

FALSE ALARM MANAGMENT

FOR

MINISTRY OF EDUCATION

PREPARED BY

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1 INTRODUCTION

On behalf of the Ministry of Education, Argest Building and Compliance have put together this easy to understand document to assist schools with the management and reduction of nuisance alarms from fire protection systems. The aim of this document is to help staff identify the common causes, and recommend ways of reducing these unwanted, disruptive, and costly incidents.

Schools are unique to other sites in many ways. There are often large areas with smoke and heat detection. There are a wide variety of contractors that often work on site. They cater for young and sometimes mischievous students. Their facilities are often used by others. The buildings can be occupied for up to eighteen hours per day.

The problem with nuisance alarms is that, after time, occupants tend to lose confidence in the system. Many occupants assume that whenever they hear a fire alarm, they can safely dismiss it as another nuisance alarm. In a given building, three nuisance alarms in one week will have a greater deterring effect than two nuisance alarms over the course of a year. If a nuisance alarm occurs in the middle of the night in a residential area, it may have a more lasting negative effect than a nuisance alarm happening in an office building on a warm sunny day. False alarms are the ones you don't expect or plan for.

This document will focus mainly on NZS4512 fire alarm systems with a small section on sprinkler systems.

2 TYPES OF EQUIPMENT

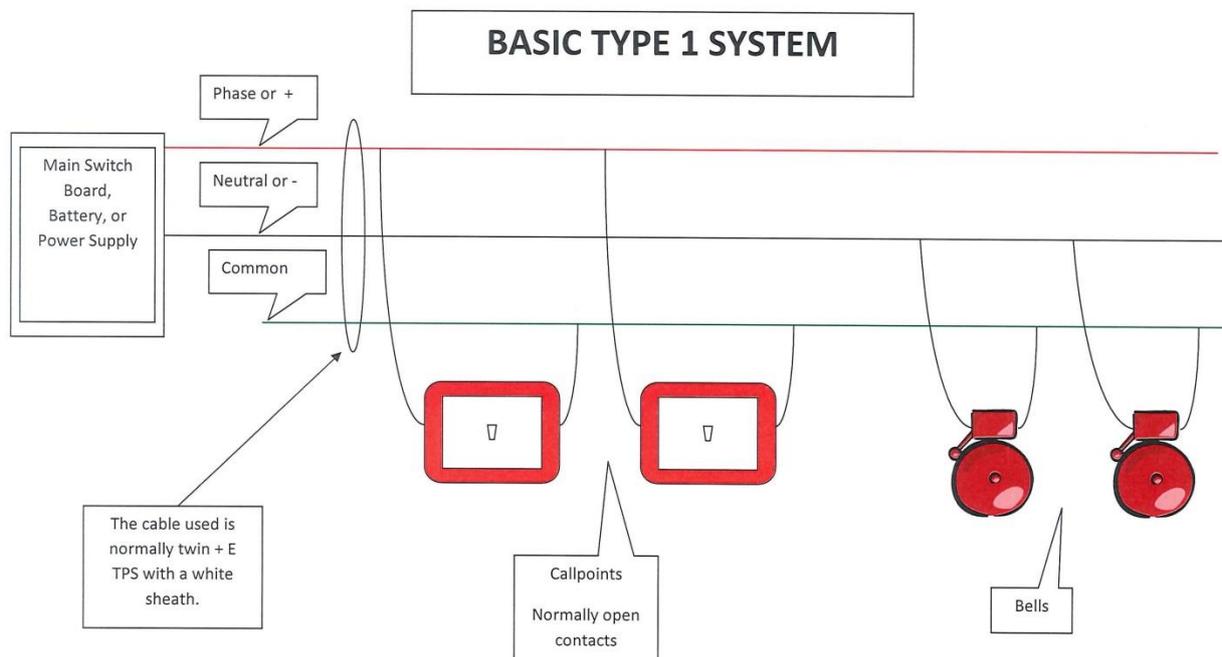
Fire Alarm Systems

Today there are four standard kinds of fire alarm systems that are commonly used in schools.

- The original class change bell system.
- The conventional alarm system used in smaller older buildings.
- The newer, better and more sophisticated analogue addressable alarm systems.
- Security system with smoke detectors (SSWS)

Class Change Bell Systems

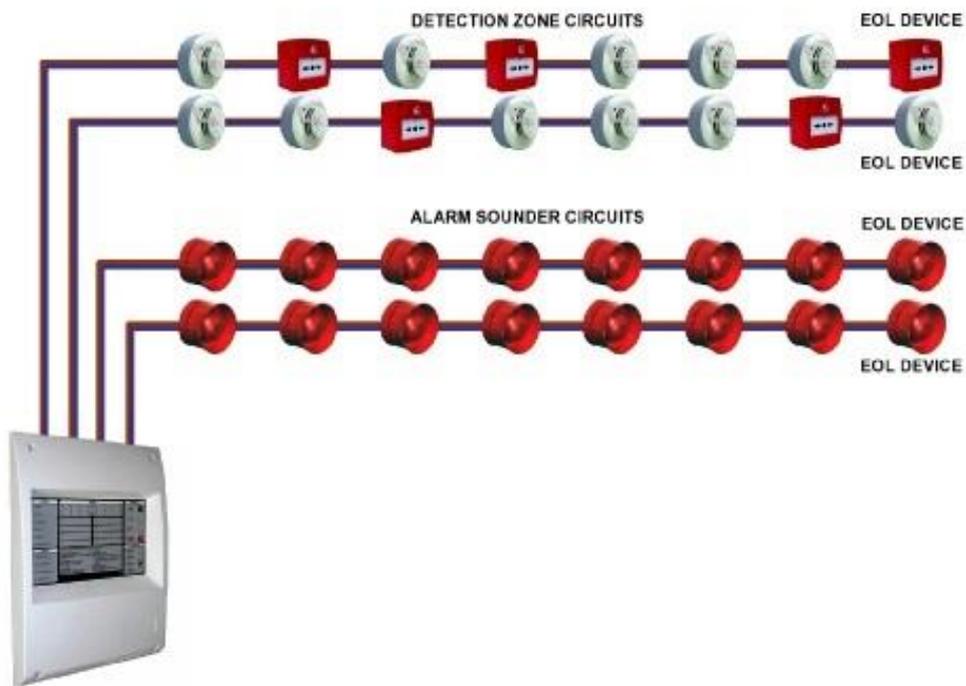
They are a basic three wire system consisting of a power supply, manual callpoints and bells. They have no fault monitoring or indicator panel to show where the callpoint was activated. Costly to repair. Prone to causing problems in wet conditions.



Conventional Systems

Conventional fire alarm systems are generally simple switches and basic heat and smoke detectors. These alarm systems can't tell the difference between a real fire and non-fire phenomena, which are often responsible for triggering these alarms from dust, water and even insects. With these conventional alarm systems, the control panel can only show the zone or circuit that activated (and sometimes faulty). They do not have the capability to identify any individual device.

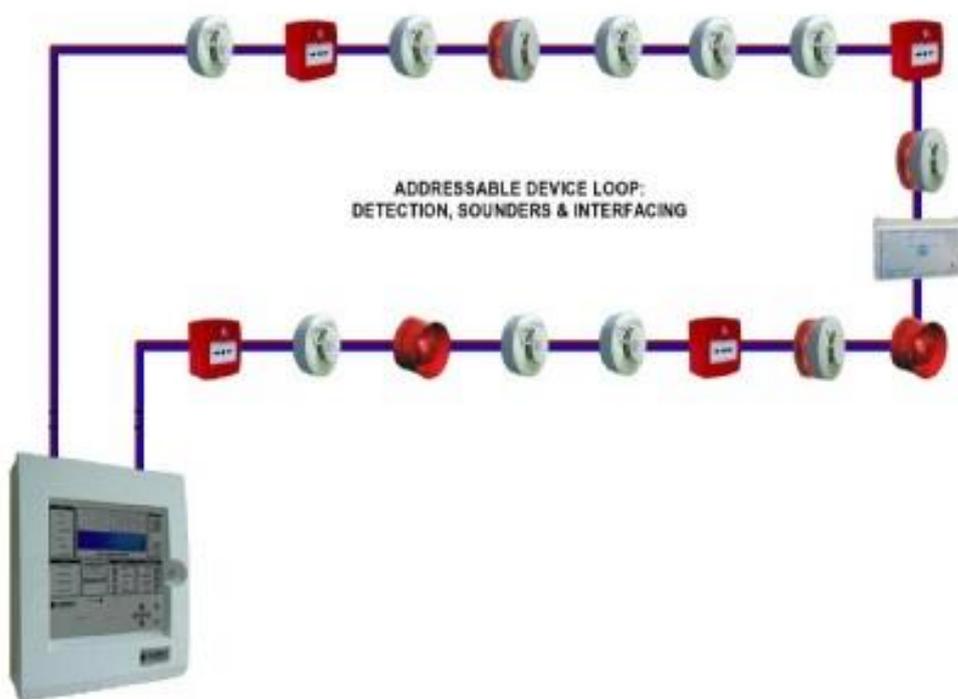
Conventional Fire Alarm System Schematic



Analogue Addressable Systems

Analogue addressable fire alarm systems have a continuous two-way communication between the main control panel and all of the detection devices in the field. Every one of these devices connected to the analogue addressable alarm system has its own individual location address in the alarm system. The advanced control power has the ability to monitor each device individually if a fire was to break out or a fault was to occur. Because of the increased intelligence they have a greater immunity to false alarms unlike conventional fire alarms. The smoke detectors in the field can also report back to the panel as they become dirty.

Analogue Addressable Fire Alarm System Schematic



Security system with smoke detectors (SSWS)

These systems were introduced to schools during the late 80s when schools were prone to arson attacks. Compliant NSZ4512 smoke detection systems were in their infancy and very costly to install. The New Zealand standard for security systems (NZS4301) did not recognize smoke detection, however the equipment was capable of having basic relay type smoke detectors connected to zones on the security control panel. In most instances this was simply one detector per room and not as per the NZS4512 standards of today.

Control Panels

The control panel is the brain of the fire alarm system and is responsible for monitoring all of devices that have been installed throughout the school. When a fire is detected the control panel has the ability to carry out a number of different activities that include:

- Sounding of all the evacuation alarms within the school.
- Notifying the Fire and Emergency New Zealand.
- Notifying other staff at the school.
- Automatically closing the fire and smoke stop doors.
- Powering up the smoke handling system.
- Starting up or shutdown ventilation systems.
- A number other facilities such as class change, PA and lockdown.

In general, Analogue Addressable systems offer the following distinct advantages:

- Pre-alarm Indication – Incidents can be investigated, and possibly resolved before the FENZ is called.
- Maintenance Alert – dirty detectors can increase false alarms, but unnecessary cleaning wastes money. Maintenance alert facilities show which detectors need cleaning.
- Individual Detector Identification – each detector is uniquely identified. A full description of a detector's precise location is displayed at the fire control panel, or on remote annunciators. This speeds the location of a fire or a fault.
- Wiring Faults – cut wires or short circuits on wiring do not generate false alarms, and are typically easier to locate.
- Adjustable Sensitivity – detectors can be tailored to its environment to give optimum sensitivity to fire phenomena and resistance to environmental influences or permitted activities.
- Multi-Sensor Detectors – multi-sensor/multi-criteria detectors use sophisticated algorithms to make them less likely to generate a false alarm, but more likely to respond promptly to a real fire.
- Networking – analogue addressable systems typically have more comprehensive processing power and large site/campus-style multi-panel networking capabilities.

The follows systems exist in todays schools:

Type 1 (basic class change bell system)

A manual bell system activated by older type manual call points.

Type 2

A manually activated fire alarm system activated by manual call points.

Type 3

An automatic fire alarm system, which is activated by both heat detectors and manual call points.

Type 4

An automatic fire alarm system, which is activated by smoke detectors and manual call points.

Type 5

This is a variation of Type 4. This particular system allows certain smoke detectors in certain fire cells to only activate a local alarm as long as such heat detectors have already been installed in the fire cells. Mainly use in accommodation. Not common in schools.

Type 6

This is an automatic fire sprinkler system combined with a Type 2 manually activated fire alarm system.

Type 7

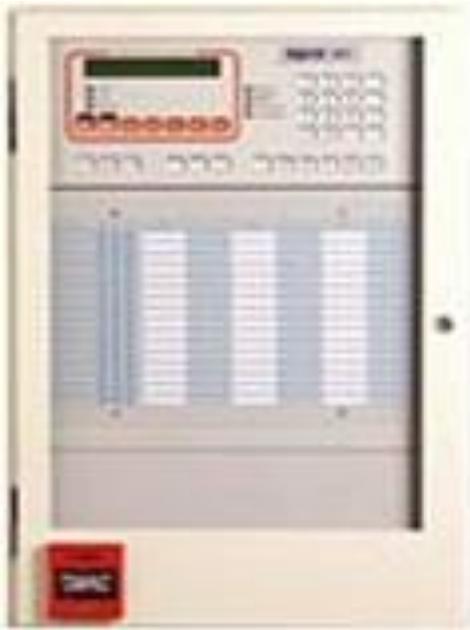
This is an automatic fire sprinkler system combined with a Type 4 automatically activated fire alarm system with smoke detectors and manual call points.

SSWS

A security based warning system activated by smoke detectors.
Typical Equipment found in schools.

Field Equipment

Analogue Addressable Control Panels.



Conventional Control Panels.



Battery operated domestic smoke detector.



Security system smoke detectors.



Approved smoke detectors as seen on a compliant NZS4512 warning system.



Approved heat detectors as seen on a compliant NZS4512 warning system.



Approved manual callpoints as seen on a compliant NZS4512 warning system.



Approved alerting devices as seen on a compliant NZS4512 warning system.



Piezo sounders found on security systems.



Conventional sprinkler heads.

Chrome Color Fire sprinkler head 68C



URRIGHT



PENDENT



SIDEWALL

Concealed sprinkler head.



3 COMMON CAUSES OF FALSE ALARMS

Dirty Smoke Detectors

Dirty smoke detectors are a common cause for false alarms. Dust and debris can build up if they are not cleaned on a regular basis. They can also become contaminated with dust and debris when contractors are working on site and detectors are not covered or removed during renovations.

Smoke detectors should be cleaned on a regular basis. NZS4512:2010 states 20% should be cleaned and tested every year. All smoke detectors should have a date sticker showing when the detector was last cleaned and tested. For analogue addressable systems there is a feature where the contamination is monitored by the system for every device. This feature ensures all contaminated detectors are identified for cleaning. It also helps identify problem areas within the school where contaminants may build up faster than normal. The nominated person taking ownership should get involved in the cleaning process. In the case of analogue addressable systems, review the detector values with the maintenance contractor.

Where work is being undertaken at the school precautions must be taken to prevent the contamination of any smoke detectors. This could be done by having the detectors covered with the correct fitting dust cover as supplied by the manufacturer, or in extreme situations have the detectors removed by the service provider and reinstated once the work is complete.



Building Issues

Building issues such as water leaks, and excessive gaps that cause drafts, can also cause false alarms. Water and moisture can cause false alarms from many parts of the system. Moisture can also cause corrosion and electrolysis than may not present immediate problems. Drafts can increase the rate of contamination as well as have an effect on the sensitivity of some smoke detectors. The investigation process should identify these issues.

Vandalism and Malicious Acts

Both unwanted visitors and students can create havoc by activating callpoints, heat and smoke detectors. The installation of Stoppers, cages, vandal proof sounders, and surveillance cameras can help reduce these problems. All incidents need to be investigated and followed up. Police involvement has worked very well at some schools.



Stoppers and detector cages help prevent malicious activations.



Vandal proof speakers as shown above will help reduce the incidents of them being stolen. However they are expensive. Cages can be used providing they are securely fixed as it is possible with the use a rope to tear the cage and sounder down. External speakers can also be installed behind grills attached with security screws.



This is where outside speakers have been ending up.

Equipment Failures

Most the components of the warning system have a usable expected life cycle.

- Batteries 5 years.
- Smoke detectors 10-15 years.
- Control equipment and electronics 10-15 years.
- Simple switch devices 15-20 years.
- Internal wiring 50 years.

These figures would be considered acceptable for the normal school environment. After these times the various components will become increasingly unreliable. A continual replacement program should be budgeted for in every school.

Contractors Working On Site

The incidents of contractors causing false alarms in schools are very high. The common causes are.

1. Building work creating dust or smoke.
2. Water blasting and steam cleaning.
3. Cut cables.
4. Underground works.
5. Hammering near heat detectors.
6. Painters preparing surfaces.
7. The knocking of heat, smoke detectors and sprinklers.

Water and dust may activate one detector, but how many other detectors are contaminated in the process. These issues may not surface for some time. Procedures to control the activity of contractors working at schools should be considered prior to the commencement of any work. These should possibly include making contractors liable for false alarm costs, should their work contaminate smoke detectors or activate the system.

Infestations

Bugs, ants, flies, and rodents can cause false alarms. Small bugs are attracted to the infrared light and heat inside the smoke detector. It's a safe warm place to lay eggs or hide. The fine mesh on the smoke detector will stop most bugs, but the very small ones can still get in. If bugs are suspected, it must first be proven before an expensive fumigation program is started. It's real easy for a contactor to say "the detector had a bug in it" when they have failed to clean the detectors properly. Always ask to see the evidence. Once bugs have been identified, there are a number of solutions the can be taken to reduce their impact.

- A fumigation program.
- Insect patches placed in the identified area.
- Electronic pest repellers.
- Seal the cable entry from the ceiling space into the back of the smoke detector.
- Use multi criteria detectors.
- Use double knock configuration in difficult areas. (costly, as additional detectors would be required)

Teething Problems (New Systems)

New systems may suffer from some initial problems such as.

- Component failures.
- The effects of unidentified building issues like water leaks and drafts.
- The accidental activation by occupants not aware of the sensitivity of the new system.
- Poor design. Smoke detector in unsuitable locations. Eg, labs, tech blocks and toilets.
- Poor installation by unqualified contractors.

Other Common Avoidable Causes

- Balls in gymnasiums.
- Theatrical smoke.
- Cooking.
- Steam.
- Leaving windows open.
- Poor general school maintenance and cleanliness.

Sprinklers

The automatic fire sprinkler system is a widely used fire protection system today. The whole philosophy of sprinklers is based upon the premise of applying the right amount of water (as little as possible) in the right place (the seat of the fire) at the right time (as quickly as possible). Many ordinary hazard systems used to be fed directly from the town's mains, but increasingly a water tank and pumps are being installed to guarantee adequate water flow and pressure.

The fire sprinkler system is constantly charged with water under pressure, which holds the fire sprinkler valve in the closed position. When a fire sprinkler head is activated water instantly flows on to the fire.

While sprinklers are relatively sturdy devices they are still prone to being knocked and activated. Guards should be fitted in such locations. The guards must be SSC approved. Talk to your approved contractor for guidance.

Sprinkler systems are also prone to leaks. Should this occur, it is important to get this attended to before the system drops in pressure. Left unattended may result in an unnecessary visit from Fire and Emergency New Zealand.

In cooler climates systems are susceptible to freezing. External pipework should be insulated. During winter holiday breaks it may be necessary to leave the heating system on to maintain an ambient temperature above freezing level.

Investigate ALL Incidents

Largely, incidents are poorly investigated. The key to false alarm reduction is the incident investigation process. This starts from the moment the incident happens, and is completed when the findings and recommendations of the investigation have been implemented. Look out for the old reset and walk away. (No investigation)
Refer to the sample false alarm checklist for a basic procedure to follow.

Take Ownership

It's important for a responsible person from each school to take ownership of the systems installed throughout the school. This person should be familiar with the systems configuration and procedures to follow during and after an activation. They should be responsible for carrying out the investigation of every incident looking for ways to prevent repeat incidents. They should be aware of any work being carried out at the school that may affect the warning systems. Any contractors working at the school should report to this person on arrival to discuss what they are doing and report back when their work is complete.

4 OTHER RECOMENDATIONS

1. Only use suitably qualified service providers. Preferably those who are members of the Fire Protection Association of New Zealand. The members are kept up to date on industry information, interpretations, and standards etc.
<http://www.fireprotection.org.nz/>
2. Procedures to control the activity of contractors working on site. These should possibly include making contractors liable for false alarm charges should their work activate the system.
3. Where possible all smoke detectors should have their gating feature enabled.
4. Staff awareness training. All schools should train and update staff on the operation of all the fire protection systems installed throughout the school. It is important that all staff are fully aware of the potential causes of false alarms, in particular in technology blocks and science labs. Other training should include evacuation and lockdown policy and procedures.
5. Get Police involved in malicious acts.
6. Remove security smoke detectors when upgrading to type 4 warning systems to fire alarm smoke detectors. Many of the smoke detectors used security systems are of inferior quality to those used on complying fire alarms.
7. Install more Stoppers on callpoints.
8. Upgrade old multi panel and out of date systems.

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5 FALSE ALARM CHECKLIST

TYPE OF INCIDENT.....

SCHOOL..... INVESTIGATED BY.....

DATE..... TIME.....

	Comments
Type of device activated	
Zone	
Device or point number	
Building	
Weather conditions?	
Temperature at the time?	
Any work being carried out at the time?	
Suspected cause?	
If bugs or contamination were suspected, was evidence provided?	
When was the smoke detector last cleaned?	
Did FENZ attend?	
Has the service agent responded?	
Did your service agent leave a copy of a service report?	
What did the service agent find?	
What was recommended or actioned to prevent reoccurrence?	