

SSL Appraisal Specification

FAS-125

Visual Smoke Detection Systems

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1. SCOPE

This document details SSL's specific requirements for assessment of visual smoke detection systems for use in fire detection systems. These are interim requirements, intended to be replaced by an International or Australian Standard, when such standards have been prepared and published.

This document also specifies the scope of testing to verify "fitness for purpose" of a VSD system, together with requirements for submittal data, and documentation. The test procedures specified herein are based on those outlined in FM Approvals engineering examination of a VSD system, in conjunction with a system validation test.

While this specification relates directly to an FM Approval engineering examination of equipment, testing/assessment by other independent recognised testing authorities (such as UL, ULc, BRE etc.) could be considered within the scope of assessment by this specification.

2. EXISTING APPROVAL, LISTING, OR COMPONENT-RECOGNITION

Existing listing, approval or component-recognition, of VSD systems by recognised listing/approval agencies such as Underwriters Laboratories Inc. (USA), Underwriters Laboratories Canada, Factory Mutual Research Corporation (USA), Building Research Establishment Ltd (UK), will be given due consideration in the assessment process, providing test requirements are appropriate for Australian Conditions.

Proper documentary evidence of such listing, approval or component-recognition and testing shall be included in any submission for assessment. The minimum evidence required by SSL is the recognised agency's letter of confirmation of the listing/approval/component-recognition of the VSD system, a copy of the relevant investigation report, and a copy of the relevant follow-up/post-listing surveillance agreement. All submitted test reports shall contain a description of the equipment tested (including Model and unique identification), the test procedures used, the results of the tests, and the applicable pass/fail criteria.

3. DOCUMENTATION LANGUAGE

All submitted documents shall be in English language. Document translations shall be in accurate "common use" technical English.

4. ASSESSMENT CRITERIA

The VSD system shall comply with all engineering examination requirements of a recognised listing or approval agency. Claimed equipment ratings and performance shall be substantiated by the results of testing which has been conducted and reported in a manner acceptable to SSL.

4.1 Identification of VSD system under investigation

Any VSD system assessed to this specification shall be uniquely defined. Documentation must include unique identification of:

- i. components, sub-components, assemblies, sub-assemblies,
- ii. software and firmware (especially version and version control),
- iii. operators manual,
- iv. Planning installation and commissioning manual,
- v. configuration data, and
- vi. any other information required to uniquely define the VSD system.

4.2 Smoke response tests - Indoor

VSD systems shall reliably respond to at least one of the following conventional indoor fire tests using industry standard smoke generating sources in accordance with the October 2001 Addendum to FM Approval Standard 3230.

Paper Test - For this test, shredded newspaper are to be burned as described in Test A*. Fuel loads can be varied to match the smoke build up curves required. Document the VSD System's response to the test.

Wood Crib Test - In this test, kiln dried fir strips, 154 x 16 x 19 mm are to be burned as described in Test B*. Fuel loads can be varied from 18 to 14 individual pieces to match the smoke build-up curves required. Document the VSD System's response to the test.

Flammable liquid test - In this test, a mixture of 25% toluene and 75% heptane are to be burned as described in Test C*. Fuel loads can be varied from 100 to 50 ml to match the smoke build-up curves required. Document the VSD System's response to the test.

Smouldering test - In this test, ponderosa pine sticks 7.62 by 2.54 by 1.9 mm are to be burned as described in Test E*. Fuel loads can be varied from 10 to 7 individual pieces to match the smoke build-up curves required. Document the VSD System's response to the test.

* Tests A,B, C, and E are described in October 2001 Addendum to FM Approval Standard 3230.

4.3 Smoke response tests - Outdoor

Subject the VSD system to outdoor full scale smoke tests. For these tests, the performance based principles of FM Approval Standard 3260 are to be utilised to assist in quantifying the VSD's response. A rolling lab cart, equipped with double lined metal trays; one to hold the test fuel and another to hold water provided cooling as well as containment means is placed in view of the VSD. These tests are to be conducted during daytime and minimal wind conditions. The VSD System's response to each test condition outlined below shall be documented.

- i. Oil Soaked Rags - Two 28 x 40 cm cotton shop rags are to be soaked in 10-30 motor oil and ignited while contained in a 929 cm² pan. Test for response to oil at 30.5 m (100ft) from source, and at 61 m (200ft) from source.
- ii. Diesel Fuel - 200 ml of diesel fuel is to be ignited while contained in a 929 cm² pan. Test for response to Diesel at 30.5 m (100ft) from source and at 61 m (200ft) from source.
- iii. 90w Gear Oil - 200 ml of 90w gear oil fuel is to be ignited while contained in a 929 cm² pan. Test for response to Gear Oil at 30.5 m (100ft) from source and at 61 m (200ft) from source.
- iv. Polypropylene - A 6.35 mm layer of polypropylene pellets is to be ignited while contained in a 929 cm² pan. Test for response to Polypropylene at 30.5 m (100ft) from source and at 61 m (200ft) from source.

4.4 Commissioning test

Commissioning tests for at least one (1) installed and operational VSD System shall be witnessed by SSL. Commissioning tests shall include tests for alarm operation and tests for rejection of non-fire phenomena (e.g. steam, exhaust fumes, etc.).

A commissioning test plan shall be prepared where the location and size of "test fires" (smoke sources) shall be selected by SSL and authorised by the submitting organisation.

The submitting organisation shall nominate whether alarm operation occurs and the time to alarm for each test in advance. Results of nominated performance and actual performance shall form part of the assessment.

4.5 Functional requirements

- i. Normal Operation - The VSD system shall be tested to verify proper operation under normal conditions.
- ii. Fault Signals - The VSD shall be capable of automatically transmitting fault signals when connected to fire alarm system control and indicating equipment (CIE). The VSD monitor shall also provide a visual indication of fault signals.
- iii. Alarm Signals - The VSD shall be capable of automatically transmitting alarm signals when connected to fire alarm system CIE. The VSD monitor shall also provide a visual indication of alarm signals.

4.6 Circuit supervision

Circuit supervision principles of AS 1670.1 are to be applied to VSD systems. Equipment shall meet the following circuit supervision requirements:

- i. The means of connection between VSD systems and CIE shall not permit disconnection of the VSD system without initiating a fault or alarm signal at the CIE.
- ii. Video Signal Cable - Cables between each camera and the VSD controller shall be monitored for open and short circuit interruptions. A fault signal shall be generated when open or short circuit interruptions occur.
- iii. Connection to Power Sources - Open or short circuit interruptions of camera power supply connections shall generate a fault signal.
- iv. Power Supply Supervision - Interruption to power supply for the VSD system shall generate a fault signal.
- v. Additional supervision Features of VSD - The following additional conditions shall generate a fault signal -
 - loss of video signal
 - attempting to make a virtual zone too small for proper operation
 - camera view that is either too dark, too light or of insufficient contrast

4.7 Stability

A VSD system comprising a controller and single camera shall be energised and tested to verify proper operation under normal, standby conditions. Continuous operation of these samples shall be monitored for 30 days in clean air (working office type); record any evidence of instability or false signals during that period.

4.8 Environmental tests

At least one sample of each VSD system component type shall be tested in each of the following environments:-

- i. Temperature of 0°C for a period of 4 hours.
- ii. Temperature of 49°C for a period of 4 hours.
- iii. Temperatures of 38°C and 90% relative humidity for a period of 24 hours.

Equipment shall operate properly before, during and after exposure to each of these environments.

4.9 Voltage Variation

Operation of the VSD system shall be monitored while the primary power source is varied between +6% and -10% of its nominal value. All VSD system components shall operate properly during this test without variation in system response.

4.10 Electrical Safety

VSD system components where the working voltage exceeds extra-low voltage (ELV) shall comply with appropriate electrical safety standards. Examples of appropriate evidence include an electrical safety test report and/or a certificate of suitability from an appropriate regulatory authority.

4.11 Vibration Test

The camera and its housing mounted in their normal position shall be subjected to a vibration test of 4 hours duration with a 0.5mm displacement at a frequency sweep of 10 to 30 Hz. The equipment shall operate properly during and after the vibration test. There shall be no loosening of parts or permanent deformation as a result of this test.

4.12 Name Plate Rating

The maximum power supply load rating shall not be exceeded by the power supply requirements for VSD system components.

4.13 RFI Protection

Subject the VSD system to the following radio frequency interference (RFI) tests. Samples shall be subjected to voice modulated and un-modulated signals at frequencies of 154, 467, and 850 MHz with equivalent radiation power levels of 5.0 watts at a distance of 0.6 . Samples shall not false alarm or give any indication of instability as a result of exposure to these tests.

4.14 MARKING

The following information shall be clearly and indelibly marked on outside of the equipment enclosure:

- Manufacturer's name
- Model number
- Electrical ratings
- Part number

4.15 Reporting of Tests

Test reports shall include the following:

- a) Name and address of the testing organisation.
- b) Number, publication date, and amendment version, of any referred Standards.
- c) Date of report issue.
- d) Name of manufacturer or agent.
- e) Trade name, model number, and revision level of VSD system components/software.
- f) Rating/performance information.
- g) Description of tested item and tested configuration.
- h) Results of tests.
- i) A statement indicating whether or not the item tested complied with the requirements of any applicable AS/other Standard, and/or the applicable requirements (if any) of this specification.

5. SUBMISSION REQUIREMENTS

5.1 Submission Documents

The applicant shall supply SSL with full sets of documentation for each VSD system variant proposed for assessment. Documents shall include listing/approval test reports (if any), drawings incorporating lists of all mechanical and electrical components, technical data sheets, electrical schematic diagrams, installation instructions, operating and maintenance instructions, and any sales literature. The electrical component lists shall specify the make and model of each component used in the VSD system. Alternatively, the electrical component lists shall include the listee's Part Number and description, and listee shall provide the performance specifications against which the components are procured. Changes to the components specifications are regarded as engineering changes, and shall be notified to SSL prior to implementation.

5.2 Engineering Changes, and Model Designation

The VSD system design variants to be assessed shall each be permanently labelled/marked with a unique and distinctive model designation, which shall be as agreed to be published in the SSL ActivFire Register. All engineering changes proposed to be made to the VSD system after SSL's initial assessment has commenced shall be promptly notified to SSL. Engineering changes shall be assessed by SSL as to the affect on function, performance, reliability, or durability, of the equipment. The outcome of SSL's engineering change assessment shall determine whether appropriate modification of the model designation is necessary.

5.3 Reference Samples

Sample of the VSD system (including each variant) shall be submitted, on request from SSL, for purposes of investigation and reference. The applicant shall arrange and pay for collection of the VSD system from SSL after completion of this process.