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FIRE ALARM INSTALLATION AND VERIFICATION – FIELD GUIDE

This document is intended to provide a practical contractor guide related to fire alarm installation and verifications for use in the field. This document is not intended to outline all fire alarm system requirements but rather to help with preparation for a fire alarm verification, explore time saving techniques and to identify common installation mistakes. Frequently the costs for fire alarm verification are billed directly to the installing contractor and can be quite costly. It is in the contractor's best interest to perform the verification as efficiently as possible to minimize costs and engineering fees.

This document is published as a public service. It is not intended to replace professional engineering advice. Please contact 908 Engineering for any additional clarification.

PREPARATION REQUIREMENTS FOR A FIRE ALARM VERIFICATION:

Any time prior to verification start, the contractor should complete the following:

- Hire and coordinate a manufacturer's fire alarm technician capable of programming the main fire alarm panel.
- Fully install all fire alarm components and wiring.
- Fully program the main fire alarm panel with all device descriptors.
- Identify major fire alarm zones and program the zone LEDs into the fire alarm panel.
- Clear any existing ground, short or open faults.
- If applicable, hook up any outside monitoring. If this work is outside the electrical contractor scope, the owner should be made aware of the monitoring requirements.
- Coordinate an appropriate verification date and time with the engineer
- Fully charge the fire alarm / booster panel batteries
- Device dust covers can be left on until the day of verification

At least 24 hours prior to the verification, the contractor should complete the following:

- Fire alarm panel should be ON, all clear, and fully charged
- Outside monitoring should be installed and active
- Turn OFF breaker serving the fire alarm panel. Verification needs to be performed on battery power only.
- If applicable, notify any building occupants or other contractors of the pending verification

On the day of the verification, the contractor should complete the following:

- Arrange for two 2-way radios (charged and ready) if not provided by the technician
- Contact the monitoring company and / or fire department and put the system on 'TEST'
- Arrange for access to all areas to be included as part of the fire alarm verification
- Have all tools, lifts, ladders, test smoke, heat source (hair dryer), keys, magnets, extension cords, etc. to facilitate verification of every device on site
- At least one electrician (in addition to the fire alarm technician) will need to be present
- If applicable, arrange to have a sprinkler representative present during the verification
- If applicable, arrange to have an elevator representative present during the verification

TIME (MONEY) SAVING TECHNIQUES:

Although not absolutely necessary, the following are some techniques to save substantial verification time and money:

- During the verification, mounting devices after verification can take significant extra time. One additional electrician following behind the verification can greatly improve efficiency.
- If you run into unexpected delays or problems the morning of the verification, call the engineer ASAP! The verification can usually be delayed at a moment's notice for no additional cost. There is NO value in having the engineer watch you troubleshoot.
- Don't wait until the day of verification to power on the fire alarm panel for the first time. Even if programming isn't scheduled until later, a non-programmed panel will show many unconfigured devices but will also show ground, short or open faults. You can clear the faults well before the verification. Troubleshooting ground, short and open faults can potentially be the most time consuming part of a fire alarm installation. Troubleshooting while an engineer is present is very costly and unnecessary.
- If it is not possible to power up and program the panel before the verification, you can easily check for open, ground and short faults with a standard multimeter. You do not need the panel to start troubleshooting.
- For devices that take time to unmount, leave them hanging by their wires prior to the verification (ie. piezos, EOL resistors, pull stations and selected horn/strobes).
- Use your multimeter. Common / Normally Open / Normally Closed wires on sprinkler valves and dry chemical systems can be quickly confirmed. Short circuits or ground faults on data or bell circuits are easily identified; even without the panel connected. EOL resistors are instantly defined. Don't wait until the day of verification to identify something your multimeter could have done days or weeks ago.
- Ideally, the panel should be fully programmed and operational a day or two prior to the verification. For larger complex projects, it is not reasonable to program, troubleshoot and verify all on the same day. For simple projects, you can program and verify on the same day, but the multimeter troubleshooting tips above should be followed to minimise unexpected troubleshooting delays.

- If the fire alarm panel is to be programmed on the same day as the verification, make sure there are allowances for this time prior to engaging the engineer. On simple projects, you can expect to have 1-2 hours of programming prior to starting the verification. Do not schedule the engineer to show up at the same time as the technician.
- Although it is not reasonable to test every device prior to the verification, a few quick spot-checks will go a long way to identify potential problems. Check for an open fault at an end-of line resistor. Pull a manual pull station and walk around to make sure all the horn/strobes are functioning. It really doesn't take much time

COMMON ERRORS:

These are the most common errors experienced with fire alarm verifications:

- Scheduling the Engineer and Technician to arrive at the same time. Programming and setup take time. Always schedule the engineer to arrive AFTER the technician.
- Not calling the engineer if you have troubleshooting issues. Sometimes troubleshooting is inevitable. Call the engineer to delay the verification until everything is working.
- Waiting until the day of verification to power up the panel. Even non-programmed panels can be powered up well before the verification.
- Fixing problems during the verification that could have been identified with a simple multimeter test.
- Ground / bonding conductors. Use ground conductors! EMT grounding is very unreliable. 3 / 5 conductor securex is only pennies more per foot than 2 / 4 conductor. Every box needs a bond. Free-air wire grounding/bonding is not acceptable.
- Boxes. Almost every device needs a standard electrical box. Make sure that the device AND wiring have ample space within your selected box. Don't underestimate the size of fire alarm equipment.
- Class 'A' (full loop back to the panel) wiring vs Class 'B' (one-way with EOL resistor) wiring. Generally speaking, data circuits should be Class 'A', bell circuits can be Class 'A' OR Class 'B'
- Wire gauges. Generally, all data circuits should be 18 gauge. All bell circuits (except for small piezos) should be at least 14 gauge or even 12 gauge.
- T-Tap wiring. Don't do it. All wiring should be IN and OUT.
- Exposed fire alarm wiring, including above t-bar ceiling, needs to be in conduit or armoured. Only concealed wiring within wood walls can be run free air.
- End-Of-Line resistors need their own box. Don't put the EOL resistor on a device.
- Keep a consistent wire polarity colour convention throughout your project in every JB. Suggested colours (contractor discretion)
 - RED / BLACK = IN
 - BLUE / BROWN = OUT or RETURN
 - GREEN = GROUND
 - BLACK / BROWN = NEGATIVE
 - RED / BLUE / WHITE = POSITIVE

- When monitoring systems are in place, the monitoring agent should be monitoring for TROUBLE and ALARM signals. Ideally, they should also be monitoring for ground and supervisory conditions as well.
- Overloading bell circuits. Check with the manufacturer for the maximum number of audible devices on a circuit.
- Sprinkler device cover switches. The cover switch needs to be wired AFTER the supervisory / alarm switch:

