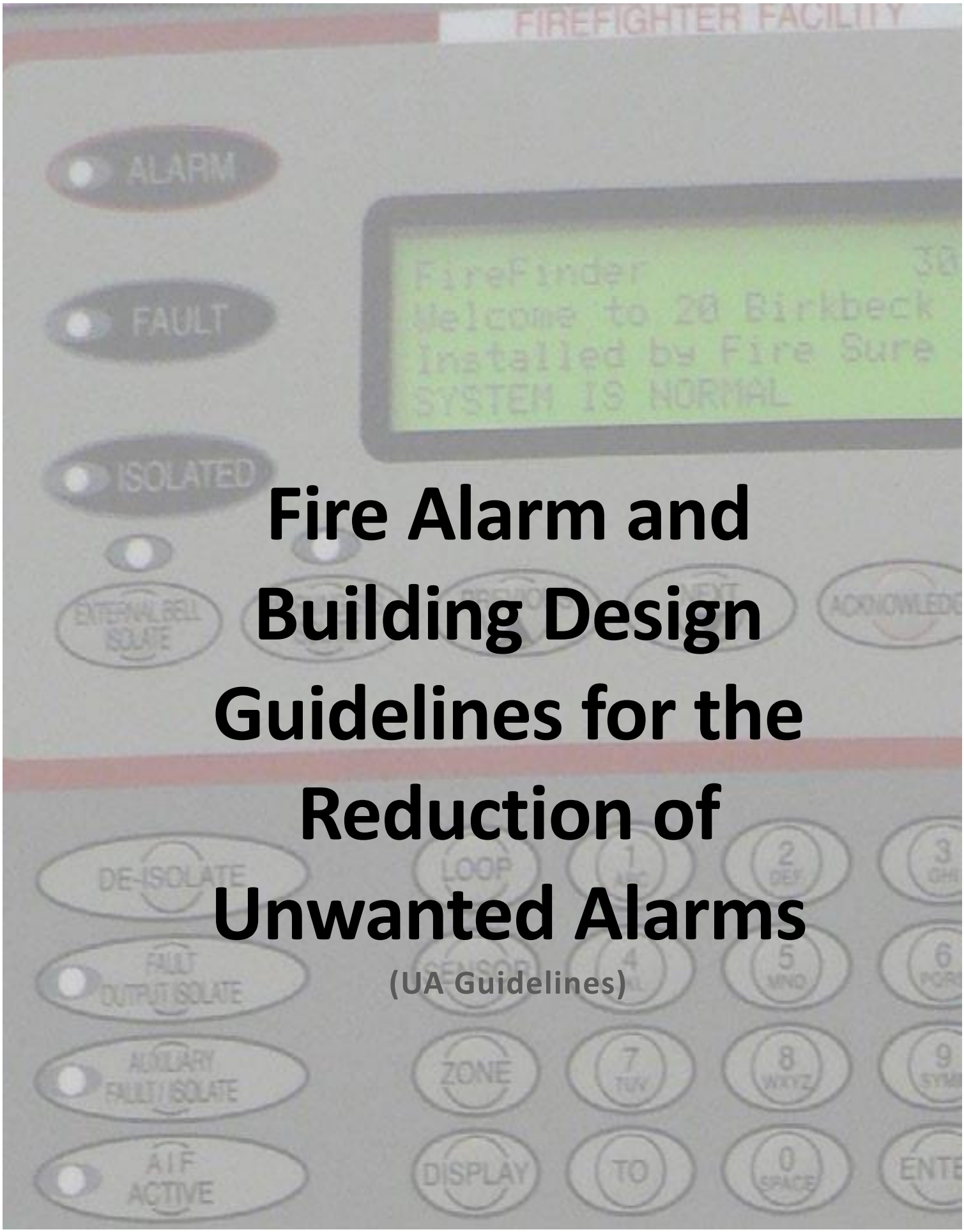

Fire Alarm and Building Design Guidelines for the Reduction of Unwanted Alarms

(UA Guidelines)

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Contents

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Fire Detection and Alarm Systems - New Building Works

Purpose

This document specifies matters that Queensland Fire and Rescue (QFR) will consider in:

- Making recommendations and providing advice about fire detection and alarm systems, under Section 292 of the *Planning Act 2016* (PA 2016) and within the jurisdiction specified by Schedules 7 and 8 of the *Planning Regulation 2017* (PR 2017) and
- Inspecting and testing fire detection and alarm systems under Section 74 of the *Building Act 1975*.

with a view to reducing the incidence of unwanted alarms (UAs) in new building works and fitouts.

Scope

To provide guidance to industry professionals involved in the design and construction of buildings about how QFR will approach the exercise of its jurisdiction concerning fire detection and alarm systems in new building works and fitouts during QFR assessment.

Performance Recommendations

The building design team must satisfy the performance recommendations stated in this document.

QFR takes the physical achievement of these performance recommendations into account in exercising its assessment, inspection, and testing jurisdiction.

1. Use of Building

The primary consideration is to determine the type of environment in which the system must deliver stable and reliable performance. The design of the building in conjunction with the use and its contents and the processes taking place must be considered.

- Class 2,3,4 example: The building has 7 storeys with 5 levels of Class 3 accommodation Sole Occupancy Units (SOU) used as short term hotel type accommodation with installed kitchens and 2 basement levels of Class 7a underground car park. There are hotel administration offices and a Class 6 restaurant located on the ground floor.
- Class 6 example: The building has 2 storeys with 2 levels of Class 6 SOU used as shops. The building has a centralised food court. A number of the SOU have kitchens and bathrooms utilised by staff. There is an office area for centre management. The car park is external to the building.

2. Building Design

Consider a holistic integrated building design solution to mitigate UAs and provide effective warning.

Floor plan layouts, room positioning, walls, doors, room size, ceiling height, bulk heads and smoke baffles are some passive systems that affect system performance.

- Class 2,3,4 example: Bulk heads are designed/installed above the bathroom doors and a baffle has been installed around the kitchen area to keep the products generated in these areas. The kitchen is located near the balcony door away from egress paths, bedrooms, and the detector.

- Class 6 example: A baffle has been designed/installed around the kitchen areas in the food court to keep the products generated in these areas. Self-closing mechanisms are fitted to the kitchen doors in the SOUs and to all bathroom doors.

3. Airflow Management

Provide an environment in which it is possible for the fire alarm system to achieve the required stable and reliable specified performance.

Locate detectors to take into account airflows and air stream.

Cooking and showering are considered to be normal activities within residential buildings. Even though smoke detection is not installed in kitchens and bathrooms, the products from activities in those rooms, namely cooking fumes and steam from showers are the main causes of UAs.

Activations occur when airflow from a kitchen or a bathroom delivers products to another area of a unit that has smoke detection. Design teams should consider air circulation in a holistic manner to ensure that cooking fumes do not migrate from the kitchen and steam from showers does not migrate from the bathroom to other areas of the SOU that have smoke detection.

- Example: An effective exhaust extraction system is being installed in the bathrooms that will maintain the steam in that room to an acceptable level and an externally extracted exhaust is also being installed in the range hood in all the kitchens. In the SOU kitchens the range hood has to be activated via a relay before any cooking appliances can be turned on. Manual controls have been blocked to ensure there is no interference to this system. Describe exactly how airflows are managed in this building to prevent unwanted alarm activations.

4. Selection, Suitability and Sensitivity Settings

Any system design must minimise the potential for UAs.

Ensure the installation of detectors that discriminate between a fire and normal conditions existing within the building (For example: cooking and showering in a residential unit are normal conditions).

The system design must have detectors that are suited to discriminating between these conditions and provide the earliest reliable warning.

A system must be designed so that it is suitable for the environment in which it is located.

If the sensitivity of a fire detection or alarm system can be varied - suitability of sensitivity settings having regard to the location of the system and the Australian Standard for that system.

- Example: A (place brand and model number here if known) analogue addressable fire alarm panel is being installed as per AS 4428.1, and/or the fire detection and alarm system is installed to AS 1668.1. The AVF has been activated on smoke detectors in all zones excluding thermal detectors, manual call points (MCP) and supply or outdoor air detectors. The AVF will have a resampling time of 20 seconds. Compliant smoke detectors (place brand and model number here if known) set at 8% obscuration have been installed throughout the building except for kitchens and bathrooms where 58°C fixed temperature thermal detectors have been installed. Seek clarification from system installer to address this section accurately.

5. Location

Have all the components of the fire detection and alarm system been located in a suitable location in order to achieve the specified performance of the system and deliver stable and reliable alarm performance.

Detectors must not be located in areas that prejudice their performance and reliability. It may be necessary to conduct air circulation observation tests to ensure proper placement of detectors.

- Example: The detectors are located away from air-conditioning outlets, away from the bathroom /laundry doors and thermal detectors have been located in kitchens/kitchenettes/staff rooms with the nearest smoke detector located in a position that will not be affected by products generated from these areas. Detectors in the food court have been located as far as possible away from the food outlets. Location of MCP to avoid malicious activity. Seek clarification from installer and reference relevant Australian Standard, NCC or Fire Engineering Report to fill this section accurately.

6. The Human Factor

The five building criteria above may not eliminate all UAs due to 'Human Error' (For example: using hair spray under a smoke detector). When the type of occupancy (particularly residential buildings) may cause these activations, compensating design features are necessary (For example: Alarm Acknowledgement Facility).

- A detector should not be activated by cooking fumes, and
- A detector should not be activated by steam from a bathroom, and
- A fire alarm system design should address the 'human factor' by including a reactive element to minimise the UAs signalled to QFR. (For example: Alarm Acknowledgement Facility, Alarm Delay Facility).

7. QFR Inspection and Testing

- When Class 2, 3, 4 parts are required to be monitored, a pragmatic test is to be undertaken.
- In addition to other alarm testing, and prior to the issuing of a final approval, QFR must be satisfied that the system will achieve specified performance (PR 2017 Schedule 19).
- The minimum pragmatic test will include or simulate:
  1. Steam produced from a four minute hot shower at maximum flow and temperature,
  2. Fumes produced from cooking a normal meal - such as steak or bacon and eggs, toast, and boiling kettle simultaneously.
  3. Tests are to be conducted with the air conditioning
     - On and set to 24˚C with all doors and windows closed, and
     - Off with doors and windows open.
  4. A successful test will not activate any of the building's detectors.
     - Testing will be directed by Fire Alarm Management Unit in QFR. An example test may be viewed at www.fire.qld.gov.au/planning-and-compliance/alarm-monitoring/unwanted-alarm-activation/pragmatic-cooking-and-shower-test.

AN UNSUCCESSFUL TEST WILL RESULT IN A NON-COMPLIANT INSPECTION FROM QFR.

Summary of Relevant Legislation

Planning Regulation 2017

Schedule 9

Specifies the role of QFR, including broader jurisdiction for performance solutions.

Schedule 19

Identifies the special fire services referred in Schedule 9.

Referral jurisdiction is covered by Part 2, Schedule 19 for fire detection and alarm systems. Four of the points listed are particularly relevant to mitigating UAs:

- Achievement of specified performance of detection and alarm systems.
- Suitability of nominated types of detection in all areas.
- Operation of direct fire service alarm.
- If the sensitivity of a fire detection or alarm system can be varied - suitability of the sensitivity settings having regard to the location of the system and the Australian Standard for that system.

Building Act 1975

Section 74 Inspection and testing of special fire service installation.

Allows QFR to inspect and test fire detection and alarm systems.

Fire Services Act 1990 – Applies to all buildings.

Section 146M.

'The occupier of a building must maintain at all times every prescribed fire safety installation to a standard of safety and reliability in the event of a fire.'

For this section maintain includes 'install or establish and maintain'.

Section 146N.

This section places an obligation on the occupier of an existing building to maintain an alarm and detection system monitored by QFR to ensure that an unacceptable number of alarms are not signalled from their building. The obligation placed on the occupier includes an obligation to:

- Ensure the alarm and detection system is able to distinguish between a fire and normal conditions in the building; and
- To implement measures for avoiding UAs from the alarm and detection system in the building.

Section 146N applies to buildings after they are occupied and has no direct application to the exercise of the jurisdiction of QFR in relation to the assessment, inspection and testing of new buildings. However, section 146N is relevant to the context in which buildings are designed and constructed. It underlines the importance of professionals involved in the design and construction of new buildings, exercising their responsibilities, and approaching the interpretation of building codes and standards, in a way that avoids the prospect of new building works failing to meet the obligations established by section 146N.

Schedule 1 - Residential Building Works

Scope

To provide additional guidelines for the assessment, inspection and testing of fire detection and alarm systems in residential buildings. These are in addition to those specified in the preceding 'Approval of fire detection and alarm systems – New Building Works'.

Airflow Management

Cooking and showering are considered to be normal activities within residential buildings. Even though smoke detection is not installed in kitchens and bathrooms, the products from activities in those rooms, namely cooking fumes and steam from showers are the main causes of UAs.

Activations occur when airflow from a kitchen or a bathroom delivers products to another area of a unit that has smoke detection. Design teams should consider air circulation in a holistic manner to ensure that cooking fumes do not migrate from the kitchen and steam from showers does not migrate from the bathroom to other areas of the SOU that have smoke detection.

Performance Recommendations for Residential Buildings

- A detector should not be activated by cooking fumes, and
- A detector should not be activated by steam from a bathroom, and
- A fire alarm system design should address the 'human factor' by including a reactive element to minimise the UAs signalled to the QFR. (For example: Alarm Acknowledgement Facility).

Note: 'human factor' is referred to previously on Page 5 under item 6.

QFR Testing

In addition to other alarm testing, and prior to the issuing of a final approval, QFR must be satisfied that the system will achieve specified performance (PR 2017 Schedule 19).

The minimum test will include or simulate:

1. Steam produced from a four minute hot shower at maximum flow and temperature,
2. Fumes produced from cooking a normal meal - such as steak or bacon and eggs, toast, and boiling kettle simultaneously.
3. Tests are to be conducted with the air conditioning
   - On and set to 24˚C with all doors and windows closed, and
   - Off with doors and windows open.
4. A successful test will not activate any of the building's detectors.

A test that simulates fumes from cooking is to be developed. In the interim, to deliver a consistent approach, testing will be directed by the Fire Alarm Management Unit in QFR.

AN UNSUCCESSFUL TEST WILL RESULT IN A NON-COMPLIANT INSPECTION FROM QFR.

Additional Information

QFR Community Safety Office Contact Details

To contact your nearest Community Safety Office, please go to our website using the following link: www.fire.qld.gov.au/compliance-and-planning

Support Documents

There are a number of documents available with more information located at www.fire.qld.gov.au/planning-and-compliance/alarm-monitoring.

- Managing Your Unwanted Fire Alarms brochure
- Checklist to help reduce unwanted alarms
- Frequently asked questions
- Pragmatic Cooking & Shower Test