
 DEPARTMENT OF ADMINISTRATIVE SERVICES
OFFICE OF EDUCATION AND DATA MANAGEMENT


Special Inspections

*Presented by
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Licensed Building Official, Licensed Architect
for the*


*Office of Education and Data Management
Spring 2016 Career Development Series*

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WHICH IS YOU?




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OR THIS?




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Would you like some assistants ...

... if you didn't have to pay them?



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Pop Quiz:

Special Inspections are only required for threshold buildings.

True
 False

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Pop Quiz:

Special Inspections are only required for threshold buildings.

True
 False

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Special inspections are based on Chapter 17 of the IBC; they apply to any building or structure for which a permit is issued under the IBC.

Threshold buildings are a Connecticut-specific definition, found in Chapter 1. The primary impact of the threshold buildings amendment is the requirement for third-party structural review.

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Connecticut amendment to IBC 2012:

(Add) 107.7.1 Requirements for proposed structures or additions that exceed the threshold limits. Pursuant to section 29-276b of the Connecticut General Statutes, if a proposed structure or addition to an existing structure will exceed the threshold limit set forth in Section 107.7 of this code, the building official of the municipality in which the structure or addition will be located shall require that an independent structural engineering consultant review the structural plans and design specifications of the structure or addition to be constructed to determine compliance with the requirements of this code to the extent necessary to assure the stability and integrity of the primary structural support systems of such structure or addition. Any modifications of approved structural plans or design specifications shall require shop drawings to the extent necessary to determine compliance with the requirements of this code and shall be reviewed by such consultant. Any fees relative to such review requirements shall be paid by the owner of the proposed building project.

If a structure or addition exceeds the threshold limit, the architect of record, professional engineer of record responsible for the design of the structure or addition and the general contractor shall sign a statement of professional opinion affirming that the completed construction is in substantial compliance with the approved plans and design specifications. If fabricated structural load-bearing members or assemblies are used in the construction, the professional engineer responsible for the design of such members or assemblies shall sign a statement of professional opinion affirming that the completed fabrication is in substantial compliance with the approved design specifications.

The building official of the municipality in which the structure or addition will be located shall satisfy himself that each architect, professional engineer, including each professional engineer responsible for the design of fabricated structural load-bearing members or assemblies, general contractor and major subcontractor involved in the project holds a license to engage in the work or occupation for which the appropriate building permit has been issued.


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(Add) 107.7.1 Requirements for proposed structures or additions that exceed the threshold limits. Pursuant to section 29-276b of the Connecticut General Statutes, if a proposed structure or addition to an existing structure will exceed the threshold limit set forth in Section 107.7 of this code, the building official of the municipality in which the structure or addition will be located shall require that an independent structural engineering consultant review the structural plans and design specifications of the structure or addition to be constructed to determine compliance with the requirements of this code to the extent necessary to assure the stability and integrity of the primary structural support systems of such structure or addition. Any modifications of approved structural plans or design specifications shall require shop drawings to the extent necessary to determine compliance with the requirements of this code and shall be reviewed by such consultant. Any fees relative to such review requirements shall be paid by the owner of the proposed building project.

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1704.2 Special inspections. Where application is made for construction as described in this section, **the owner** or the *registered design professional in responsible charge* acting as the owner's agent shall employ one or more *approved agencies* to perform inspections during construction on the types of work listed under Section 1705. These inspections are in addition to the inspections identified in Section 110.

(Source: IBC 2012)

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Exceptions:

1. *Special inspections* are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as *approved* by the *building official*.
2. Unless otherwise required by the *building official*, *special inspections* are not required for Group U occupancies that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1.
3. *Special inspections* are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.

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Why have Special Inspections?

- The old, "traditional" system wasn't working.
- Collapses:
 - 1978: Hartford Civic Center collapse
 - 1981: Kansas City Hyatt Regency catwalk failure
 - 1987: L'Ambience Plaza, Bridgeport, collapse

The code community and the engineering profession decided that there was a need for more involvement and oversight by the engineers during construction. The result was what we know as Special Inspections.


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CHAPTER 17 IS YOUR FRIEND!

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**CHAPTER 17
SPECIAL INSPECTIONS AND TESTS**

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How does it work?

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Chapter 1: Permit application

105.3 Application for permit. To obtain a *permit*, the applicant shall first file an application therefor in writing on a form furnished by the department of building safety for that purpose. Such application shall:

1. Identify and describe the work to be covered by the *permit* for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by *construction documents* and other information as required in Section 107.
5. State the valuation of the proposed work.
6. Be signed by the applicant, or the applicant's authorized agent.
7. Give such other data and information as required by the *building official*.

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**SECTION 107
SUBMITTAL DOCUMENTS**

107.1 General. ~~Submittal documents~~ consisting of *construction documents*, statement of special inspections, geotechnical report and other data shall be submitted in two or more sets with each *permit* application. The *construction documents* shall be prepared by a *registered design professional* where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a *registered design professional*.

Exception: The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a *registered design professional* if it is found that the nature of the work applied for is such that review of *construction documents* is not necessary to obtain compliance with this code.

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1704.2.3 Statement of special inspections. The applicant shall submit a statement of *special inspections* in accordance with Section 107.1 as a condition for permit issuance. This statement shall be in accordance with Section 1704.3.

Exception: A statement of *special inspections* is not required for portions of structures designed and constructed in accordance with the cold-formed steel lightframe construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.


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What is this “Statement of Special Inspections” thing, anyway?

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What’s this “Statement of Special Inspections” thing?

IT’S THE BIBLE FOR THE PROJECT. It spells out:

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What’s this “Statement of Special Inspections” thing?

IT’S THE BIBLE FOR THE PROJECT. It spells out:

- What gets inspected?

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What's this "Statement of Special Inspections" thing?

IT'S THE BIBLE FOR THE PROJECT. It spells out:

- What gets inspected?
- Who inspects it?

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What's this "Statement of Special Inspections" thing?

IT'S THE BIBLE FOR THE PROJECT. It spells out:

- What gets inspected?
- Who inspects it?
- How often it gets inspected?

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Special Inspections were introduced into the BOCA Basic Building Code in the 1988 edition. Connecticut didn't adopt BOCA 1988. We first got Special Inspections in 1994, when we adopted the 1990 BOCA Basic Building Code.


Problem: When Special Inspections were first introduced, there was no professional standard of care for performing Special Inspections. That meant – no professional liability coverage.


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Connecticut's Three Musketeers:

- John Ruddy, P.E.
- Ken Gibble, P.E.
- Dick DiSalvo, P.E.




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Ruddy, Gibble and DiSalvo created the **Statement of Special Inspections** form as a way of creating and standardizing a standard of care for engineers performing Special Inspections.


- Created for the Structural Engineers Coalition (SEC) of Connecticut Engineers in Private Practice (CEPP).
- Subsequently donated to the national engineers' professional society and promulgated nationally by CASE (Council of American Structural Engineers).


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CASE also puts out a very useful guide that helps explain how the Special Inspections process works.

Available on-line.




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Quality Assurance Plan

Quality Assurance for Seismic Resistance

Seismic Design Category: **C (per 1)**

Quality Assurance Plan Required (Y/N): **Yes**

Description of seismic force resisting system and integrated seismic systems:
When the building is designed for Seismic Category C, a portion of the building has been designed for intermediate moment-resisting frames (MRF) or F or F₁ or F₂ and is classified as Seismic Category C. The building is also supported from ground anchorage with Ground Anchor and Concrete Slab Walls.

Within the higher modal portion of the building, connections and supports for MRF elements meet or exceed the higher seismic forces.

Basic Project Information

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Other Permit Application Information:

"Seismic Design Category" must be indicated on the construction documents.

Caution -

Seismic Design Category is not the same as Site Class – but they use the same alphabetic classifications.

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SITE CLASS. A classification assigned to a site based on the types of soils present and their engineering properties as defined in Section 1613.3.2.

1613.3.2 Site class definitions. Based on the site soil properties, the site shall be classified as *Site Class A, B, C, D, E or F* in accordance with Chapter 20 of ASCE 7. Where the soil properties are not known in sufficient detail to determine the site class, Site Class D shall be used unless the building official or geotechnical data determines Site Class E or F soils are present at the site.

Applies to the site, and is determined by the geotechnical consultant, if there is one, or by the structural engineer-of-record.

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SEISMIC DESIGN CATEGORY. A classification assigned to a structure based on its *risk category* and the severity of the *design earthquake ground motion* at the site.

1613.3.5 Determination of seismic design category. Structures classified as *Risk Category* I, II or III that are located where the mapped spectral response acceleration parameter at 1-second period, S_1 , is greater than or equal to 0.75 shall be assigned to *Seismic Design Category* E. Structures classified as *Risk Category* IV that are located where the mapped spectral response acceleration parameter at 1-second period, S_1 , is greater than or equal to 0.75 shall be assigned to *Seismic Design Category* F. All other structures shall be assigned to a *seismic design category* based on their *risk category* and the design spectral response acceleration parameters, SDS and $SD1$, determined in accordance with Section 1613.3.4 or the site-specific procedures of ASCE 7. Each building and structure shall be assigned to the more severe *seismic design category* in accordance with Table 1613.3.5(1) or 1613.5.5(2), irrespective of the fundamental period of vibration of the structure.

Applies to the building, and is determined by the structural engineer-of-record

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TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATIONS


VALUE OF S_{DS}	RISK CATEGORY			
	I or II	III	IV	
$S_{DS} < 0.167g$	A	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D	D
$0.50g \leq S_{DS}$	D	D	D	D

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY			
	I or II	III	IV	
$S_{D1} < 0.067g$	A	A	A	A
$0.067g \leq S_{D1} < 0.133g$	B	B	C	C
$0.133g \leq S_{D1} < 0.20g$	C	C	D	D
$0.20g \leq S_{D1}$	D	D	D	D

2012 INTERNATIONAL BUILDING CODE® 367

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1604.5 Risk category. Each building and structure shall be assigned a *risk category* in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the *risk category* shall not be taken as lower than the occupancy category specified therein.

1604.5.1 Multiple occupancies. Where a building or structure is occupied by two or more occupancies not included in the same *risk category*, it shall be assigned the classification of the highest *risk category* corresponding to the various occupancies. Where buildings or structures have two or more portions that are structurally separated, each portion shall be separately classified. Where a separated portion of a building or structure provides required access to, required egress from or shares life safety components with another portion having a higher *risk category*, both portions shall be assigned to the higher *risk category*.

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IV Buildings and other structures designated as essential facilities, including but not limited to:

- Group I-2 occupancies having surgery or emergency treatment facilities.
- Fire, rescue, ambulance and police stations and emergency vehicle garages.
- Designated earthquake, hurricane or other emergency shelters.
- Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
- Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures.
- Buildings and other structures containing quantities of highly toxic materials that:
 - Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and
 - Are sufficient to pose a threat to the public if released ^b.

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IV Buildings and other structures designated as essential facilities, including but not limited to:

- Aviation control towers, air traffic control centers and emergency aircraft hangars.
- Buildings and other structures having critical national defense functions.
- Water storage facilities and pump structures required to maintain water pressure for fire suppression.

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TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATIONS

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50g \leq S_{DS}$	D	D	D

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.067g$	A	A	A
$0.067g \leq S_{DS} < 0.133g$	B	B	C
$0.133g \leq S_{DS} < 0.20g$	C	C	D
$0.20g \leq S_{DS}$	D	D	D

2012 INTERNATIONAL BUILDING CODE*

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PAY ATTENTION!

- Classification as Seismic Design Category C, D, E or F triggers stricter requirements for many materials and trades.
 - *BO does not make this classification. It is determined by the structural engineer.*


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1704.4 Contractor responsibility. Each contractor responsible for the construction of a main wind- or seismic force resisting system, designated seismic system or a wind- or seismic-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the *building official* and the owner **prior to the commencement of work on the system or component**. The contractor's statement of responsibility shall contain acknowledgement of awareness of the special requirements contained in the statement of *special inspection*.

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1704.5 Structural observations. Where required by the provisions of Section 1704.5.1 or 1704.5.2, the owner shall employ a *registered design professional* to perform structural observations as defined in Section 1702.

Prior to the commencement of observations, the structural observer shall submit to the *building official* a written statement identifying the frequency and extent of structural observations.

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Section 1702 sends us to Chapter 2:

STRUCTURAL OBSERVATION. The visual observation of the structural system by a *registered design professional* for general conformance to the *approved construction documents*. **Structural observation does not include or waive the responsibility for the inspection required by Section 110, 1705 or other sections of this code.**


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IMPORTANT TERMS:

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IMPORTANT TERMS:

SER: Structural Engineer of Record

- The engineer whose seal and signature are on the construction documents submitted for permit, AND on the Statement of Special Inspections
 - [Must be the same engineer]

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IMPORTANT TERMS:


SER: Structural Engineer of Record

- The engineer whose seal and signature are on the construction documents submitted for permit, AND on the Statement of Special Inspections
 - [Must be the same engineer]

RDPIRC: Registered Design Professional in Responsible Charge

- NOT the SER. The code requires special inspections of more than just structure. The RDPIRC is the engineer responsible for the design of each respective system or subsystem that requires Special Inspection, and who specifies the Special Inspection criteria.
 - The various RDPIRC may all be from one large firm, or they may be from different, smaller firms.

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IMPORTANT TERMS:

(My definitions):


Special Inspector: (a.k.a. Special Inspection Coordinator)

- The person or entity in overall charge of the Special Inspection program.
 - May be the same person or entity as the SER, but does not have to be.

special inspector:

- The person or entity possessing particular skills or expertise, who performs Special Inspections of one or more specific trades subject to Special Inspections.
 - May be the SER, one or more of the RDPIRC, or an independent testing laboratory or agency.

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IMPORTANT TERMS:

(IBC 2012 definition):

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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IMPORTANT TERMS:

Continuous Special Inspection:

- The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed. (*CASE Guide to Special Inspections)
- Special inspection by the special inspector who is present when and where the work to be inspected is being performed. (*IBC 2012)
 - When continuous inspection is required, 100% of the work must be inspected and it must be inspected as the work is being performed.

→ Read the Statement of Special Inspections. Many engineers don't understand what "continuous" means, and call for continuous inspection when it isn't necessary or practical. Remember, the Owner has to pay for these inspections.

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IMPORTANT TERMS:

Periodic Special Inspection:

- The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work. (*CASE Guide to Special Inspections)
- Special inspection by the special inspector who is intermittently present where the work to be inspected has been or is being performed. (*IBC 2012)
 - When periodic inspection is indicated, inspection of less than 100% of the work may be acceptable for certain items.
 - The Registered Design Professional, when preparing the Statement of Special Inspections, should indicate the frequency of inspection that is required.

→ Read the Statement of Special Inspections. Engineers often call for Periodic Inspection without specifying the frequency of the required inspections.

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YOU'RE IN CHARGE!

The Special Inspections program is primarily to assist the Building Official.

- Review the Statement of Special Inspections during the plan review stage.
- If you have questions, ask them.
- If you want changes, discuss with the engineer.

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BUILDING PERMIT APPLICATION SPECIAL INSPECTIONS CHECKLIST

- Special Inspector identified?
 - Engineer-of-Record, or independent inspector?
- Seismic Design Category listed on construction documents?
- Statement of Special Inspections submitted?
 - Frequency identified for periodic inspections?
- Testing laboratories and agents identified?
 - Qualifications reviewed and approved?
- Report interval appropriate to project?
- Compare Statement to Chapter 17 of Building Code
 - Is everything addressed?

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IBC 2012:

1704.2 Special inspections. Where application is made for construction as described in this section, the owner or the *registered design professional in responsible charge* acting as the owner's agent shall employ one or more *approved agencies* to perform inspections during construction on the types of work listed under Section 1705. These inspections are in addition to the inspections identified in Section 110.

- Section 110 tells us what the Building Department inspects
- Chapter 17 tells us what the Special Inspector(s) inspect

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Masonry

Code	Section	Section Title
91.05	91.05	General Requirements
91.05.1	91.05.1	General Requirements - Masonry
91.05.2	91.05.2	General Requirements - Concrete
91.05.3	91.05.3	General Requirements - Steel Decking
91.05.4	91.05.4	General Requirements - Formwork
91.05.5	91.05.5	General Requirements - Scaffolding
91.05.6	91.05.6	General Requirements - Shoring
91.05.7	91.05.7	General Requirements - Erection
91.05.8	91.05.8	General Requirements - Hoisting
91.05.9	91.05.9	General Requirements - Lifting
91.05.10	91.05.10	General Requirements - Tying
91.05.11	91.05.11	General Requirements - Welding
91.05.12	91.05.12	General Requirements - Painting
91.05.13	91.05.13	General Requirements - Finishing
91.05.14	91.05.14	General Requirements - Protection
91.05.15	91.05.15	General Requirements - Safety
91.05.16	91.05.16	General Requirements - Cleanliness
91.05.17	91.05.17	General Requirements - Record Keeping
91.05.18	91.05.18	General Requirements - Inspection
91.05.19	91.05.19	General Requirements - Testing
91.05.20	91.05.20	General Requirements - Material Storage
91.05.21	91.05.21	General Requirements - Site Access
91.05.22	91.05.22	General Requirements - Site Security
91.05.23	91.05.23	General Requirements - Site Cleanup
91.05.24	91.05.24	General Requirements - Site Restoration
91.05.25	91.05.25	General Requirements - Site Handover

Typical page

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REMEMBER:

“TBD” = “Not Gonna Happen”

Ask for qualifications of inspection agencies and inspectors during the permit review period, when you can control the process.

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Quality Assurance Plan

Quality Assurance for Permitting

Number Design Changes	0000
Number Inspections Performed (TBD)	0000
Number Quality Assurance Meetings (TBD)	0000

Quality Assurance for Permitting

Number Design Changes	0000
Number Inspections Performed (TBD)	0000
Number Quality Assurance Meetings (TBD)	0000

Statement of Responsibility

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Project Information

This information should already be shown on the construction documents. Check to be sure the information here agrees with the drawings.

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(Amd) **1704.2.4 Report requirement.** Special inspectors shall keep records of inspections. The special inspector shall furnish inspections reports to the building official, and to the registered design professional in responsible charge. Reports shall indicate that work inspected was or was not completed in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report of inspections documenting completion of all required special inspections and correction of any discrepancies noted in the inspections shall be submitted prior to the issuance of the Certificate of Occupancy. Interim reports shall be submitted periodically at the frequency agreed upon by the permit applicant and the building official prior to the start of work.

Source: 2015 Connecticut Amendment


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What does the Special Inspector Inspect?


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1704.5.1 Structural observations for seismic resistance. Structural observations shall be provided for those structures assigned to *Seismic Design Category D, E or F* where one or more of the following conditions exist:

1. The structure is classified as *Risk Category III or IV* in accordance with Table 1604.5.
2. The height of the structure is greater than 75 feet (22 860 mm) above the base.
3. The structure is assigned to *Seismic Design Category E*, is classified as *Risk Category I or II* in accordance with Table 1604.5, and is greater than two stories above grade plane.
4. When so designated by the registered design professional responsible for the structural design.
5. When such observation is specifically required by the building official.

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(Amd) **1704.5.2 Structural observations for wind requirements.**
Structural observations shall be provided for those structures sited where *V_{sd}* as determined in accordance with Appendix N exceeds 110 mph (49 m/sec), where one or more of the following conditions exist:

1. The structure is classified as Risk Category III or IV in accordance with Table 1604.5.
2. The building height of the structure is greater than 75 feet (22 860 mm).
3. When so designated by the registered design professional responsible for the structural design.
4. When such observation is specifically required by the building official.

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1705.1.1 Special cases. *Special inspections* shall be required for proposed work that is, in the opinion of the *building official*, unusual in its nature, such as, but not limited to, the following examples:

1. Construction materials and systems that are alternatives to materials and systems prescribed by this code.
2. Unusual design applications of materials described in this code.
3. Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in this code or in standards referenced by this code.

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1705.2 Steel construction. The *special inspections* for steel elements of buildings and structures shall be as required in this section.

Exception: *Special inspection* of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, and grade for the main stress-carrying elements are capable of being determined. Mill test reports shall be identifiable to the main stress-carrying elements when required by the approved construction documents.

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1705.2.1 Structural steel. Special inspection for structural steel shall be in accordance with the quality assurance inspection requirements of AISC 360.


1705.2.2 Steel construction other than structural steel. Special inspection for steel construction other than structural steel shall be in accordance with Table 1705.2.2 and this section.

1705.2.2.1 Welding. Welding inspection and welding inspector qualification shall be in accordance with this section.

1705.2.2.1.1 Cold-formed steel. Welding inspection and welding inspector qualification for coldformed steel floor and roof decks shall be in accordance with AWS D1.3.


1705.2.2.1.2 Reinforcing steel. Welding inspection and welding inspector qualification for reinforcing steel shall be in accordance with AWS D1.4 and ACI 318.

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(Amd) 1705.2.2.2. Cold-formed steel trusses. Where a cold-formed steel truss clear span is 30 feet (9,144 mm) or greater, the special inspector shall verify that the permanent individual truss member restraint/bracing is installed in accordance with the approved truss submittal package. Where a cold-formed steel truss clear span is 60 feet (18,288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.


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Code Statement of S.I.

Code	Statement of S.I.
1	1. Site Survey
2	2. Submittal Preparation
3	3. Field Inspection
4	4. Final Inspection
5	5. Final Report
6	6. Final Report
7	7. Final Report
8	8. Final Report
9	9. Final Report
10	10. Final Report
11	11. Final Report
12	12. Final Report
13	13. Final Report
14	14. Final Report
15	15. Final Report
16	16. Final Report
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100	100. Final Report

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1705.4 Masonry construction. Masonry construction shall be inspected and verified in accordance with TMS 402/ACI 530/ASCE 5 and TMS 602/ACI 530.1/ASCE 6 quality assurance program requirements.

Exception: *Special inspections* shall not be required for:

1. Empirically designed masonry, glass unit masonry or masonry veneer designed by Section 2109, 2110 or Chapter 14, respectively, where they are part of structures classified as *Risk Category I, II or III* in accordance with Section 1604.5.
2. Masonry foundation walls constructed in accordance with Table 1807.1.6.3(1), 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4).
3. Masonry fireplaces, masonry heaters or masonry chimneys installed or constructed in accordance with Section 2111, 2112 or 2113, respectively.

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1705.5 Wood construction. *Special inspections* of the fabrication process of prefabricated wood structural elements and assemblies shall be in accordance with Section 1704.2.5. *Special inspections* of site-built assemblies shall be in accordance with this section.

1705.5.1 High-load diaphragms.

Unusual construction. See the code if you encounter this.


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(Amd) 1705.5.2. Metal-plate-connected wood trusses. Where a truss clear span is 30 feet (9,144 mm) or greater, the special inspector shall verify that the permanent individual truss member restraint/bracing is installed in accordance with the approved truss submittal package. Where a truss clear span is 60 feet (18,288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

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Remember ...

Seismic Design Category?

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1705.11 Special inspections for seismic resistance. *Special inspections* itemized in Sections 1705.11.1 through 1705.11.8, unless exempted by the exceptions of Section 1704.2, are required for the following:

1. The seismic force-resisting systems in structures assigned to *Seismic Design Category C, D, E or F* in accordance with Sections 1705.11.1 through 1705.11.3, as applicable.
2. Designated seismic systems in structures assigned to *Seismic Design Category C, D, E or F* in accordance with Section 1705.11.4.
3. Architectural, mechanical and electrical components in accordance with Sections 1705.11.5 and 1705.11.6.
4. Storage racks in structures assigned to *Seismic Design Category D, E or F* in accordance with Section 1705.11.7.
5. Seismic isolation systems in accordance with Section 1705.11.8.

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WHY DO WE CARE ABOUT SEISMIC DESIGN CATEGORY?

Because I'm the Daddy and I say so.

And

Because ... reasons ...


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Seismic Design Category is a trap




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[A] 104.9 Approved materials and equipment.
Materials, equipment and devices *approved* by the *building official* shall be constructed and installed in accordance with such approval.

Source: 2012 IBC

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We have to read the instructions.

(Yes, turn in your man card.)

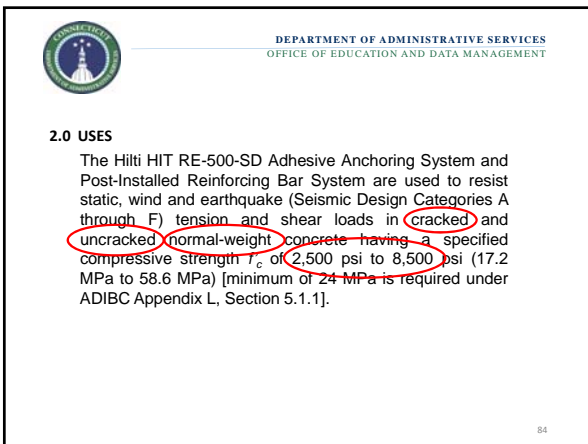
81




82



83



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4.1.11 Design Strength in Seismic Design Categories C, D, E and F: In structures assigned to Seismic Design Category C, D, E or F under the IBC or IRC, design anchors must be in accordance with ACI 318-14 17.2.3 or ACI 318-11 D.3.3, as applicable. Modifications to ACI 318-14 17.2.3 shall be applied under Section 1905.1.8 of the 2015 IBC. For the 2012 IBC, Section 1905.9 shall be omitted. Modifications to ACI 318 (-08, -05) D.3.3 must be applied under Section 1908.1.9 of the 2009 IBC or Section 1908.1.16 of the 2006 IBC, as applicable.

The nominal steel shear strength, V_{sp} must be adjusted by $\alpha_{V,seis}$ as given in the tables summarized in Table 1 for the corresponding anchor steel. The nominal bond strength $T_{k,cr}$ must be adjusted by $\alpha_{N,seis}$ as given in the tables summarized in Table 1 for the corresponding anchor steel.

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Highlight differences **IBC-RE 508** **IBC-RE 508-02**
 Reinforcing anchor Reinforcing anchor

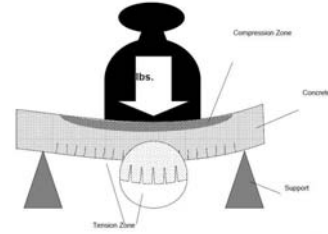
	IBC-RE 508	IBC-RE 508-02
Steel anchors	<ul style="list-style-type: none"> • Deformed steel bars • Deformed steel cables 	<ul style="list-style-type: none"> • Deformed steel bars • Deformed steel cables
Steel material condition	<ul style="list-style-type: none"> • CR • S • M • F 	<ul style="list-style-type: none"> • CR • S • M • F
Clearing procedure	<ul style="list-style-type: none"> • Compression at loading • Anchor casting 	<ul style="list-style-type: none"> • Compression at loading • Anchor casting
Anchority criteria	<ul style="list-style-type: none"> • 40% deformed steel • 40% A deformed steel • 40% A deformed steel • 40% A deformed steel • 40% A deformed steel • 40% A deformed steel 	<ul style="list-style-type: none"> • 40% deformed steel • 40% A deformed steel • 40% A deformed steel • 40% A deformed steel • 40% A deformed steel • 40% A deformed steel
Seismic	Yes	Yes
Storage and transportation	<ul style="list-style-type: none"> • 30' x 30' • 30' x 30' 	<ul style="list-style-type: none"> • 30' x 30' • 30' x 30'
Storage and transportation	<ul style="list-style-type: none"> • 30' x 30' • 30' x 30' 	<ul style="list-style-type: none"> • 30' x 30' • 30' x 30'
Temperature range	<ul style="list-style-type: none"> • -40° to 120° F • -40° to 120° F 	<ul style="list-style-type: none"> • -40° to 120° F • -40° to 120° F
Approved / Test reports	<ul style="list-style-type: none"> • ICC-ES ESR-1001 • ICC-ES ESR-1001 	<ul style="list-style-type: none"> • ICC-ES ESR-1001 • ICC-ES ESR-1001
Load information available	<ul style="list-style-type: none"> • Yes • Yes 	<ul style="list-style-type: none"> • Yes • Yes
Advantages	<ul style="list-style-type: none"> • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement 	<ul style="list-style-type: none"> • Suitable for use in congested and awkward locations with all standard equipment • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement • Long working time allows greater flexibility in placement

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IBS **IBS: Outperform. Outlast.**

What is cracked and uncracked concrete?




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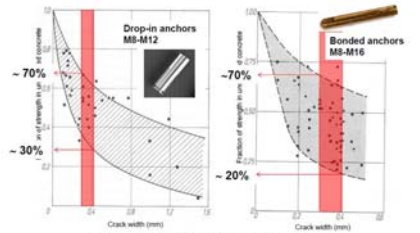

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HILTI Hilti. Outperform. Outlast.



performance of anchors in cracked concrete



www.hilti.com Elgehabazen, et al. 1998 Hilti Hilti Safety Seminar May 8, 2008

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HILTI Hilti. Outperform. Outlast.

Anchors Not Suitable For IBC 2006 - Concrete

- Drop In Anchors - Any Manufacture 
- HDI-P - Hilti Anchors for PT Slab 
- Powers Spike Anchor 
- Powers Drive Anchors 
- Tapcon Screw Anchors 
- No approved screw anchors yet 
- No Shot Pins 

www.hilti.com Hilti Hilti Safety Seminar May 8, 2008

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If we can't use drop-in anchors, what can we use?

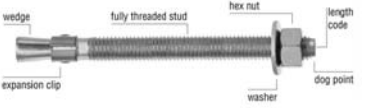


FIGURE 1—ITW RED HEAD TRUBOLT WEDGE ANCHOR

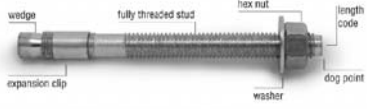



FIGURE 1—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR
(Carbon and Stainless Steel)

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If we can't use drop-in anchors, what can we use?

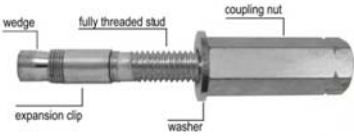


FIGURE 2—OVERHEAD TRUBOLT+ WEDGE ANCHOR

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Testing Laboratories

TRUST, BUT VERIFY

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Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM C 1090 - 10 (Reapproved 2015)

1. **Scope**
1.1 These methods cover procedures for determining the thickness and density of sprayed fire-resistive material (SFRM) applied to structural members. The methods are applicable to SFRM applied to steel, concrete and masonry. It is intended to be used in conjunction with ASTM C 1091.

2. **Referenced Documents**
2.1 *ASTM Standards*
2.1.1 *ASTM C 1091*, Standard Test Method of Test for Density and Thickness of Sprayed Fire-Resistive Material Applied to Structural Members
2.1.2 *ASTM C 1092*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.3 *ASTM C 1093*, Standard Test Method for Determination of the Density of Building Concrete
2.1.4 *ASTM C 1094*, Standard Test Method for Determination of the Density of Building Concrete
2.1.5 *ASTM C 1095*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.6 *ASTM C 1096*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.7 *ASTM C 1097*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.8 *ASTM C 1098*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.9 *ASTM C 1099*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.10 *ASTM C 1100*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.11 *ASTM C 1101*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.12 *ASTM C 1102*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.13 *ASTM C 1103*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.14 *ASTM C 1104*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.15 *ASTM C 1105*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.16 *ASTM C 1106*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.17 *ASTM C 1107*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.18 *ASTM C 1108*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.19 *ASTM C 1109*, Standard Test Method for Determination of the Density of Mortar and Concrete
2.1.20 *ASTM C 1110*, Standard Test Method for Determination of the Density of Mortar and Concrete

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Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM C 1090 - 10 (Reapproved 2015)

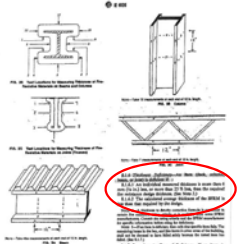



FIG. 35 Test Locations for Measuring Thickness of Fire-Resistive Material on Beams (Thickness)
FIG. 36 Beam
FIG. 37 Column
FIG. 38 Column
FIG. 39 Joist

Note—Take 12 measurements at each end of 12 in. length.
Note—Take 7 measurements at each end of 12 in. length.

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Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM C 1090 - 10 (Reapproved 2015)

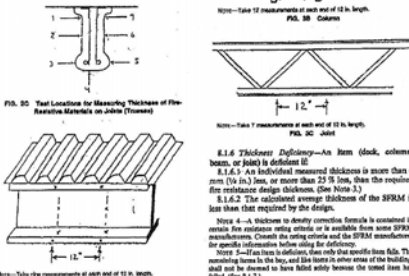


FIG. 35 Test Locations for Measuring Thickness of Fire-Resistive Material on Beams (Thickness)
FIG. 36 Beam
FIG. 37 Column
FIG. 38 Column
FIG. 39 Joist

Note—Take 12 measurements at each end of 12 in. length.
Note—Take 7 measurements at each end of 12 in. length.


8.1.6 Thickness Deficiency—An item (deck, column, beam, or joist) is deficient if:
8.1.6.1 An individual measured thickness is more than 6 mm (1/4 in.) less, or more than 25 % less, than the required fire resistance design thickness. (See Note 2.)
8.1.6.2 The calculated average thickness of the SFRM is less than that required by the design.

Note—An average thickness correction formula is contained in certain fire resistance rating criteria or is available from some SFRM manufacturers. Consult the rating criteria and the SFRM manufacturer for specific information before using for deficiency.

Note—Low-tack fire resistives are only those specific items. The remaining items in the list, and the items in other areas of the building, shall not be checked for low-tack fire resistive because the tested items are failed. (See 8.1.7.)

8.1.7 Procedure in Case of Deficiency—If an item is deficient, then it shall be corrected and retested, along with another of that specific item that is another column, if a

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E 505

5.3.1 This is an alternative method to 5.2 for determining the in-place density of specimens with irregular surfaces or dimensions or for specimens that are difficult to remove from the substrate.

5.3.2 The minimum sample size recommended is 131 cm³ (8 in.³).

5.3.3 The sample shall be cut to a uniform size, removing all uneven edges.

5.3.4 Cure the specimen in accordance with 7.1.2 or 7.2.

5.3.5 Determine weight.

5.3.6 Volume Determination:

5.3.6.1 Place the empty 400 mL beaker in the center of the flat pan and pour the unexpanded polystyrene beads or shot through the flanged until the excess beads (shot) fall over the rim of the beaker.

5.3.6.2 Hold the screen perpendicular to the rim of the beaker. Begin at the edge opposite the spout and screed off the excess beads (shot). One pass is all that is needed.

5.3.6.3 Discard the overflow that collects in the pan.

5.3.6.4 Pour all the beads (shot) remaining in the beaker into the graduated cylinder.

5.3.6.5 Return the empty beaker into the center of the pan and pour about 100 mL of beads (shot) poured from the graduated cylinder(s) into the beaker. Do not shake the beaker for the same reason.

5.4 Report

5.4.1 Thickness—Report the average, maximum, and minimum thickness of the test specimens, expressed in millimeters (inches).

5.4.2 Density—Report the average, maximum, and minimum density values of the test specimens—expressed in kilograms per cubic meter (pounds per cubic foot).

5.4.3 Also report the following information, as applicable:

5.4.3.1 Date of test and report.


5.4.3.2 Identification of the specimen (product name, manufacturer, dimensions, and other pertinent information).

5.4.3.3 Description of specimen.

5.4.3.4 Project and design specification.

5.4.3.5 Size of test specimens.

5.4.3.6 Detailed drawings of the specimen that provide a description of the physical characteristics, including dimensioned section profiles and any other pertinent construction details.



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E 605

5.3.1 This is an alternative method to 5.2 for determining the in-place density of specimens with irregular surfaces or dimensions or for specimens that are difficult to remove from the substrate.

5.3.2 The minimum sample size recommended is 131 cm³ (8 in.³).

5.3.3 The sample shall be cut to a uniform size, removing all uneven edges.

5.3.4 Cure the specimen in accordance with 7.1.2 or 7.2.

5.3.5 Determine weight.

5.3.6 Volume Determination:

5.3.6.1 Place the empty 400 mL beaker in the center of the flat pan and pour the unexpanded polystyrene beads or shot through the flanged until the excess beads (shot) fall over the rim of the beaker.

5.3.6.2 Hold the screen perpendicular to the rim of the beaker. Begin at the edge opposite the spout and screed off the excess beads (shot). One pass is all that is needed.

5.3.6.3 Discard the overflow that collects in the pan.

5.3.6.4 Pour all the beads (shot) remaining in the beaker into the graduated cylinder.

5.3.6.5 Return the empty beaker into the center of the pan and pour about 100 mL of beads (shot) poured from the graduated cylinder(s) into the beaker. Do not shake the beaker for the same reason.

5.4 Report

5.4.1 Thickness—Report the average, maximum, and minimum thickness of the test specimens, expressed in millimeters (inches).

5.4.2 Density—Report the average, maximum, and minimum density values of the test specimens—expressed in kilograms per cubic meter (pounds per cubic foot).

5.4.3 Also report the following information, as applicable:

5.4.3.1 Date of test and report.

5.4.3.2 Identification of the specimen (product name, manufacturer, dimensions, and other pertinent information).

5.4.3.3 Description of specimen.

5.4.3.4 Project and design specification.

5.4.3.5 Size of test specimens.

5.4.3.6 Detailed drawings of the specimen that provide a description of the physical characteristics, including dimensioned section profiles and any other pertinent construction details.



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Fireproofing Inspection Report

Client: Urban Engineers Project No.: 0088
Project: New Haven Railroad Report No.: 002
Inspector: Brian Bennett Date: 04/22/12
Subject: ASTM E-665, E-706

The writer performed a fireproofing thickness inspection on the installation, floor framing in the area of C-D-01 and in accordance with the design drawings. Right (R) beams were tested.

Specification from which Approved Submittal Brand California T-0P
Thickness: 8mm 20mm 30mm 40mm 50mm 60mm 70mm 80mm
Density: 13 15 17 19 21 23 25 27

Location (Beam, Column, or Decking)	Avg. Thickness (1/8" INCH)	Density (pcf)	Force (kN)	Steel Break (pcf)	Steel Break Type
21 Beams 20 C-B-C	8.0	—	—	—	—
21 Beams 20 C-C-A	8.0	—	—	—	—
21 Beams 21 C-C-08B	8.0	—	—	—	—
21 Beams 21 C-C-1	8.0	—	—	—	—
21 Beams 21 C-C-2	8.0	—	—	—	—
21 Beams 21 C-C-3	8.0	—	—	—	—
21 Beams 21 C-C-4	8.0	—	—	—	—
21 Beams 21 C-C-5	8.0	—	—	—	—
21 Beams 21 C-C-6	8.0	—	—	—	—
21 Beams 21 C-C-7	8.0	—	—	—	—
21 Beams 21 C-C-8	8.0	—	—	—	—
21 Beams 21 C-C-9	8.0	—	—	—	—
21 Beams 21 C-C-10	8.0	—	—	—	—
21 Beams 21 C-C-11	8.0	—	—	—	—
21 Beams 21 C-C-12	8.0	—	—	—	—
21 Beams 21 C-C-13	8.0	—	—	—	—
21 Beams 21 C-C-14	8.0	—	—	—	—
21 Beams 21 C-C-15	8.0	—	—	—	—
21 Beams 21 C-C-16	8.0	—	—	—	—
21 Beams 21 C-C-17	8.0	—	—	—	—
21 Beams 21 C-C-18	8.0	—	—	—	—
21 Beams 21 C-C-19	8.0	—	—	—	—
21 Beams 21 C-C-20	8.0	—	—	—	—
21 Beams 21 C-C-21	8.0	—	—	—	—
21 Beams 21 C-C-22	8.0	—	—	—	—
21 Beams 21 C-C-23	8.0	—	—	—	—
21 Beams 21 C-C-24	8.0	—	—	—	—
21 Beams 21 C-C-25	8.0	—	—	—	—
21 Beams 21 C-C-26	8.0	—	—	—	—
21 Beams 21 C-C-27	8.0	—	—	—	—
21 Beams 21 C-C-28	8.0	—	—	—	—
21 Beams 21 C-C-29	8.0	—	—	—	—
21 Beams 21 C-C-30	8.0	—	—	—	—
21 Beams 21 C-C-31	8.0	—	—	—	—
21 Beams 21 C-C-32	8.0	—	—	—	—
21 Beams 21 C-C-33	8.0	—	—	—	—
21 Beams 21 C-C-34	8.0	—	—	—	—
21 Beams 21 C-C-35	8.0	—	—	—	—
21 Beams 21 C-C-36	8.0	—	—	—	—
21 Beams 21 C-C-37	8.0	—	—	—	—
21 Beams 21 C-C-38	8.0	—	—	—	—
21 Beams 21 C-C-39	8.0	—	—	—	—
21 Beams 21 C-C-40	8.0	—	—	—	—
21 Beams 21 C-C-41	8.0	—	—	—	—
21 Beams 21 C-C-42	8.0	—	—	—	—
21 Beams 21 C-C-43	8.0	—	—	—	—
21 Beams 21 C-C-44	8.0	—	—	—	—
21 Beams 21 C-C-45	8.0	—	—	—	—
21 Beams 21 C-C-46	8.0	—	—	—	—
21 Beams 21 C-C-47	8.0	—	—	—	—
21 Beams 21 C-C-48	8.0	—	—	—	—
21 Beams 21 C-C-49	8.0	—	—	—	—
21 Beams 21 C-C-50	8.0	—	—	—	—




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Testing Laboratories

TRUST, BUT VERIFY

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KEEP TRACK OF UNRESOLVED ISSUES

- Special Inspector?
- Building Department?
- _____ ?

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BIG NAME CORPORATION, INC.

SUMMARY of SPECIAL INSPECTION ISSUES

Number	Date	Issue	Findings	Disposition	Responsible Party	Resolution	Build to Code
01	1/20/16	Special Inspector	This is an inspection of new construction in accordance with the Florida Building Code and the Florida Building Code. The inspector observed the following: [Detailed description of findings]	Disregard design requirements for [specific code section]	Submitter	Disregard design requirements for [specific code section]	Not to Code
02	1/20/16	Building Department	This is an inspection of new construction in accordance with the Florida Building Code and the Florida Building Code. The inspector observed the following: [Detailed description of findings]	Disregard design requirements for [specific code section]	Submitter	Disregard design requirements for [specific code section]	Not to Code
03	1/20/16	Building Department	This is an inspection of new construction in accordance with the Florida Building Code and the Florida Building Code. The inspector observed the following: [Detailed description of findings]	Disregard design requirements for [specific code section]	Submitter	Disregard design requirements for [specific code section]	Not to Code


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Project Close-Out: Required Documents

1704.2.4 Report requirement. Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the *building official*, and to the *registered design professional in responsible charge*. Reports shall indicate that work inspected was or was not completed in conformance to *approved construction documents*. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the *building official* and to the *registered design professional in responsible charge* prior to the completion of that phase of the work. A final report documenting required *special inspections* and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon prior to the start of work by the applicant and the *building official*.

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Final Report of Special Inspections

Project: _____
 Location: _____
 Owner: _____
 Owner's Address: _____
 Architect of Record: _____
 Structural Engineer of Record: _____

To the best of my information, knowledge and belief, the Special Inspections required for this project, and detailed on the Statement of Special Inspections submitted for permit, have been performed, and all structural components have been tested and recorded in the following:

Comments: _____

(When continuation sheets are required to complete the description of construction.)
 Continuation sheets submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Responsible Submitter: _____
 Special Inspector: _____

Type of print name: _____

Signature: _____ Date: _____
 Licensed Professional Seal or Certification

OSDE Form 106 - Final Report of Special Inspections - 1/2016 107

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Final Report of Special Inspections

Agent's Final Report

Project: _____
 Agent: _____
 Special Inspector: _____

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and detailed on the Statement of Special Inspections submitted for permit, have been performed, and all structural components have been tested and recorded in the following:

Comments: _____


(When continuation sheets are required to complete the description of construction.)
 Continuation sheets submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Responsible Submitter: _____
 Agent of the Special Inspector: _____

Type of print name: _____

Signature: _____ Date: _____
 Licensed Professional Seal or Certification


OSDE Form 108 - Final Report of Special Inspections - 1/2016 108



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1704.2.5.2 Fabricator approval. *Special inspections* required by Section 1705 are not required where the work is done on the premises of a fabricator registered and *approved* to perform such work without *special inspection*. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an *approved special inspection agency*. **At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building official stating that the work was performed in accordance with the approved construction documents.**

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1704.5 Structural observations. Where required by the provisions of Section 1704.5.1 or 1704.5.2, the owner shall employ a *registered design professional* to perform structural observations as defined in Section 1702.

Prior to the commencement of observations, the structural observer shall submit to the *building official* a written statement identifying the frequency and extent of structural observations.

At the conclusion of the work included in the permit, the structural observer shall submit to the building official a written statement that the site visits have been made and identify any reported deficiencies which, to the best of the structural observer's knowledge, have not been resolved.


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(Add) **111.1.4 Statement of professional opinion.** Pursuant to section 29-276c of the Connecticut General Statutes, no certificate of occupancy shall be issued for a proposed structure or addition to buildings classified as (1) assembly, educational, institutional, high hazard, transient residential, which includes hotels, motels, rooming or boarding houses, dormitories or similar buildings, other than residential buildings designed to be occupied by one or more families, without limitation as to size or number of stories; (2) business, factory and industrial, mercantile, moderate and low hazard storage, having three stories or more or exceeding 30,000 square feet total gross area; and (3) nontransient residential dwellings having more than 16 units or 24,000 square feet total gross area per building, until the building official has been provided with a **statement signed by the architect or professional engineer and the general contractor stating that the completed structure or addition is in substantial compliance with the approved plans on file.**

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