Information Bulletin 12

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TESTING MULTI-CRITERIA DETECTORS

Fortifire is committed to helping our customers in being compliant, clean, green and sustainable. This fact sheet provides information to assist Fortifire technicians and property owners and their representatives to better understand their responsibilities and comply with Queensland Building Fire Safety Regulation and QDC MP6.1.

View our website www.fortifire.com.au for videos and other information.

What are Multi-Criteria Detectors

The detection performance of fire alarm systems has improved substantially with the development of multisensor/multicriteria detection technology. These detection devices are a new generation of products that derive various alarm and diagnostic criteria from a combination of input signals from sensors responding to different fire phenomena.

In a simple multicriteria detector, the signals from a photoelectric smoke sensor and a temperature sensor are combined using modern techniques of signal analysis, such as neural networks and fuzzy logic, which by far exceed commonly used simple logic. The underlying algorithms are parametrized to allow application-specific adaptation of the fire alarm system response behavior. Results from laboratory experiments and computer simulations, field tests, and a rapidly increasing number of real installations clearly demonstrate that systems using multisensor/multicriteria detection technology outperform systems that depend on single sensor inputs, such as ionization or photoelectric smoke detection or temperature sensing.

Indeed, the results show that such systems can be adapted to respond to a substantially wider spectrum of fire phenomena, such as visible/invisible and black/white smoke, aerosols, and temperature, while remaining much less sensitive to deceptive phenomena that result from cigarette smoke, welding, spray aerosols, dust, humidity, and so on. This technology not only contributes to improved life safety, it also reduces the probability of nuisance alarms.

Legislative Obligations

In Queensland, the requirement to perform inspection and testing of Automatic Fire Detection and Alarm Systems is mandated by the Queensland Development Code MP6.1 and the Queensland Building Fire Safety Regulation 2008. Building owners/occupiers have an obligation to ensure Automatic Fire Detection and Alarm Systems are inspected and tested by a QBCC Licensed Fire Contracting Company. This work is typically required to be performed in accordance with Australian Standard 1851-2012 which includes monthly, six monthly, annual, five yearly and ten yearly services. This work is required to be recorded by way of Logbooks. These test records must be stored and made available upon the request of an authorized officer.

Testing Requirements for Multicriteria Detectors

Inspection and Testing helps prove the function and operation of the Multicriteria detectors and whether their condition and location is compliant with their originally certified installation. The inspection and testing verifies there are no obstructions, area of coverage is compliant and that each element within

the device is in proper working order. Testing verifies that the LED indicator on the device is working properly and that alarm signals are transmitted to the Fire Indicator panel.

AS1851-2012 (Table 6.4.1.4) nominates annual requirements:

Item 3.8 FIRE DETECTORS

Test detectors as specified in Appendix G and confirm correct alarm zone indication.

Item 3.15 SERVICE LIFE

Inspect detectors, equipment or other items having a defined service life and report where the service life is exceeded or will be exceeded before the next scheduled service.

Item 3.17 PROTECTED AREAS SURVEY

Survey all areas of the building from floor level and check –

(a) That the fire detection and alarm system has not been altered from the approved design, damaged or compromised; and
(b) Detection device and remote indicators are appropriate for the current use; and
(c) For any condition that may cause a nuisance alarm or the unintentional operation of a suppression system; and
(d) All exposed cabling, conduits, junction boxes and the like for any condition that may impact on the performance of the system and is labelled in accordance with approved design; and
(e) All Control and Indicating Equipment to ensure all components are appropriately mounted and secure.

Appendix G

G15 MULTI-SENSORS AND COMBINED DETECTORS

G15.1 General

Multi-sensor smoke/CO detectors are primarily smoke detectors or CO fire detectors with their sensitivity enhanced by the presence of a rate or rise in temperature. This provides a faster flaming fire response, but still detects cold smoke or CO from fire. Test them as smoke or CO fire detectors in accordance with this Appendix.

Combined detectors have more than one sensor that can initiate an alarm without a signal from another sensor. If the detectors are installed on the basis of one sensor type only (e.g. smoke, CO, flame or heat), and the other sensors are supplementary, test them according to the type installed.

Where a fire detector is installed in combination with another detector as a deemed to satisfy (e.g. a combined CO and heat detector), test each sensor in accordance with its type.

If detectors are installed as an engineered solution requiring more than one sensor, then test each sensor according to the type.

NOTE: Engineered solutions may have an engineered maintenance schedule as an alternative to this Standard.

G15.2 Multi-sensors that do not respond to any one single sensor signal

If the detectors are installed as smoke or CO detectors, functionally test them with a test medium that includes components specifically designed for this type of detector.

If detectors are installed with a multi-sensor setting that cannot be verified electronically at the CIE or at the detectors, functionally test the interaction of all sensors according to the manufacturer's specified procedure.

It is important to recognise that the testing requirements must be determined on a case-by-case basis with consideration being given to the building approvals and the type of system installed.

Consideration must be given to the specified testing instructions from the manufacturer. This is especially important because the proper function of the device is likely to be dependant on the signals provided by each sensor type within the device.

The image below is an extract from a Manufacturer's Data Sheet and is provided here as an example of specified instructions for testing by the manufacturer. It is interesting to note that in this case, if the device is not tested within a specified timeframe after performing the initial magnet test, then a time delay feature remains active in the device. This may result in the technician mistakenly failing the device due to the detector not activating within a reasonable time which would not be correct.

applicable local codes, and any special requirements of the Authority Having Jurisdiction.Proper wire gauges should be used. The installation wires should be color-coded to limit wiring mistakes and ease system troubleshooting. Improper connections will prevent a system from responding properly in the event of a fire.

Remove power from the communication line before installing sensors.

1. Wire the sensor base (supplied separately) per the wiring diagram, see Figure 1.
2. Set the desired address on the sensor address switches, see Figure 2.
3. Install the sensor into the sensor base. Push the sensor into the base while turning it clockwise to secure it in place.
4. After all sensors have been installed, apply power to the control unit and activate the communication line.
5. Test the sensor(s) as described in the TESTING section of this manual.

TESTING

Before testing, notify the proper authorities that the system is undergoing maintenance, and will temporarily be out of service. Disable the system to prevent unwanted alarms.

All sensors must be tested after installation and periodically thereafter. Testing methods must satisfy the Authority Having Jurisdiction (AHJ). Sensors offer maximum performance when tested and maintained in compliance with NFPA 72.

The sensor can be tested in the following ways:

A. **Functional: Magnet Test (P/N M02-04-01 or M02-09-00)**

This sensor can be functionally tested with a test magnet. The test magnet electronically simulates smoke in the sensing chamber, testing the sensor electronics and connections to the control panel.

1. Hold the test magnet in the magnet test area as shown in Figure 3.
2. The sensor should alarm the panel.

Two LEDs on the sensor are controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, can cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED status operation and expected delay to alarm.

B. **Smoke Entry: Aerosol Generator (Gemini 501)**

The GEMINI model 501 aerosol generator can be used for smoke entry testing. Set the generator to represent 4%/ft to 5%/ft obscuration as described in the GEMINI 501 manual. Using the bowl shaped applicator, apply aerosol until the panel alarms.

For FSC-851, smoke entry testing should be performed immediately following the magnet test. Magnet test initiates an approximately 10 minute period when the detector's signal processing software routines are not active. Failure to first perform the magnet test will introduce a time delay before the detector alarms.

5. Use a vacuum cleaner and/or clean compressed air to remove dust and debris from the sensing chamber and sensing chamber cover.
6. Re-install the sensing chamber cover assembly by sliding the cover over the chamber, gently pressing it home until it snaps into place.
7. Re-install the sensor cover. Use the cover removal tabs, LEDs and thermistors to align the cover with the sensor. Snap the cover into place.
8. When all sensors have been cleaned and re-installed, restore power to the loop and test the sensor(s) as described under TESTING.

After completion of maintenance and testing, notify the proper authorities that the system is operational.

FIGURE 4:

More information

For more information, feel free to contact Fortifire via email or phone or contact Fortifire to see how we can help.

Alternatively, contact your local Queensland Fire and Emergency Services representatives to seek their advice. They prefer building owners are proactive in these matters and will assist you to ensure your building is compliant.

https://www.qfes.qld.gov.au/buildingsafety/Pages/default.aspx

NOTE: Fortifire provides a range of Fire Safety Equipment Testing and Certification Services that is automatically scheduled each year and we will also provide the required fire records.

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