Managing the Documentation

by Dean K. Wilson, P.E.

Question: **I work in the plans examiner's office for a large county government in the Midwest. I recently received the specifications for a fire alarm system at a large manufacturing facility. Among the requirements, the engineer included these words: "The contractor shall provide an electronic version of all plans and specifications, equipment date sheets, wiring diagrams, equipment installation manuals, wire number sheets, Record of Completion, acceptance testing results, and all other pertinent documentation for this system and shall make provision for a permanent, off-site backup for this critical documentation." How common is such a requirement and do you see any value to such stringent demands?**

I applaud the engineer who has written such a comprehensive requirement. This individual recognizes the importance of retaining all of the information necessary to properly inspect, test, and maintain the fire alarm system throughout the operational life of the system. This engineer also realizes that so often the critical documentation for a fire alarm system becomes lost. That explains why he or she has insisted on an off-site backup for this data.

An obvious strategy would use a scanner to capture all hard-copy documentation. The person preparing the documentation could add this scanned data to electronic versions of all other plans—likely using computer-aided-drafting (CAD) drawings—to form a complete file. He or she

might also employ a database to keep track of unique identifiers for each piece of documentation and to allow speedy access to particular details.

As far as requirements in NFPA 72-2010, *National Fire Alarm and Signaling Code*®, please take note of the following sections:

> **10.18 Documentation.**
>
> **10.18.1 Approval and Acceptance.**
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> **10.18.1.1** The authority having jurisdiction shall be notified prior to installation or alteration of equipment or wiring.
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> **10.18.1.2*** At the authority having jurisdiction's request, complete information regarding the system or system alterations, including specifications, type of system or service, shop drawings, input/output matrix, battery calculations, and notification appliance circuit voltage drop calculations, shall be submitted for approval.
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> **A.10.18.1.2 Shop Drawings.**
>
> *General.* Shop drawings for fire alarm systems should provide basic information and should provide the basis for the record drawings required elsewhere in this Code.
>
> *Content.* Shop drawings should include, to an extent commensurate with the extent of the work being performed, floor plan drawings, riser diagrams, control panel wiring diagrams, point-to-point wiring diagrams, conduit, conductor routing, typical wiring diagrams, and other information as described herein. All shop drawings should be drawn on sheets of uniform size and should include the following information:
>
> (1) Name of protected premises, owner, and occupant (where applicable)
>
> (2) Name of installer or contractor
>
> (3) Location of protected premises
>
> (4) Device legend in accordance with NFPA 170, *Standard for Fire Safety and Emergency Symbols*
>
> (5) Date of issue and any revisions.
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> Floor plan drawings should be drawn to an indicated scale and should include the following information:
>
> (1) Floor identification
>
> (2) Point of compass (indication of north)
>
> (3) Graphic scale

(4) All walls and doors

(5) All partitions extending to within 10 percent of the ceiling height (where applicable)

(6) Room descriptions

(7) Fire alarm device/component locations

(8) Locations of fire alarm primary power connection(s)

(9) Locations of monitor/control interfaces to other systems

(10) Riser locations

(11) Type and number of fire alarm system components/devices on each circuit, on each floor or level

(12) Type and quantity of conductors and conduit (if used) used for each circuit

(13) Location of all supply and return air diffusers (where automatic detection is used) Fire alarm system riser diagrams should include the following information:

(1) General arrangement of the system in building cross-section

(2) Number of risers

(3) Type and number of circuits in each riser

(4) Type and number of fire alarm system components/devices on each circuit, on each floor or level

(5) Type and quantity of conductors and conduit (if used) for each circuit

Control unit wiring diagrams should be provided for all control equipment (i.e., equipment listed as either a control unit or control unit accessory), power supplies, battery chargers, and annunciators and should include the following information:

(1) Identification of the control equipment depicted

(2) Location(s)

(3) All field wiring terminals and terminal identifications

(4) All circuits connected to field wiring terminals and circuit identifications

(5) All indicators and manual controls, including the full text of all labels

(6) All field connections to supervising station signaling equipment, releasing equipment, and fire safety control interfaces Typical wiring diagrams should be provided for all initiating devices, notification appliances, remote

indicators, annunciators, remote test stations, and end-of-line and power supervisory devices.

10.18.1.3 Before requesting final approval ofthe installation, if required by the authority having jurisdiction, the installing contractor shall furnish a written statement stating that the system has been installed in accordance with approved plans and tested in accordance with the manufacturer's published instructions and the appropriate NFPA requirements.

10.18.1.4* The record of completion form, Figure 10.18.2.1.1, shall be permitted to be a part of the written statement required in 10.18.1.3. When more than one contractor has been responsible for the installation, each contractor shall complete the portions of the form for which that contractor had responsibility.

A.10.18.1.4 Protected premises fire alarm systems are often installed under construction or remodeling contracts and subsequently connected to a supervising station alarm system under a separate contract. All contractors should complete the portions of the record of completion form for the portions of the connected systems for which they are responsible. Several partially completed forms might be accepted by the authority having jurisdiction provided that all portions of the connected systems are covered in the set of forms.

10.18.1.5 The record of completion form, Figure 10.18.2.1.1, shall be permitted to be a part of the documents that support the requirements of 10.18.2.4.

10.18.2 Completion Documents.

10.18.2.1 Preparation.

10.18.2.1.1* The preparation of a record of completion, Figure 10.18.2.1.1, shall be the responsibility ofthe qualified and experienced person described in 10.4.2.

A.10.18.2.1.1 The requirements of Chapter 14 should be used to perform the installation wiring and operational acceptance tests required when completing the record of completion.

The record of completion form shall be permitted to be used to record decisions reached prior to installation regarding intended system type(s), circuit designations, device types, notification appliance type, power sources, and the means of transmission to the supervising station.

An example of a completed record of completion form is shown in Figure A.I0.18.2.1.1.

10.18.2.1.2 The preparation of a record of completion, Figure 10.18.2.1.1 shall be in accordance with 10.18.2.1.2.1 through 10.18.2.1.2.8.

10.18.2.1.2.1 Parts 1 through 14 of the record of completion shall be completed after the system is installed and the installation wiring has been checked.

10.18.2.1.2.2 Parts 15 and 16 of the record of completion shall be completed after the operational acceptance tests have been completed.

10.18.2.1.2.3 A preliminary copy of the record of completion shall be given to the system owner and, if requested, to other authorities havingjurisdiction after completion of the installation wiring tests.

10.18.2.1.2.4 A final copy of the record of completion shall be provided after completion of the operational acceptance tests.

10.18.2.1.2.5 One copy of the record of completion shall be stored at the tire alarm control unit or other approved location.

10.18.2.1.2.6 This copy shall be updated to reflect all system additions or modifications and maintained in a current condition at all times.

10.18.2.1.2.7 Where not stored at the main fire alarm control unit, the location of these documents shall be identified at the main fire alarm control unit.

10.18.2.1.2.8 If the documents are located in a separate enclosure or cabinet, the separate enclosure or cabinet shall be prominently labeled FIRE ALARM DOCUMENTS.

10.18.2.2 Revision. All fire alarm system modifications made after the initial installation shall be recorded on a revised version of the original record of completion.

10.18.2.2.1 All changes from the original information shall be shown.

10.18.2.2.2 The revised record of completion shall include a revision date.

10.18.2.3 Documentation Required. Every system shall include the following documentation, which shall be delivered to the owner or the owner's representative upon £lnal acceptance of the system:

(1)* An owner's manual and manufacturer's published instructions covering all system equipment

A.10.18.2.3(1) The owner's manual should include the following:

(1) A detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations

(2) Operator instructions for basic system operations, including alarm acknowledgment, system reset, interpretation of system output (LEDs, CRT display, and printout), operation of manual evacuation signaling and ancillary function controls, and change of printer paper

(3) A detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contract, including testing and maintenance instructions for each type of device installed. This information should include the following:

(a) Listing of the individual system components that require periodic testing and maintenance

(b) Step-by-step instructions detailing the requisite testing and maintenance procedures, and the intervals at which these procedures shall be performed, for each type of device installed

(c) A schedule that correlates the testing and maintenance procedures that are recommended by A.10.18.2.3(1)(3)(b) with the listing recommended by A.10.18.2.3(1)(3)(a)

(4) Detailed troubleshooting instructions for each trouble condition generated from the monitored field wiring, including opens, grounds, and loop failures [These instructions should include a list of all trouble signals annunciated by the system, a description of the condition(s) that causes such trouble signals, and step-by-step instructions describing how to isolate such problems and correct them (or how to call for service, as appropriate.]

(5) A service directory, including a list of names and telephone numbers of those who provide service for the system

(2) Record drawings

(3) For software-based systems, record copy of the site-speci£lc software

(4) A written sequence of operation

Now that's a lot of code text. I hope you took the time to read through it. If you did, you can clearly see that NFPA 72-2010 offers a very comprehensive list of items that a contractor should include in the documentation for a fire alarm system. I wonder how many Authorities Having Jurisdiction (AHJs) actually insist on receiving this kind of information? And, why don't they? Obviously, the integrity of the fire alarm system over its useful life depends on having this kind of information available to anyone who must inspect, test, and maintain the system. This information also becomes necessary when anyone needs to make modifications or additions to the fire alarm system.

So, again, I applaud the particular engineer who insisted on the level of documentation you have described. Now I hope that this will serve as an example to you and other AHJs for future fire alarm system submittals.

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