When Replacing Control Units, Please Test

by Dean K. Wilson, P.E.

Question: We recently had an alarm company install a new fire alarm control panel and some additional detectors and strobes in a building for which they had a contract to provide maintenance and service. This company provided a copy of the "Record of Completion" from NFPA 72-2002, *National Fire Alarm Code.* At any time during installation of a new fire panel, would the company be required by NFPA 72 to test *all* devices and appliances (pull stations, bells, and smoke detectors), existing and new?

Answer: NFPA 72-2002, *National Fire Alarm Code,* does make provision for certain testing that must be conducted whenever anyone makes changes or additions to a fire alarm system. The *Code* states these requirements in Section 10.4.1.2, which reads as follows:

> 10.4.1.2* Reacceptance Testing.
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> 10.4.1.2.1 Reacceptance testing shall be performed as required in 10.4.1.2.1.1 through 10.4.1.2.1.4.
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> 10.4.1.2.1.1 When an initiating device, notification appliance, or control relay is added, it shall be functionally tested.
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> 10.4.1.2.1.2 When an initiating device, notification appliance, or control relay is deleted, another device, appliance, or control relay on the circuit shall be operated.
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> 10.4.1.2.1.3 When modifications or repairs to control equipment hardware are made, the control equipment shall be tested in accordance with Table 10.4.2.2, items 1(a) and 1(d).
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> 10.4.1.2.1.4 When changes are made to site-specific software, the following shall apply:
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> (1) All functions known to be affected by the change, or identified by a means that

indicates changes, shall be 100 percent tested.

(2) In addition, 10 percent of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, also shall be tested and correct system operation shall be verified.

(3) A revised record of completion in accordance with 4.5.2.1 shall be prepared to reflect these changes.

10.4.1.2.2 Changes to all control units connected or controlled by the system executive software shall require a 10-percent functional test of the system, including a test of at least one device on each input and output circuit to verify critical system functions such as notification appliances, control functions, and off-premises reporting.

An item in the Annex, as denoted by the asterisk (*) following Section 10.4.1.2, offers further clarification regarding the requirements contained in that Section. This reads as follows:

A.10.4.1.2 Reacceptance testing is performed to verify the proper operation of added or replaced devices, appliances, fire safety control function devices, control equipment, and so forth. It is not the intent of the committee to unduly burden the owner with increased costs for repeated testing of devices not directly affected by the replacement of devices with like devices.

For example, if a 2-amp fuse is replaced with another 2-amp fuse in the control unit, verification of the circuit(s) served by the fused supply is required, but it would not be necessary to test 10 percent of initiating devices not directly affected by replacing the fuse. Likewise, it is not necessary to test all these initiating devices whenever a smoke detector is replaced with a like smoke detector.

When wiring changes are made to correct improperly supervised circuits, a test of the affected device or appliance is required, but not a test of 10 percent of initiating devices not directly affected.

In your case, where the contractor replaced a fire alarm system control unit, the requirements of Section 10.4.1.2.1.3 would apply. The specific tests referenced in this Section from Table 10.4.2.2, items 1(a) and 1(d), include:

(a) Functions: At a minimum, control equipment shall be tested to verify correct receipt of alarm, supervisory, and trouble signals (inputs), operation of evacuation signals and auxiliary functions (outputs), circuit supervision including detection of open circuits and ground faults, and power supply supervision for detection of loss of ac power and

disconnection of secondary batteries.

(d) Lamps and LEDs: Lamps and LEDs shall be illuminated.

Thus, the contractor should have tested the performance of all circuits connected to the new fire alarm system control unit, including tests for proper monitoring for integrity of the connected circuits, and tests of the monitoring for integrity of the primary and secondary power supplies. This would require the testing of at least one fire alarm system initiating device (detector) on each circuit, and the operation of each notification appliance circuit.

You will also want to call the contractor's attention to the specific requirements in Sections 10.4.1.2.1.1 and 10.4.1.2.1.4. The contractor should have certainly tested all new detectors and strobes. If the addition of these devices and appliances required a change to the fire alarm system site-specific software, then all functions affected the the change should have been tested, along with 10 percent of the other initiating devices, up to a maximum of 50 devices.

Some manufacturers of fire alarm system control units provide a comparator software that identifies the actual portions of the system affected by changes to the site-specific software. If the manufacturer of the particular fire alarm system control unit used at your facility has provided such comparator software, this can identify the exact components or portions of the fire alarm system that the contractor must test.

In the unlikely event that the contractor would have also changed the executive software of the fire alarm system control unit at the same time, then the contractor would also have to satisfy the requirements of Section 10.4.1.2.2.

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