

# SOUTHERN NEVADA FIRE CODE COMMITTEE

## UNIFORM GUIDELINE for SMOKE CONTROL & SMOKE REMOVAL TESTING & RECERTIFICATION

Published July 1<sup>st</sup> 2011

**TITLE:** Uniform Guideline for Smoke Control & Smoke Removal Testing & Recertification of Existing Smoke Control & Removal Systems

**REFERENCE (S):** 2009 International Fire Code (as amended)

**202 Smoke Control, Dedicated Systems.** Dedicated smoke-control systems are intended for the purpose of smoke control only. They are separate systems of air moving and distribution equipment that do not function under normal building operating conditions. Upon activation, these systems operate specifically to perform the smoke-control function.

**202 Smoke Control, Non-Dedicated Systems.** Non-dedicated systems are those that share components with some other system(s) such as the building HVAC system. Activation causes the system to change its mode of operation to achieve the smoke-control objectives.

**909.20 Maintenance.** Smoke control systems shall be maintained in an operable condition at all times to ensure to a reasonable degree that the system is capable of controlling smoke for the duration required.

Inspection and periodic testing of existing smoke control systems shall be performed in accordance with the Southern Nevada Fire Code Committee's Uniform Guideline for smoke control testing & recertification, the manufacturer's instructions and Sections 909.20.1 through 909.20.5.

**909.20.1 Schedule.** A routine maintenance and operational testing program shall be initiated immediately after the smoke control system has passed the acceptance tests. A written schedule for routine maintenance and operational testing shall be established.

**909.20.2 Written record.** A written record of smoke control system testing and maintenance shall be maintained on the premises (fire command center when provided). The written record shall include the date of the maintenance, identification of the servicing personnel and notification of any unsatisfactory condition and the corrective action taken, including parts replaced.

**909.20.3 Testing.** Operational testing of the smoke control system shall include all equipment such as initiating devices, fans, dampers, controls, doors and windows.

**909.20.4 Dedicated Smoke Control Systems.** Dedicated smoke control systems shall be operated for each control sequence semiannually. When required by the fire code official the system shall also be tested under standby power conditions.

**909.20.5 Non-Dedicated Smoke Control Systems.** Non-dedicated smoke control systems shall be operated for each control sequence annually. When required by the fire

code official the system shall also be tested under standby power conditions.

**915.5 (Smoke Removal) Maintenance.** Smoke removal systems shall be maintained in an operable condition at all times to ensure to a reasonable degree that the system is capable of removing smoke when required.

Inspection and periodic testing of smoke removal systems shall be performed in accordance with the Southern Nevada Fire Code Committee's Uniform Guideline for smoke control testing & recertification using a Level I inspection firm, and the manufacturer's instructions.

### **SCOPE:**

To identify the responsibilities of the fire code official, Special Inspector and Owner.

To provide details regarding who is qualified to perform the periodic testing of smoke control or removal systems with the intended result being the issuance of a re-certification of the system by the special inspector.

To specify what components are required to be tested and how often they shall be tested.

### **TESTING FREQUENCY:**

Dedicated systems shall be tested on a semi-annual basis.

Non-Dedicated systems shall be tested on an annual basis.

The amount of testing shall be in accordance with the test plan.

### **PURPOSE:**

To maintain the minimum level of life safety and property protection originally designed into the building by verifying through inspections and testing that the existing smoke control and/or removal system(s) continue to operate in accordance with the approved design.

To standardize the procedures describing the testing of existing smoke control and/or removal systems and to provide a standard guideline for qualified special inspectors to utilize when testing these systems.

### **DEFINITIONS:**

#### **SPECIAL INSPECTOR**

An individual approved by the fire code official to inspect smoke control and/or removal systems, OR a company [firm] employing an individual meeting the criteria specified herein. Nothing in this definition is intended to prevent a Level 1 or 2 special inspector from supervising the work of an employee.

The Southern Nevada Fire Code Committee will maintain a list of approved individuals.

Two levels of approval are available:

- A Level 1 special inspector is not limited in the level of service they can provide.

- A Level 2 special inspector is limited to those areas as defined in this guideline.

### **RECORD DOCUMENTS FOR SMOKE CONTROL/ REMOVAL**

Record documents for smoke control and removal systems typically consist of the following (Note: See appendix A for further information):

- Control Diagrams
- Life Safety Report or Fire Protection Report
- Sprinkler System Drawings
- Fire Alarm System Drawings
- As-built Mechanical Drawings
- As-built Building Automation System Drawings
- As-built Architectural Drawings
- Original Smoke Control Report (when available)

If there are no previously approved record documents, the smoke control and/or removal report required in this guideline provided by the level 1 special inspector shall constitute the initial document regarding the design and expectations of the existing smoke control and/or removal system.

### **CERTIFICATE OF COMPLIANCE**

A certificate that is provided by the special inspector certifying that the referenced property is in substantial compliance. The certificate shall identify the company and special inspector that performed the testing, name, date and address of the property being tested, plus the following statement:

*I have reviewed this report and by personal knowledge and on-site observation certify that the smoke control and/or removal system is in substantial compliance with the approved design documents, and to the best of my understanding complies with requirements of the applicable codes as identified in the smoke control and/or removal report.*

### **RECERTIFICATION OF SMOKE CONTROL SYSTEM**

The smoke control system for the **entire** structure is tested and recertified to establish that the smoke control system complies with the original approved design documents.

### **PERIODIC TESTING OF SMOKE CONTROL SYSTEM**

The smoke control system for a portion of the structure is tested on an annual or semi-annual occurrence as required. The portion of the structure to be tested for each test period is outlined in the test plan report. Generally, the periodic testing is arranged such that the entire structure has been tested at the end of a test cycle.

## **RULES AND REGULATIONS:**

### **GENERAL – INITIAL RECERTIFICATION**

Upon notification by the fire code official, or after the owner determines that their property contains a smoke control and/or removal system the following steps need to occur.

- 1) The owner shall contract with an approved special inspector to perform the recertification of the system.
  - a) Owner contacts the fire code official to obtain list of pre-approved special inspectors. The Southern Nevada Fire Code Committee maintains this list.
  - b) The initial recertification shall be done by a Level – 1 special inspector.
  - c) The level of special inspector needed for subsequent periodic testing depends upon the type of smoke control and/or removal system installed.
- 2) The special inspector prepares a test plan report and submits it to the fire code official for review and approval.
- 3) Within 180 days of test plan report approval the testing shall be completed and a final report submitted to the fire code official for review and approval.
- 4) Periodic testing shall be commenced within two years of system acceptance or the system shall be re-certified.

### **SPECIAL INSPECTOR LEVELS**

Each applicant shall submit a written request for approval to the Chairman of the Southern Nevada Fire Code Committee and stipulate the level(s) being requested.

General Requirements– All requests shall contain the following:

- Curriculum vitae
- Copy of business license
- Sample test and inspection report

Level 1 – A special inspector that is qualified to recertify or test any smoke control and/or removal system. Examples include buildings containing: systems that have extensive interfaces with fire alarm, security and building automation systems or widespread usage of fire assemblies and smoke barriers.

A level 1 special inspector shall be a professional engineer meeting the following requirement and providing the required documentation:

- Copy of Nevada Registration as a Professional Engineer with demonstrated expertise in the fire protection, mechanical and electrical aspects of smoke control and removal systems.
- Detailed explanation of experience with an engineered smoke control system utilizing a “UBC 905 or IBC 909” smoke control system.
- Detailed explanation of experience with an engineered smoke removal

system utilizing an “IBC 403.4.6” smoke removal system.

Level 2 – A special inspector qualified to inspect designated smoke control & removal equipment. Examples include: buildings with only pressurized stair towers and/or elevator machine rooms or mechanical smoke exhaust systems installed as alternates to smoke and heat vents.

A level 2 special inspector shall meet the following requirements and provide required documentation:

Registered with either:

- Association of Air Balance Council (AABC), **OR**
- National Environmental Balancing Bureau (NEBB), and

a copy of the individuals current registration as a member in good standing with either of the above mentioned associations, AND

Detailed explanation of experience with engineered smoke control and removal equipment or systems.

### **APPROVAL OF SPECIAL INSPECTOR**

The owner shall select a special inspector from the list of special inspectors published by the Southern Nevada Fire Code Committee.

### **OPERATIONS and MAINTENANCE DOCUMENTATION**

All operations and maintenance activities since the last certification shall be documented. By documenting all activities, the recertification of smoke control and/or removal systems is greatly simplified. The special inspector may review operations and maintenance documentation to determine if any changes have occurred since the previous recertification.

All changes, corrections, modifications or alterations to the smoke control and/or removal system shall be approved by the Authorities having Jurisdiction and documentation maintained.

### **SMOKE CONTROL and/or REMOVAL REPORTS**

Written reports shall include all of the following, as applicable or available.

#### **Test Plan Report and Schedule**

A test plan report is a preliminary report outlining the methodology of the proposed testing and a detailed schedule of testing. The test plan report shall be submitted for review and receive approval by first the Owner and then the fire code official prior to the start of testing. Draft preliminary reports may be submitted prior to obtaining original signatures. The report shall consist of the following sections:

1. Summary of smoke control and/or removal system’s design methodology.
2. Documents Reviewed
3. Proposed Passing Criteria
4. Proposed Testing Scenarios

5. Proposed Testing Schedule.
6. Testing Methodology
  - Matrix of the testing zones schedule
  - Matrix of the testing zones pass/fail criteria
  - Fire Alarm system programming audit.
7. Methodology for testing the Emergency-Power.

Appendix A provides a list of documents to be considered in the analysis of a smoke control system and in the preparation of both portions of the smoke control report. If the special inspector determines that any document listed in Appendix A will not be used, an explanation describing why, shall be included in the reports. It is the responsibility of the special inspector to determine what level of documentation is necessary. Either the Owner or the fire code official may require additional documentation.

### **Periodic Testing Results (semi-annual or annual testing results and report)**

The results of periodic testing (semi-annual or annual testing) shall be submitted after the completion of each testing cycle. The report shall be typed and bound. The report shall consist of the following sections:

1. Executive Summary of smoke control and/or removal system design methodology
2. Testing Schedule (previously approved)
3. Air Balance Test Data / System Performance Verification
4. Non-Compliance Reports (NCR) / Daily Reports
5. Inspection and Testing Report
6. Certificate of Compliance

The following sections may also be included:

1. Documents Reviewed
2. Passing Criteria
3. Testing Scenarios

A minimum of four originals shall be produced. (Owner, Special Inspector, fire code official and Fire Command Center)

### **The Final Report**

The final report shall be developed at completion of a recertification or after the last (final) completed cycle. The periodic testing report and final report may be combined into one report. The report shall be typed and bound. The report shall consist of the following sections:

1. Executive Summary of smoke control and/or removal system design methodology for the past testing cycle
2. Documents Reviewed

3. Passing Criteria
4. Testing Scenarios
5. Testing Schedule (previously approved)
6. Inspection and Testing Report
7. Certificate of Compliance

A minimum of four originals shall be produced. (Owner, Special Inspector, fire code official and Fire Command Center)

### **INITIAL RECERTIFICATION FOR ALL SMOKE CONTROL and/or REMOVAL SYSTEMS**

- Shall be performed by a Level – 1 special inspector.
- Shall test 100% of the smoke control and/or removal system.
- Testing shall be completed within a time frame approved by the fire code official.
- Shall be performed when a smoke control system has not been tested for more than two years.
- Shall be performed when a smoke control system is replaced, or a substantial remodel of the structure warrants recertification of the smoke control system
- The fire alarm system or the building management system is replaced or the programming is substantially changed.

### **PRE – 1994 SYSTEMS PERIODIC TESTING**

- May be performed by either a Level – 1 or 2 special inspector as determined by the fire code official.

### **POST – 1994 SYSTEMS PERIODIC TESTING**

UBC 905, IBC 403 Smoke Removal or IBC 909 Smoke Control Systems

- Shall be performed by a Level – 1 special inspector.
- Shall test at least 20% of the smoke control and/or removal system as required for dedicated versus non-dedicated systems. Cumulative testing using the 20% option shall result in a 100 percent of the system being tested every 5 years.

Other Post – 1994 Systems (mechanically exhausted storage occupancies)

- May be performed by either a Level – 1 or 2 special inspector.
- Shall test at least 50% of the smoke control and/or removal system annually as required for dedicated versus non-dedicated systems. Cumulative testing using the 50% option shall result in a 100 percent of the system being tested every 2 years.

**INITIAL RECERTIFICATION TESTING PROCEDURE**

1. The Owner or fire code official identifies a building containing a smoke control or removal system. Examples include:
  - Buildings with Pressurized Stair Enclosures.
  - High-rise buildings with Mechanical Smoke Control or Removal Systems.
  - Mall buildings containing Mechanical Smoke Control Systems.
  - Buildings with Atria
  - Buildings with Mechanical Smoke Control Systems in lieu of smoke & heat venting.
  - Other buildings with Mechanical Smoke Control or Removal Systems such as hospitals and jails.
2. Owner contacts the fire code official to obtain list of pre-approved special inspectors. The Southern Nevada Fire Code Committee maintains this list.
3. Owner employs an approved special inspector to write the smoke control and/or removal test plan report.

If there is no previously approved report, the smoke control and/or removal report required in this section shall constitute the initial document regarding the design and expectations of the existing smoke control and/or removal system. If no record documents are found then the special inspector and owner or owners' representative shall meet to discuss alternative documentation requirements, and shall submit the alternate documentation to the fire code official for approval.

4. When required by the fire code official, a meeting shall be arranged between the owner, fire code official and special inspector to determine what tests are required. This meeting will also provide an opportunity for discussion of any unique aspects of the facility.
5. The special inspection agency shall prepare a test plan and schedule for 100% of the building.
6. A test plan report shall be submitted for review and be approved by both the Owner and the fire code official prior to the commencement of any testing.
7. Testing shall be conducted and a final report submitted within 180 days after the test plan report is approved. The following is the minimum testing and/or auditing of records that shall be performed in order for a special inspector to issue a certificate of compliance.

**A. Testing**

- All testing shall be coordinated with the companies holding the maintenance contracts for affected systems. (Fire alarm, sprinkler, HVAC, kitchen hood etc.)
- Verify that devices are properly annunciated at the control panel.
- Verify system function by placing zones into alarm and checking the input and output signals and device functionality against the information contained within the test plan report.



- Verify system performance by measuring appropriate indicators. These may include differential pressure, fan performance (i.e., CFM, voltage, amperage), and door openings forces.
  - A percentage as approved by the fire code official of smoke control system testing shall be performed using standby or emergency power.
- B. Records Review
- Verification of location and integrity of smoke zone boundaries to approved documents.
  - Review of the building's maintenance records of devices and equipment making up the smoke control and/or removal system; this is to include as a minimum: initiating devices, fans, dampers, controls, doors and windows if self or automatic closing.
  - Verify that the appropriate maintenance requirements are being met by the facility.
  - Documentation shall be on forms submitted as a part of the preliminary smoke control and/or removal report.
8. Special Inspectors shall immediately notify the fire code official in writing whenever it is determined that a smoke control and/or removal system, or substantial portion thereof, is inoperable
  9. The special inspector upon discovery of any non-complying aspect shall give written notice (non-compliance report) to the owner if the item is not corrected prior to the special inspector leaving for the day. All non-complying aspects shall be corrected.
  10. Special Inspector shall notify the fire code official of all items not corrected within 30 days from date of discovery.
  11. Within 30 days of completion of the testing the Final Report shall be submitted, signed by special inspector and owner, to the fire code official. Any unresolved issues shall be identified in summary form in the initial sections of the report.
  12. Fire code official reviews the report. This completes the special inspector testing for this period of time.
  13. The fire code official may charge for any work associated with the recertification or testing of smoke control and/or removal systems in accordance with local ordinances.

### **PERIODIC TESTING PROCEDURE**

1. The owner or fire code official identifies a building containing a smoke control or removal system. Examples include:
  - Buildings with Pressurized Stair Enclosures.
  - High-rise buildings with Mechanical Smoke Control or Removal Systems.
  - Mall buildings containing Mechanical Smoke Control Systems.
  - Buildings with Atria built under the 1994 code.
  - Buildings with Mechanical Smoke Control Systems in lieu of smoke & heat

venting.

- Other buildings with Mechanical Smoke Control or Removal Systems such as hospitals and jails.
2. Owner contacts the fire code official to obtain list of pre-approved special inspectors. The Southern Nevada Fire Code Committee maintains this list.
  3. Owner employs an approved special inspector to write the smoke control and/or removal test plan report.

If there is no previously approved report, the smoke control and/or removal report required in this section shall constitute the initial document regarding the design and expectations of the existing smoke control and/or removal system. If no record documents are found then the special inspector and owner or owners' representative shall meet to discuss alternative documentation requirements, and shall submit the alternate documentation to the fire code official for approval.

4. When required by the fire code official, a meeting shall be arranged between the owner, fire code official and special inspector to determine what tests are required. This meeting will also provide an opportunity for discussion of any unique aspects of the facility.
5. The special inspection agency shall prepare a test plan and schedule based on the specific test period.
6. A test plan report shall be submitted for review and be approved by both the Owner and the fire code official prior to the commencement of any testing.
7. Testing of the standby and emergency power shall be in accordance with the approved test plan.
8. Special Inspectors shall immediately notify the fire code official in writing whenever it is determined that a smoke control and/or removal system, or substantial portion thereof, is inoperable.
9. The special inspector upon discovery of any non-complying aspect shall give written notice (non-compliance report) to the owner if the item is not corrected prior to the special inspector leaving for the day. All non-complying aspects shall be corrected.
10. Special Inspector shall notify the fire code official of all items not corrected within 30 days from date of discovery.
11. Within 30 days of completion of the testing the periodic testing report shall be submitted, signed by special inspector and owner, to the fire code official. Any unresolved issues shall be identified in summary form in the initial sections of the report.
12. Fire code official reviews the report. This completes the special inspectors testing for this period of time.
13. The fire code official may charge for any work associated with the recertification or testing of smoke control and/or removal systems in accordance with local ordinances.

## **CERTIFICATE OF COMPLIANCE**

A certificate that is provided by the special inspector certifying that the referenced

property is in substantial compliance. The certificate shall identify the company and special inspector that performed the testing, name, date and address of the property being tested, plus the following statement:

*I have reviewed this report and by personal knowledge and on-site observation certify that the smoke control and/or removal system is in substantial compliance with the approved design documents, and to the best of my understanding complies with requirements of the applicable codes as identified in the smoke control and/or removal report.*

A sample Certificate of Compliance Tag or placard certificate shall be submitted for review and be approved by the fire code official.

The Certificate of Compliance Tag or a placard certificate (8-1/2" x 11") shall be attached to or mounted adjacent to the smoke control and/or removal panel.

## APPENDIX A

### REFERENCE DOCUMENTS, TO BE USED AS NEEDED

#### Applicable Codes

- Building
- Fire
- Mechanical
- Approved Code Modifications or Variances

#### Design Methodology

- Describe the original design criteria
- Designate smoke zones using mechanical technology
  - Pressure Differential
  - Exhaust Method
- Designate smoke zones using passive technology
- Small scale drawings showing zoning

#### Testing forms

- Area or equipment covered
- Acceptability of test results
- Signature of inspector(s) and date of test

#### Testing scenarios

- Shall be designed to anticipate all potential events
- Designate whether testing is intrusive or non-intrusive to the normal operations of the facility
- Fans shall be tested to verify airflow and amperage drain

#### Control Diagrams

- Location of all devices that initiate smoke control
- Location of all devices involved in the smoke control process (including control dampers, smoke dampers, variable air volume controls, and fans)
- Identification of all devices provided with standby power
- Locations of active and passive smoke barriers
- Smoke control method being used for each smoke zone

#### Control Diagrams (continued)

- Capacities of each fan involved in smoke control
- Sequence of operations (including timing, if necessary to prevent duct implosion or explosion)
- Positioning of each damper for every fire scenario

Life Safety Report or Fire Protection Report

- Sprinkler System
  - As-built drawings

Fire Alarm System

- As-built drawings
- Original Program of Record (showing revision level)
- Current Program of Record (showing revision level)
- Print out of comparison report using built-in software
- Record of inspections, tests and maintenance
- Diskette of original fire alarm programming
- Identify applicable maintenance procedures

As-built Mechanical Drawings

- Design documents (specifications)
- Identify applicable maintenance procedures

As-built Building Automation System Drawings

- Design documents (specifications)
- Identify applicable maintenance procedures

As-built Architectural Drawings

- Wall ratings
- Door ratings and hardware schedule
- Draft curtains
- Smoke barriers
- Identify applicable maintenance procedures

Review Operations and Maintenance Documentation

- Documentation of changes to system

Sample Certificate of Compliance

- Statement
- Tag

Final Report

- Acceptance and resolution for all non-compliance items
- Typed and bound
- Minimum of 4 copies
- One CD containing the report in Adobe Acrobat (PDF) formats.

<b>Approved by:</b>	Southern Nevada Fire Code Committee
<b>Date Approved:</b>	TBD
<b>Revision Date:</b>	June 2, 2011
<b>Previous Rev. Date:</b>	June 19, 2003