TECHNICAL BULLETIN

CITY OF RALEIGH, N.C.	Planning & Development Building & Safety		
SUBJECT **Smoke Control Systems: Special Inspections REPORTS**	Authority NC Building Code	Section(s) 909	Notice DATE 01 July 2023
	PREPARED BY Special Projects Team - JW		APPROVED BY Bryan Robinson, CBO

1.0 Purpose

Provide clarification for special inspections reports related to smoke control systems: responsible parties, content information and turnover of reports for building occupancy in new construction.

2.0 Scope

Where application is made to the building official for construction as specified in the North Carolina Administrative Code and Policies, the owner shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in Section 1705 and identify the approved agencies to the building official.

Organization(s) Effected

City of Raleigh Fire Marshal's Office
Planning and Development – Building Safety
Building Owners, Design Professionals, Contractors

3.0 References

North Carolina Building Code
North Carolina Fire Code
NFPA 92

4.0 Definitions

[A] APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, where such agency has been approved by the building official.

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. A *registered design professional* engaged by the owner or the owner's authorized agent to review and coordinate certain aspects of the project, as determined by the *building official*, for compatibility with the design of the building or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.

Smoke Control System An engineered system that includes all methods that can be used singularly or in combination to modify smoke movement. (per NFPA 92)

[BS] SPECIAL INSPECTOR. A qualified person employed or retained by an *approved* agency and *approved* by the *building official* as having the competence necessary to inspect a particular type of construction requiring *special inspection.*

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5.0 Requirements

Reports

Once the testing by the special inspector is complete, documentation of the activity is required. This documentation is to be prepared in the form of a report. Content in the report may vary depending on system design. This report is to be provided to the building official and a copy is also to remain in the building in an approved location.

[F] 909.18.8.3 Reports. A complete report of testing shall be prepared by the approved agency. The report shall include identification of all devices by manufacturer, nameplate data, design values, measured values and identification tag or mark. The report shall be reviewed by the responsible registered design professional and, when satisfied that the design intent has been achieved, the responsible registered design professional shall sign, seal and date the report.
The report needs to be reviewed, approved, and then signed, sealed and dated. This report is to be provided to the building official and a copy is also to remain in the building in an approved location. When a fire command center is required, this is the best location for such documents. Otherwise, a location such as the security office or building manager's office might be appropriate.

[F] 909.19 System acceptance. Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the fire code official determines that the provisions of this section have been fully complied with and that the fire department has received satisfactory instruction on the operation, both automatic and manual, of the system and a written maintenance program complying with the requirements of Section 909.20.1 of the *International Fire Code* has been submitted and approved by the fire code official.

6.0 Enforcement

6.1 Continuous

This technical bulletin references code requirements already in effect and being enforced.

6.2 Final Inspection

Prior to occupancy, a final special inspections report shall be submitted to the building official prior to verification inspection.

6.3 Record Keeping

A copy of the final report shall be filed with the fire code official, and an identical copy shall be maintained in an approved location at the building.

7.0 References

1704.2 Special inspections and tests. Where application is made to the building official for construction as specified in the North Carolina Administrative Code and Policies, the owner shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in Section 1705 and identify the approved agencies to the building official.
*The contractor is permitted to employ the approved agencies where the contractor is also the owner.

1704.2.1 Special inspector qualifications. *The registered design professional in responsible charge* or engineers of record involved in the design of the project shall indicate in the project documents the required qualifications of the *special inspector*.

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1704.3 Statement of special inspections. Where *special inspections* or tests are required by Section 1705, the *registered design professional in responsible charge* for each discipline shall prepare a statement of *special inspections* in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3. Statements of special inspections shall be included in the construction documents.

[F] 1705.18 Testing for smoke control. Smoke control systems shall be tested by a special inspector.

[F] 1705.18.1 Testing scope. The test scope shall be as follows:
1. During erection of ductwork and prior to concealment for the purposes of leakage testing and recording of device location.
2. Prior to occupancy and after sufficient completion for the purposes of pressure difference testing, flow measurements and detection and control verification.

[F] 1705.18.2 Qualifications. *Approved agencies* for smoke control testing shall have expertise in fire protection engineering, mechanical engineering and certification as air balancers.

Supporting code sections

Building codes for reference:

[F] 909.1 Scope and purpose. This section applies to mechanical or passive smoke control systems where they are required by other provisions of this code. The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations or for assistance in fire suppression or overhaul activities. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat venting provisions found in Section 910. Mechanical smoke control systems shall not be considered exhaust systems under Chapter 5 of the *International Mechanical Code*.

[F] 909.3 Special inspection and test requirements.
In addition to the ordinary inspection and test requirements that buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 shall undergo *special inspections* and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the *construction documents* shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same
terms in Section 1704.

[F] 909.18 Acceptance testing. Devices, equipment, components, and sequences shall be individually tested. These tests, in addition to those required by other provisions of this code, shall consist of determination of function, sequence and, where applicable, capacity of their installed condition.

[F] 909.18.1 Detection devices. Smoke or fire detectors that are a part of a smoke control system shall be tested in accordance with Chapter 9 in their installed condition. Where applicable, this testing shall include verification of airflow in both minimum and maximum conditions.

[F] 909.18.2 Ducts. Ducts that are part of a smoke control system shall be traversed using generally accepted practices to determine actual air quantities.

[F] 909.18.3 Dampers. *Dampers* shall be tested for function in their installed condition.

[F] 909.18.4 Inlets and outlets. Inlets and outlets shall be read using generally accepted practices to determine air quantities.

[F] 909.18.5 Fans. Fans shall be examined for correct rotation. Measurements of voltage, amperage, revolutions per minute (rpm) and belt tension shall be made.

[F] 909.18.6 Smoke barriers. Measurements using inclined manometers or other *approved* calibrated measuring devices shall be made of the pressure differences across *smoke barriers*. Such measurements shall be conducted for each possible smoke control condition.

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[F] 909.18.7 Controls. Each smoke zone equipped with an automatic-initiation device shall be put into operation by the actuation of one such device. Each additional device within the zone shall be verified to cause the same sequence without requiring the operation of fan motors in order to prevent damage. Control sequences shall be verified throughout the system, including verification of override from the fire-fighter's control panel and simulation of standby power conditions.

[F] 909.18.8 Testing for smoke control. Smoke control systems shall be tested by a special inspector in accordance with Section 1705.18.

[F] 909.18.8.1 Scope of testing. Testing shall be conducted in accordance with the following:

1. During erection of ductwork and prior to concealment for the purposes of leakage testing and recording of device location.
2. Prior to occupancy and after sufficient completion for the purposes of pressure-difference testing, flow measurements, and detection and control verification.

[F] 909.18.8.2 Qualifications. *Approved* agencies for smoke control testing shall have expertise in fire protection engineering, mechanical engineering and certification as air balancers.

[F] 909.18.8.3 Reports. A complete report of testing shall be prepared by the *approved* agency. The report shall include identification of all devices by manufacturer, nameplate data, design values, measured values and identification tag or *mark*. The report shall be reviewed by the responsible *registered design professional* and, when satisfied that the design intent has been achieved, the **responsible *registered design professional*** shall sign, seal and date the report.

[F] 909.18.8.3.1 Report filing. A copy of the final report shall be filed with the fire code official, and an identical copy shall be maintained in an *approved* location at the building.

[F] 909.18.9 Identification and documentation. Charts, drawings and other documents identifying and locating each component of the smoke control system, and describing its proper function and maintenance requirements, shall be maintained on file at the building as an **attachment to the report** required by Section 909.18.8.3. Devices shall have an *approved* identifying tag or *mark* on them consistent with the other required documentation and shall be dated indicating the last time they were successfully tested and by whom.

[F] 909.19 System acceptance. Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the fire code official determines that the provisions of this section have been fully complied with and that the fire department has received satisfactory instruction on the operation, both automatic and manual, of the system and a written maintenance program complying with the requirements of Section 909.20.1 of the *International Fire Code* has been submitted and approved by the fire code official.

> **Exception:** In buildings of phased construction, a temporary certificate of occupancy, as *approved* by the fire code official, shall be allowed provided that those portions of the building to be occupied meet the requirements of this section and that the remainder does not pose a significant hazard to the safety of the proposed occupants or adjacent buildings.

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Maintenance:

FIRE CODE references re: maintenance

909.20 Maintenance. Smoke control systems shall be maintained to ensure to a reasonable degree that the system is capable of controlling smoke for the duration required. The system shall be maintained in accordance with the manufacturer's instructions and Sections 909.20.1 through 909.20.6.

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 Records. Records of smoke control system testing and maintenance shall be maintained. The 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. The system shall be tested under standby power conditions.

909.20.5 Nondedicated smoke control systems. Nondedicated smoke control systems shall be operated for each control sequence annually. The system shall be tested under standby power conditions.

909.20.6 Components bypassing weekly test. Where components of the smoke control system are bypassed by the preprogrammed weekly test required by Section 909.12.1, such components shall be tested semiannually. The system shall be tested under standby power conditions.

909.20.7 Manual smoke removal. Where manually operated panels or windows are required by Section 403.4.6 of the *North Carolina Building Code,* they shall be maintained in an operable condition and identified in an *approved* manner.

Amendments

N/A

8.0 Frequently Asked Questions

1) **Q**. Is the final report required to be submitted prior to final inspections?

   A. Yes. Since functional inspections of the smoke control system include all equipment. It is important that final inspections related to the smoke control system be conducted after a complete final report has been submitted and accepted. The report shall be reviewed by the responsible registered design professional and, when satisfied that the design intent has been achieved, the responsible registered design professional shall sign, seal and date the report.

2) **Q**. What information is required in the smoke control report?

   A. Smoke control systems vary in design and complexity and may have different data to include in a report. A complete report of testing shall be prepared by the approved agency. During the design process, a "detailed design report" and "operations and maintenance manual" shall be created. The cumulative information from design to testing and maintenance shall be contained in the final report.

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3) **Q**. What information is in a "detailed design report" for smoke control systems?

A. Per NFPA 92 – the detailed design report shall contain documentation of the smoke control system as it is designed and intended to be installed. This report shall contain the following elements if applicable:

i. System purpose
ii. System design objectives
iii. Design approach
iv. Design assumptions (building height, ambient conditions, reliance on other fire protective systems, leakage, etc.)
v. Location of smoke zones
vi. Building use limitations that arise out of the system design
vii. Design calculations
viii. Fan and duct specifications
ix. Damper specifications
x. Detailed inlet or exhaust inlets site information
xi. Detailed method of activation
xii. Smoke control system operation logic
xiii. System commissioning procedures

4) **Q**. What information is required in the "operations and maintenance manual" for smoke control systems?

A. Per NFPA 92 – The operations and maintenance manual shall provide the requirements to ensure the proper operation of the system for the life of the building. The manual shall include the following:

i. The procedures used in the commissioning of the system as well as the measured performance of the system at the time of commissioning.
ii. The testing and inspection requirements for the system and system components and the required frequency of testing.
iii. The critical design assumptions used in the design and limitations on the building and its use that arise out of the design assumptions and limitations.
iv. The purpose of the smoke control system.

5) **Q**. What do I do with the smoke control report once inspections have been approved?

A. A copy of the final report shall be filed with the fire code official, and an identical copy shall be maintained in an approved location at the building.

Bryan Robinson 08-14-2023 - Approved by
(Bryan Robinson – CBO) Date

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