from a smoke/fire damper, shutdown the associated HVAC unit(s) and all other smoke/fire damper(s) associated with the specific HVAC system ductwork.
h. Manual acknowledge function at the fire alarm control panel silences local audible alarm. Visual supervisory condition is displayed until supervisory condition is restored.

5. Security Sequence of Operation: Operation of any security detection type device shall automatically:
   a. Transmit security signal to Metasys.
6. Trouble Sequence of Operation: The entire fire alarm system wiring shall be electrically supervised to automatically detect and report trouble conditions to the fire alarm panel. Any opens, grounds, disarrangement of system wiring on alarm or security initiating circuits, opens, shorts, grounds, or disarrangement of system wiring on alarm indicating circuits, or device trouble or maintenance conditions, shall automatically:
   a. Sound local audible signal and display yellow common trouble LED.
   b. Indicate the device in trouble on the fire alarm control panel and remote annunciator.
   c. Indicate the location of trouble condition, as applicable, on the fire alarm control panel and remote annunciator.
   d. Transmit trouble signal to Metasys and central station receiver.
   e. Manual acknowledgement function at the fire alarm control panel silences local audible signal. Visual trouble condition is displayed until the trouble condition is restored.
7. Alarm Reset: System remains in alarm mode until alarm condition is restored and fire alarm system is manually reset. System resets only if initiating circuits are out of alarm.
   a. Alarm Silence: System audible and visual signaling appliances remain sounding/flashing until the fire alarm system is manually silenced. Visual signaling appliances remain flashing until the fire alarm system is manually reset as described above. System audible and visual signaling appliances shall resound/flash upon re-activation of alarm silence function.
8. Lamp Test: Manual lamp test function causes alarm indication of each alarm, trouble and/or system LED at the fire alarm control panel (and remote annunciator) upon activation of key-accessible lamp test function. Alarm indication of LEDs shall turn off upon re-activation of lamp test function, or upon automatic time-out.

END SECTION 28 31 00

28 31 23 Fire Detection and Alarm Annunciation Panels and Fire Stations - August 19, 2005

- Work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
- See Data, Communications, and Alarm Diagram
- Remote Annunciators:
  1. Alpha Numeric Annunciators:
     a. Remote alpha numeric annunciators shall be located throughout the facility.
     b. Operate from system 24vDC, battery back up, and shall contain a supervised, backlit, liquid crystal display (LCD) with a minimum of four lines with twenty characters per line.
     c. Each annunciator shall be capable of supporting custom messages similar to the main fire alarm control panel display.
  2. Graphic Display Map
     a. Layout maps of the system shall be located at the fire alarm control panel and at the fire alarm annunciator panels.
     b. Graphical representation of the building layout with fire alarm devices and system ID numbering indicated.
     c. Frame behind clear lexan to be readily modifiable to incorporate future changes in the buildings function.
- Intelligent Analog/Addressable Initiating Devices
  1. UL Listed for Fire Protective Use.
  2. Capable of full digital communications using polling protocol, and individually addressable.
     a. Separate means of displaying communication and alarm status.
     b. As a minimum, each detector shall have a flashing LED to indicate communication status, and a red LED to indicate alarm status of the detector.
     c. Capable of providing pre-alarm and alarm signals, in addition to normal, trouble and need for cleaning information.
     d. Individually programmed to operate at any one (1) of five (5) sensitivity levels, and capable of being programmed for different sensitivities during day/night periods; which allows the detector to be more sensitive during unoccupied periods, when lower ambient background conditions are expected.
     e. Each detector shall be provided with an environmental compensation feature, which will adjust the detector's compensation value to counteract the impacts of temperature, humidity, other contaminants, as well as detector aging.
     f. The individual detector's environmental compensation feature shall update itself, as a minimum, once every twenty-four (24) hours.
     g. The detector shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value.
  3. Ionization smoke detectors are prohibited in District facilities.

END SECTION 28 31 23

28 31 33 Fire Detection and Alarm Interfaces - August 19, 2005

- Work in this section is restricted to specific products of specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
- See Data, Communications, and Alarm Diagram
- Dialer: Digital Alarm Communicator Transmitter (DACT) that shall transmit any control panel off normal condition, including Alarm, Waterflow, Supervisory or Trouble.
  1. Radionics Model D2071A, or District approved equivalent.
  2. The DACT shall utilize two (2) phone lines to comply with NFPA 72 requirements, and shall utilize a BFSK2300 communication format.
  3. The fire alarm system shall be interfaced into the District's Central Reporting System (Metasys), as follows:
     a. The District shall provide the Metasys integrator (for Simplex systems) or the replacement serial interface boards (for Notifier or Johnson Controls systems), and shall provide all costs associated with reprogramming the District Metasys system, and the reprogramming of the particular system, where applicable.
     b. The Contractor shall provide all raceway, bridle rings, cabling, equipment power, and costs for the original fire alarm system programming.
     c. Both hard copy and electronic copy of the original fire alarm system programming are required.
  4. Off Normal Relay Contacts: Provide separate alarm, waterflow, trouble, and supervisory Form "C" relay contacts rated at 120vAC at 1 Amps inductive load, for interconnection to a Central Station transmitter, or other District purpose.
- Fire Alarm Control Panel:
  1. Coded "self-test" test feature, capable of audible or silent testing.
     a. The "self-test" test feature shall signal alarms and troubles during the test, and shall allow receipt of alarms and programmed operations for alarms from other areas not under "self-test".
  2. Internal system diagnostics and maintenance user interface controls to display and/or report the power, communications, and general status of specific panel components, detectors, and modules.
     a. Provide device loop controller diagnostics to identify common alarm, trouble, ground fault, and Class A fault conditions.
  3. Allow the user to display/report the condition of the analog addressable detectors, with analog sensitivity reading, and shall allow the user to report history for alarm, supervisory, monitor, trouble and restore activity on the system, with time date stamp.
  4. Allow the user to disable/enable devices, zones, actions, and sequences and activate/restore outputs, actions, and sequences and allow the user to service the time and date of the system, and to change passwords for users.
     a. All these features shall be password protected.
  5. Program to District standards for specific general alarm functions, and other common operating functions, as defined by the District's Fire Alarm Maintenance Group.
     a. Failure to follow District standards shall be cause to reprogram the system to District standards, at contractor's expense.
- Remote Relays

1. Remote control relays connected to supervised ancillary circuits for control of HVAC units, smoke/fire dampers, door releases, elevator controls, and other uses.
2. Relay coils shall have a diode across its coil for polarity reversal purposes and contacts rated for its interconnected load.
3. Provide load suppression devices, as required.

- Heavy Duty Remote Relays:
  1. Remote control relays connected to supervised ancillary circuits for control of HVAC units, smoke/fire dampers, door releases, elevator controls, and other uses.
  2. Relay coils shall have a diode across its coil for polarity reversal purposes and contacts rated for its interconnected load.
  3. Provide load suppression devices, as required.
- Electromagnetic Door Holders:
  1. Wall mounted electromagnetic door holder/release rated at 120vAC input, with a minimum holding force of 25 Lbs.
  2. Mount to a heavy duty electrical box with reinforced supports to withstand 80 lbs of pulling force.

END SECTION 28 31 33

28 31 43 - Fire Detection Sensors - August 19, 2005

- Work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
- See Data, Communications, and Alarm Diagram.
- Heat Detector, Fixed Temperature/Rate-of-Rise:
  1. Intelligent analog/addressable combination fixed temperature/rate of rise heat detector with a nominal alarm point rating of 135 degrees F, and a rate of rise alarm point of 15 degrees F per minute.
  2. Incorporate a low mass thermistor heat sensor and shall operate at a fixed temperature and/or at a temperature rate-of-rise.
  3. Continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to report an alarm condition, and shall be rated for ceiling or wall mount installation.
  4. Mount to any approved mounting bases, and shall be suitable for operation in the following environment:
     a. Temperature: 32 degrees F to 100 degrees F
     b. Humidity: 0-93% RH, non-condensing
     c. Elevation: No limit
     d. Locate fire detection sensors per NFPA 72 guidelines
  5. Kiln areas: Non addressable fixed temperature heat detector, rated at 200 degrees F with two alarm contacts; One for the fire alarm system to monitor and one for direct hardwire shutdown of the kiln.

END SECTION 28 31 43

28 31 46 - Smoke Detection Sensors - August 19, 2005

- Work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
- See Data, Communications, and Alarm Diagram.
- Intelligent Modules - General
    1. System modules shall be capable of full digital communications using polling protocol, and shall be individually addressable.
    2. The modules shall have a separate means of displaying communication and alarm status.
    3. As a minimum, each module shall have a flashing LED to indicate communications status, and a red LED to indicate alarm or active control status of the module.
    4. The modules input and output circuit wiring shall be supervised for opens and ground faults, and shall be suitable for operation in the following environment:
        a. Temperature: 32 degrees F to 120 degrees F
        b. Humidity: 0-93% RH, non-condensing
        c. Elevation: No limit
    5. Intelligent modules must be mounted at a height accessible from a 6’ ladder on the finished floor.
    6. Do not mount intelligent modules above finished ceilings.
        a. If intelligent modules must be placed above the ceiling, label the adjacent ceiling tile grid T-Bar with engraved plastic laminate label, with device ID address, and circuit function.
    7. Provide a separate addressable monitor module for each set of conventional projected beam smoke detectors.
- Photoelectric Smoke Detector:
    1. Intelligent analog/addressable photoelectric smoke detector.
    2. Light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings, and shall continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging and humidity.
    3. Stable, solid-state, photoelectric smoke detector capable of detecting visible products of combustion.
    4. Self-compensating circuitry to protect its stability against the effects of aging, dust and film accumulation.
    5. Rated for ceiling or wall mount installation, and for operation in constant air velocities from 0-5,000 ft/min.
    6. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five (5) sensitivity settings, ranging from 1.0% to 3.5%.
    7. Protect the measuring chamber from damage and insects.
    8. Safeguard and protect circuitry against electrical transients, electromagnetic interference, and polarity reversal.
    9. UL listed compatible 2-wire with common power supply and signal circuits.
    10. Tamper resistant with adjustable sensitivity
    11. Suitable for mounting to a standard electrical box or trim ring.
    12. Locate detectors per NFPA 72 guidelines.

- Multisensor (Photoelectric/Heat) Detector:
  1. Intelligent analog/addressable multisensor (photoelectric and heat) smoke detector.
  2. Utilize a light scattering type photoelectric smoke sensor and a fixed temperature type heat sensor to sense changes in air samples from its surroundings, and continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging, and humidity.
  3. Employ time-based algorithms to dynamically examine values from both sensor elements simultaneously, and initiate an alarm signal based on that data.
  4. Rated for ceiling or wall mount installation, and shall be rated for operation in constant air velocities from 0-5,000 ft/min.
  5. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five (5) sensitivity settings, ranging from 1.0% to 3.5%, and shall have a fixed temperature alarm set point of 135 degrees F nominal.
- Where acceptable to the Owner, a separate intelligent analog/addressable photoelectric smoke detector and a separate intelligent analog/addressable combination fixed temperature/rate of rise heat detector shall be an acceptable alternative.
- Projected Beam Smoke Detectors
  1. Intelligent addressable projected beam type smoke detector
  2. 24vDC type detector powered from the control panel 4-wire non-resettable smoke power, with single transmitter/receiver and a reflector.
  3. Unit shall be capable of covering distances up to 300 feet, and shall feature automatic gain control, which shall compensate for gradual deterioration from dirt accumulation on lenses.
  4. Beam detectors shall either ceiling mount or wall mount, and shall be capable of being tested using calibrated test filters.
  5. Provide a key activated remote test switch/annunciator station.
- Standard Detector Mounting Base with Trim Ring
  1. Suitable for mounting to a standard electrical box or trim ring. The standard detector base shall have the following minimum requirements:
  2. Removal of the respective smoke detector shall not affect communications with the remaining other detectors.
  3. Terminal connections shall be made on the room side of the base.
  4. The base shall be capable of supporting one (1) remote alarm LED indicator in designated locations.
- Relay Detector Mounting Base with Trim Ring
  1. Suitable for mounting to a standard electrical box or trim ring.
  2. Removal of the respective smoke detector shall not affect communications with the remaining other detectors.
  3. Terminal connections shall be made on the room side of the base.
  4. The form "C" dry relay contacts shall have a minimum contact rating of 1 Amp at 30vDC, and be listed for "pilot duty".

- Isolator Detector Mounting Base with Trim Ring
  1. Suitable for mounting to a standard electrical box or trim ring.
  2. Terminal connections shall be made on the room side of the base.
  3. The isolator base shall operate upon a short circuit condition on the device initiating loop circuit.
  4. When connected in a Class A configuration, the device initiating loop circuit shall identify an isolated circuit condition, and provide communications to all non-isolated analog/addressable devices.
  5. Following a short circuit condition, each isolator/detector shall be capable of performing an internal self-test procedure to re-establish normal operations.
- Audible Sounder Mounting Base with Trim Ring
  1. Suitable for mounting to a standard electrical box.
  2. Removal of the respective smoke detector shall not affect communications with the remaining other detectors.
  3. Terminal connections shall be made on the room side of the base.
  4. Output of the audible base shall be selectable via reversible jumper setting; allowing temporal or steady tone output signals.
  5. Output of the audible base shall be selectable via reversible jumper setting; allowing synchronized low output (94dBA) or high output (98dBA) signals.
  6. The operation of the audible sounder base shall be controlled from its respective detector.
     a. Upon alarm condition from the detector, the local audible base shall signal a local alarm condition, while other audible bases remain silent.
  7. The operation of the audible sounder base shall be capable of allowing group signaling of selected audible bases.
- Photoelectric Duct Smoke Detector
  1. Intelligent device with auto-sensitivity testing.
  2. Stable, solid-state, photoelectric duct smoke detector capable of detecting visible products of combustion.
  3. Self-compensating circuitry to protect its stability against the effects of aging, dust and film accumulation.
  4. Protect the measuring chamber from damage and insects.
  5. Safeguard and protect circuitry against electrical transients, electromagnetic interference, and polarity reversal.
  6. Variations in air duct velocity between 400 and 4,000 CFM shall not cause false alarms.
  7. Mount the duct detector head in an enclosure suitable for mounting to an air duct.
  8. Provide an air sampling tube that extends into the air duct stream, with a minimum length of at least 75% the width of the duct being covered.
  9. UL listed compatible power supply and signal circuits.
  10. Adjustable sensitivity
  11. Locate duct detectors per NFPA 72 and NFPA90A guidelines.

- Duct Detector Housing
  1. Assemblies to facilitate mounting an intelligent analog/addressable photoelectric smoke detector, with a standard, relay, or isolator mounting base without trim ring.
  2. Protect the measuring chamber from damage and insects, and provide an air exhaust tube and an air sampling inlet tube, which extends into the duct air stream, a minimum length of 75% of the duct width being covered.
  3. Air sampling inlet tube to cover duct widths up to ten (10) feet.
  4. Suitable for use on ductwork with an airflow velocity of 300-4,000 ft/min.
- Remote Duct Detector Test Station
  1. To facilitate testing of an intelligent duct smoke detector's programmed actions and sequences.
  2. Key-operated, shall feature a red alarm LED, and shall mount to a standard electrical box or trim ring.
  3. When the key is in the "TEST" position, it shall not be possible to remove the key; the alarm LED shall light to indicate that the duct detector is in alarm, and all programmed functions shall occur.
  4. Upon system reset, the "TEST" condition shall clear and the system returns to normal.
  5. Mount remote test station in the nearest corridor location in the ceiling or wall.
  6. Identify the remote test station with the associated device ID number it controls, and the associated HVAC unit identification.
     a. Indicate location of duct smoke detector if remote test station is not located in the direct vicinity of the associated duct smoke detector.

END 28 31 46

28 31 53 – Fire Alarm Initiating Devices - August 19, 2005

- Work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
- All conventional initiating devices shall be UL Listed for Fire Protective Use.
- See Data, Communications, and Alarm Diagram
- Input Module
  1. Intelligent addressable single or dual input module.
  2. Mount to a standard electrical box or trim ring, and provide supervised Class B circuit capable of supporting the following circuit types:
     a. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
     b. Normally-Open Alarm Delayed Latching (Waterflow Switches)
     c. Normally-Open Active Non-Latching (Monitors, Fans, Dampers, Doors, etc.)
     d. Normally-Open Active Latching (Supervisory, Tamper Switches)

- Single Input Signal Module
  1. Intelligent addressable single input signal module.
  2. Mount to a standard electrical box or trim ring, and provide one (1) supervised Class B output circuit, capable of supporting the following circuit types:
     a. Audible Indicating Appliance Circuit, polarized, rated at 24vDC at 2 Amps
     b. Visual Indicating Appliance Circuit, polarized, rated at 24vDC at 2 Amps
     c. Audible Indicating Appliance Circuit, polarized, rated at 25vRMS at 50 Watts
     d. Audible Indicating Appliance Circuit, polarized, rated at 70vRMS at 35 Watts
     e. Firefighter's Telephone Circuit with internally generated "Ring Tone"
- 2-Wire Smoke Interface Module
  1. Intelligent addressable 2-wire smoke interface module.
  2. Mount to a standard electrical box or trim ring, and provide a means to interface UL Listed 2-wire compatible non-addressable photoelectric smoke detectors to the one (1) supervised input circuit, capable of supporting the following circuit types:
     a. Supervised Class B 2-wire Smoke Alarm Verified
     b. Supervised Class B 2-wire Smoke Alarm Non-Verified
     c. Supervised Class A 2-wire Smoke Alarm Verified
     d. Supervised Class A 2-wire Smoke Alarm Non-Verified
- Control Relay Module
  1. Intelligent addressable control relay module.
  2. Mount to a standard electrical box or trim ring, and provide one (1) Form "C" dry relay contact, rated at 2 Amps at 24vDC or 0.5 Amps at 120vAC; to control external appliances or equipment shutdown.
  3. Rated for "pilot duty" and releasing systems, and shall provide confirmation of the position of the relay contact by the system software.
- Fault Isolation Module
  1. Intelligent fault isolation module.
  2. Mount to a standard electrical box or trim ring, and be capable of isolating and removing a fault from a Class A device initiating loop circuit, while allowing the remaining device initiating loop circuit to continue operating.
- Intelligent Manual Station
  1. Intelligent addressable manual station.
  2. Non-coded double action type, red in color, and individually addressable.
  3. Key to reset
- Manual Pull Station
  1. Surface mounted non-coded type, double action type manual station.
  2. Red in color, furnished with terminal blocks or wire leads for wiring interconnect
  3. Key to reset

END SECTION 28 31 53

28 31 63 – Fire Alarm Integrated Audio/Visual Evacuation Systems - August 19, 2005

- Work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Services Department.
- Indicating appliances shall be UL Listed for Fire Protective Service.
- See Data, Communications, and Alarm Diagram
- Visual signaling appliances (strobes) or combination appliances with strobes shall be capable of providing the "Equivalent Facilitation" allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADAAG), and shall be UL1971 listed.
- Appliances – General
    1. Screw Terminals for wiring interconnect
    2. Mount to standard electrical box or trim ring
        a. Extension ring for speakers
    3. Locate per NFPA 72 and ADAAG
- Strobes
    1. Standard, synchronized, 24vDC, red strobe unit with flash outputs.
- Mini-Horns and Mini-Horn/Strobes
    1. 24vDC, red electronic mini-horn, with a sound rating of 91dBA.
- Horns and Horn/Strobes
    1. 24vDC, red electronic horn, with a selectable low or high dBA output, capable of producing a sound rating of 100dBA
    2. Selectable steady or temporal output.
- Speakers and Speaker/Strobes
    1. 4 inch round, white, 70vRMS speaker, capable of producing a sound rating from 81dBA to 90dBA.
    2. UL Listed for fire signaling applications
    3. Multiple wattage tap settings of ¼, ½, 1 and 2 watts.

END SECTION 28 31 63