Fire Safety Guideline
Hot Smoke Tests

MFS Fire Safety Guideline for Hot Smoke Tests

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Government of South Australia

METROPOLITAN FIRE SERVICE SOUTH AUSTRALIA

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DOCUMENT CONTROL

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-	Original document	11 June 2004
A	General review	6 April 2016
1.0	Format update	2 March 2022

List of Amendments:

Clause	Amendment
Title	Change from *Built Environs Section Guideline 004: Hot Smoke Tests* to *MFS Fire Safety Guideline for Hot Smoke Tests.*
Whole document	Update to new format
Glossary	All acronyms used in the document included.
Referenced Documents	Updated.
Definitions	Further details provided regarding defined terms. Definition for “Performance Solution” included.
Section 5 Smoke Generators	New sub-section heading (Product) included and information rearranged accordingly
Section 9 Hot Smoke Test	New sub-sections added regarding the Test Report and information about requirements for rectification of issues and re-testing.

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GLOSSARY

AS	Australian Standard
BCA	Building Code of Australia
BES	MFS Built Environment Section, Community Safety & Resilience Department
MFS	South Australian Metropolitan Fire Service
NCC	National Construction Code
PPE	personal protective equipment
SCBA	self-contained breathing apparatus

REFERENCED DOCUMENTS

The following documents are referred to in this Guideline:

AS 4391 Australian Standard 4391 – *Smoke management systems – Hot smoke test*

Australian Building Codes Board, *National Construction Code, Volume One, Building Code of Australia,* (Edition applicable at the time of Development Approval), Australian Building Codes Board, Canberra.

Planning, Development and Infrastructure (General) Regulations 2017 (SA)

DEFINITIONS

Ash arrester means a device located in the flue of a smoke distribution system to assist in capturing ash deposits from the smoke generators, as described in AS 4391.

Fire trays means a component of the test apparatus as detailed in AS 4391.

Performance Solution has the meaning as defined in the National Construction Code.

Smoke distribution system means component of the test apparatus used to direct the flow of generated smoke, as described in AS 4391.

Smoke generator has the meaning as defined in AS 4391.

Water baths means a component of the testing apparatus as detailed in AS 4391, in which a fire tray is placed.

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1 SCOPE

1.1 Scope

This document details the safety procedures and equipment required by the South Australian Metropolitan Fire Service (MFS) to carry out a hot smoke test.

1.2 Application

This document will help facilitate a successful hot smoke test and shall be read in conjunction with Australian Standard AS 4391.

2 GENERAL

Hot smoke testing is generally carried out in accordance with AS 4391 *Smoke Management Systems – Hot Smoke Test* and provides a means to assess the correct sequential operation of a building's smoke management system under simulated fire conditions.

Tests are usually required as part of a building approval pursuant to Regulation 103 of the South Australian *Planning, Development and Infrastructure (General) Regulations 2017*. The MFS Built Environment Section (BES) also especially requests such tests where the application for building approval involves Performance Solutions.

Arrangements should be made at least four (4) weeks prior to a test. Written confirmation of these arrangements from the client or their representative must be forwarded to the BES before a test is undertaken.

3 FIRE SAFETY

An appropriate number of firefighters should be dressed in Level 2 personal protective equipment (PPE) including self-contained breathing apparatus (SCBA).

One firefighter overseeing the test fire and an additional firefighter acting as safety officer should wear Level 2 PPE and SCBA. All other fire service personnel should wear Level 1 PPE. Self-contained breathing apparatus should be carried and available for use by all fire service personnel involved with the test.

Suitable fire extinguishers and a fire hose reel should be located near the test fire should there be a need for fire control or extinguishment of the test fire.

4 OCCUPANT SAFETY

The smoke used during the testing procedure is classed as a mild irritant. The MFS recommends that participants witnessing the testing be kept to a minimum.

Persons to be in attendance during hot smoke testing are to be advised that the following minimum level of personal protective equipment (PPE) is required:

- long sleeve shirt and trousers;
- enclosed steel-capped boots;
- eye protection; and
- respiratory protection incorporating a Profile 2 A1B1E1 P2/P3 combination filter.

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5 SMOKE GENERATORS

5.1 General

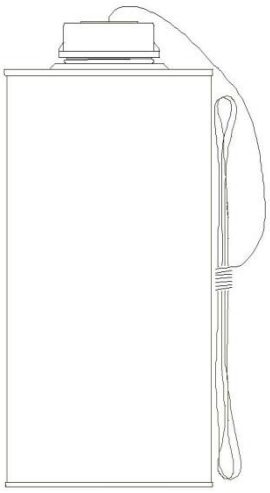
The number of smoke generators required will depend on the fire size and number of tests to be completed. The number recommended for each smoke test will be advised by the BES following a review of the project when a hot smoke test booking is made.

5.2 Product

At present, the BES recommends the use of the following smoke generating product.

The type of smoke generator used is CS3 – 1750 Smoke Generator, as detailed below.

CS3-1750 - GENERATOR SMOKE, WHITE, 3 MINUTE, NON-TOXIC, ELECTRIC



The CS3-1750 is a medium volume screening smoke generator. It comprises a waterproofed, steel bodied container with approximately 1350 grams of non-toxic smoke composition, and an electric igniter, and response is immediate.

The container is 110 mm diameter, 215 mm high, and has 2 metre leads.

The device is designed for screening smoke in military exercises, but is also used in the testing ventilation systems, and fire suppression systems. On ignition the item produces a cloud of dense white smoke for a duration of three minutes.

NEQ 1.2 kilograms Safety distance 1 metre

HCC 1.4 G UN Nº 0197

5.3 Supplier

The CS3 – 1750 Smoke Generators can be obtained from:

Combat Simulation Systems
Lot 72, St. Andrews Road
LEPPINGTON NSW 2171

Note: The responsibility to supply the smoke generators lies with the client.

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6 FUEL

These hot smoke tests use denatured industrial grade methylated spirits (95 IMS) as the fuel source. The quantity of fuel required depends on the size and number of test fires to be completed (see AS 4391, Table 2.7 for recommended fuel quantities). The quantity of fuel required is specified by the BES following a review of the project when a hot smoke test booking is made.

Note: The responsibility to supply the fuel lies with the client. Industrial grade methylated spirits can be purchased from most large building industry suppliers.

7 CHECKLIST OF EQUIPMENT

The following is a list of equipment recommended for a hot smoke test and should be used as an *aide memoir* before conducting a hot smoke test.

7.1 Equipment Supplied By the Client

1. Smoke generators
2. Fuel
3. Plasterboard sheets (2 @ 1200mm x 2400mm)
4. Ladder or an aerial work platform to reach sprinkler heads above
5. Scott Safety Profile 2 A1B1E1K1-P2/3 respirator filters (twin filter pack) – 2
6. Portable fire extinguishers and fire hose reel

7.2 Equipment Supplied By the MFS

1. Fire trays and water baths of varying sizes
2. Ash arrester assembly
3. Salvage sheet
4. Firefighting PPE
5. Breathing apparatus
6. Device to monitor temperature
7. Anemometer
8. 9 volt battery
9. Fire lighter

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8 ON-SITE PROCEDURES

The client should adopt the following procedures in preparation for a hot smoke test:

1. Arrange for appropriate access point(s) to the building. The MFS will attend site with a vehicle towing an equipment trailer. The hot smoke testing equipment is bulky and will be moved into and around the building utilising large equipment trolleys.
2. Liaise with the system designer, site project manager, fire alarm, sprinkler and air handling system installers.
3. Clear the area in the selected fire location as necessary; protect the floor with plasterboard sheets on top of a salvage sheet as necessary.
4. Ensure all on-site personnel are briefed prior to the test (e.g. explain hazards, PPE requirements).
5. Notify MFS Com-Cen of the test and expected duration.

9 HOT SMOKE TEST

9.1 Test Procedure

The hot smoke test will generally be carried out in accordance with AS 4391.

9.2 Test Report

A Hot Smoke Test Report will be issued by the BES to the client in the days after the test has been completed, pursuant to Regulation 103 of the *Planning, Development and Infrastructure (General) Regulations*.

9.3 Requirement for Re-Testing

If any issues relating to the functionality of the smoke management system and integrated building systems are identified during the hot smoke test, they will be identified discussed with the client with the aim to rectification. The BES shall be notified on the completion of any rectification works. A further inspection and re-test of the smoke management systems may be required, including the possibility of further hot smoke tests to confirm the required functionality of the system/s.

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