



Permit & Development Center
Community Development Department
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**City of Des Moines
Permit & Development Center
Special Inspection Program
Handbook**

CONTENTS

This document is a guideline to assist builders, special inspectors, code officials and owners and contractors in their efforts to secure compliance with Section 1701 of the *International Building Code* (IBC).

The guideline provides a descriptive procedure for special-inspection administration. It defines the duties and responsibilities of the special inspector, project owner, engineer or architect of record, contractor, and building official.

The manual is divided into three major sections and two appendices:

I. Special Inspection - An Overview

Provides an overview of project quality assurance through special inspection.

II. General Program Guidelines

Describes overall purposes of special inspection, and outlines the respective duties and responsibilities of special inspectors, project owners, designers, contractors, and building officials.

III. Special-inspector Qualifications.

Lists competency and experience standards and references performance standards for special inspectors to aid building officials in determining special-inspector competence to perform specific tasks in accordance with IBC Section 1704.

Appendix A - Special-inspection Forms & Schedules.

These forms can be photocopied and adapted for use by special inspectors, and special inspection agencies.

1. Special-inspection Forms

- Daily Report Form
- Weekly Report Form
- Discrepancy Notice
- Final Report Form

Appendix B - Task Lists for Special Inspectors

These lists were compiled from job task analyses conducted by model code organizations through extensive surveys of practitioners in the applicable disciplines.

- Reinforced Concrete
- Prestressed Concrete
- Structural Masonry
- Structural Steel and Welding
- Spray-applied Fireproofing

SPECIAL INSPECTION - AN OVERVIEW

The *International Building Code (IBC)* has set forth a number of situations in which the employment of special inspectors is mandatory. In accordance with the IBC, the *owner or the registered design professional in responsible charge acting as the owner's agent* is required to provide specially qualified inspectors for *continuous or periodic* inspections during construction (IBC 1704.1). These inspections are in addition to the inspections specified in IBC 109. Exceptions to special inspection are noted also.

A special inspector is a person who has been approved by the building official in accordance with the International Building Code and the local jurisdiction to perform certain types of inspection as detailed in IBC Section 1704. These generally include:

1. **Inspection of fabricators** - where fabrication of structural load-bearing members and assemblies are being performed on the premises of the fabricator. Note exception for approved fabricators. See Section 1704.2
2. **Steel construction** - See Table 1704.3 for detailed information regarding inspections. Major areas under steel construction (see Section 1704.3) are:
 - Material verification of high-strength bolts, nuts, and washers;
 - Inspection of high-strength bolting,
 - Material verification of structural steel,
 - Material verification of weld filler materials,
 - Inspection of welding for both structural steel and reinforcing steel, and
 - Inspection of steel frame joint details for compliance with approved construction documents.
3. **Concrete construction** - See Table 1704.4 for detailed information regarding inspections. Major areas under steel construction (see Section 1704.4) are:
 - Inspection of reinforcing steel, including prestressing tendons, and placement,
 - Inspection of bolts to be installed in concrete prior to and during placement of concrete,
 - Verification of use of required design mix,
 - Sampling of fresh concrete and performing slump, air content and fresh concrete temperature at time of making specimens for strength tests,
 - Inspection of concrete and shotcrete placement for proper application techniques,
 - Inspection for maintenance of specified curing temperature and techniques,
 - Inspection of prestressed concrete including application of prestressing forces and grouting of bonded prestressing tendons,
 - Erection of precast concrete members,
 - Verification of in-situ concrete strength prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.
4. **Masonry construction** - See IBC Tables 1604.5 and 1617.6.2 for classification of building or structure requiring special inspection. Tables 1704.5.1 and 1704.5.3 show detailed information

regarding level 1 and level 2 special inspections for masonry construction. Major areas under masonry construction are (see Section 1704. 5):

- Verification of site prepared mortar, construction of mortar joints, and locations of reinforcement and connectors,
 - Verification of size and location of structural elements; type, size, and location of anchors; including details of anchorage of masonry to structural members, frames, or other construction,
 - Verification of specified size, grade, and type of reinforcement,
 - Verification of welding of reinforcing bars,
 - Verification of protection of masonry during cold or hot weather,
 - Verification prior to grouting that grout space is clean and correct proportions of site prepared grout are present,
 - Verification that grout placement is in compliance with code and construction document provisions,
 - Preparation of any grout specimens, mortar specimens, and / or prisms,
 - Verification of compliance with required inspection provisions of the construction documents and the approved submittals.
5. **Wood construction** - Inspection of the fabrication of wood structural elements and assemblies. (Section 1704.2). See Section 1704.6.
 6. **Soils** - Inspection of site preparation prior to placement of prepared fill, verification of fill material and maximum lift thickness, and verification that in-place densities meet soils report, See Section 1704.7.
 7. **Pile foundations** - Inspection of installation and testing of pile foundations, and recording of installation, load tests, and cutoff and tip elevation of each pile. See Section 1704.8
 8. **Pier foundations** - Inspection of pier foundations in accordance with Section 1616.3 for buildings located in Seismic Design Categories C, D, E, or F. See Section 1704.9.
 9. **Wall panels and veneers** - Inspection of exterior and interior architectural wall panels and the anchoring of veneers for buildings assigned to Seismic Design Categories E and F. Inspections of veneers shall meet requirements of Section 1704.5. See Section 1704.10
 10. **Sprayed fire-resistant materials** - Inspection of fire-resistant material applied to structural elements and decks in accordance with Sections 1704.11.1 through 1704.11.5.
 11. **Exterior insulation and finish systems (EIFS)**. See Section 1704.12 for exceptions to required inspections.
 12. **Special cases** - Inspections that, in the opinion of the building official, are needed because of the use of alternate materials, unusual design, or use of materials not having building code approval that are necessary to meet special manufacturer requirements. See Section 1704.13.
 13. **Smoke control** - See Section 1704.14.

The use of special inspectors is *not* discretionary. IBC Section 1704 clearly states the conditions under which they must be utilized, but there is a provision for the building official to waive special inspection for work of a minor nature.

It is the responsibility of the building official in accordance with the State of Iowa Structural Engineering Board to determine the competency of special inspectors. The IBC does not make specific requirements for the determination of an inspector's qualifications, but that in no way lessens the importance of being selective in this crucial process.

A qualified special inspector usually has skills that are significantly more specialized than those of regular municipal inspectors. A municipal inspector is required to have a general knowledge of a great number of code requirements, whereas special inspectors focus on limited areas of structural inspection and materials testing.

II. GENERAL PROGRAM GUIDELINES

A. Purpose of Special Inspection

Special Inspection is the monitoring of the materials and workmanship that are critical to the integrity of the building structure. It is a review of the work of the contractors and their employees to assure that the approved plans and specifications are being followed and that relevant codes and ordinances are being observed. The special inspection process is in *addition* to those inspections conducted by the municipal building inspector and by the engineer or architect of record as part of periodic structural observation. The special inspectors furnish *continuous or periodic* inspection as prescribed in IBC Table 1704.3 for that construction which requires their presence. [IBC Section 109.3.9 and 1704]

Good communication between the special inspector and the designers, contractor, and building department is essential to project quality assurance.

B. Duties and Responsibilities of the Special Inspector

Though not required by code, special inspectors and/or inspection agencies can document acceptance of their responsibilities and scope of work for a project by signing an agreement that includes a detailed schedule of services, commonly known as the Special-inspection and Testing Agreement and the Special-inspection and Testing Schedule. See City of Des Moines Building Department for the Special Inspection Agreement form. Duties of special inspectors and/or inspection agencies include the following:

1. **Signify presence at job site.** Special inspectors should notify contractor personnel of their presence and responsibilities at the job site. As required by the building official, they shall sign in on the appropriate form posted with the building permit. See City of Des Moines Building Department for the Special Inspection Agreement form for the sign in sheet.
2. **Observe assigned work.** [IBC Section 1704] Special inspectors shall inspect all work for which they are responsible for conformance with the building department approved (stamped) plans and specifications and applicable provisions of the IBC.
3. **Report nonconforming items.** Special inspectors shall bring all nonconforming items to the immediate attention of the contractor. If any such item is not resolved in a timely manner or is about to be incorporated into the work, the Engineer or Architect of record and the Building Official shall be notified immediately and the item noted in the special inspector's written report. [IBC Section 1704.1] A discrepancy notice form is included in Appendix A. The special inspector shall write a separate report to be posted at the job site regarding noted discrepancies that should contain, as a minimum, the following information about each nonconforming item:
 - Description and exact location
 - Reference to applicable detail of approved plans/specifications
 - Name and title of each individual notified and method of notification
 - Resolution or corrective action taken.
4. **Provide timely reports.** The special inspector shall complete written inspection reports for each

inspection visit and provide the reports on a timely basis determined by the building official. The special inspector or inspection agency shall furnish these reports directly to the building official, engineer or architect of record, and others as designated. [IBC Section 1704.1.2] These reports should be organized on a daily format and may be submitted weekly at the option of the Building Official. Daily and weekly report forms are included in Appendix A. In these reports, special inspectors should:

- Describe inspections and tests made, with applicable locations
- Indicate how nonconforming items were resolved
- List unresolved items, parties notified, time and method of notification
- Itemize changes authorized by the engineer or architect of record if not included in nonconforming items.

5. **Submit final report.** Special inspectors or inspection agencies shall submit a final signed report to the building department stating that all items requiring special inspection and testing were fulfilled and reported and, to the best of their knowledge, in conformance with the approved plans, specifications, and the applicable provisions of the IBC. [IBC Section 1704.1.2] Items not in conformance, unresolved items, or any discrepancies in inspection coverage (i.e., missed inspections, periodic inspection when continuous inspection was required, etc.) should be specifically itemized in this report. An final report form is included in Appendix A.

C. Duties and Responsibilities of the Project Owner

The project owner, the engineer or architect of record, or an agent of the owner is responsible for funding special inspection services. The special inspector/agency shall *not* be in the employ of the contractor, subcontractor, or material supplier. [IBC Section 106.3.4.1] In the case of an owner/contractor, the special inspector/agency shall be employed as specified by the building official.

D. Duties and Responsibilities of the Design Professional in Responsible Charge

The design professional in responsible charge shall be a consenting party by written acknowledgment of special inspection and testing agreements. See City of Des Moines Building Department for the Special Inspection Agreement form. The design professional in responsible charge has many duties and responsibilities related to special inspection, including the following:

1. **Prepare special inspection program.** The design professional in responsible charge shall list the items for which special inspection is required; and shall indicate any items for which the IBC or the building official approves periodic inspection and the frequency of such inspection. [IBC 106.3.4.1]

The design professional in responsible charge should coordinate with the project owner in the selection of special inspectors [IBC Sec. 1704.1] and is required to list special inspectors and their duties on the special inspection program [IBC Sec. 106.3.4.1]. The choice of special inspectors should include the following considerations:

- Project size and complexity - experience with similar projects
- Inspection staffing - sufficient qualified inspectors
- Site location - proximity of inspection and testing facilities
- Off-site inspection - capabilities for inspection at remote locations.

2. **Respond to field discrepancies.** The Engineer or Architect of record shall respond to special inspector reports of uncorrected noncomplying items and shall approve remedial measures.

3. **Review shop drawings and submit revisions to approved plans.** The design professional in responsible charge shall acknowledge and approve shop drawings that may detail structural information, shall submit to the Building Official and to the special-inspection agency written approval of any verbally approved deviations from the approved plans, and shall submit revised plans for Building Official approval as required. [IBC Sec. 106.3.4.2]

E. Duties and Responsibilities of the Contractor

The contractor's duties include the following:

1. **Notify the special inspector.** The holder of the building permit or their duly authorized agent is responsible for notifying the special inspector or agency regarding individual inspections required by the building department. [IBC Sec. 109.5] Adequate notice shall be provided so that the special inspector has time to become familiar with the project.
2. **Provide access to approved plans.** The contractor is responsible for providing the special inspector with access to approved plans [IBC 106.3.1].
3. **Retain special inspection records.** As required by the Building Official, the contractor is responsible for retaining at the job site all special-inspection records submitted by the special inspector, and providing these records for review by the building department's inspector upon request.

F. Duties and Responsibilities of the Building Official

Of all the team members involved in the construction process, the Building Official is the only one with the legal authority to enforce the special-inspection provisions of the code. The employment of a special inspector or agency shall *not* relieve the Building Department of responsibility for progress or called inspections as required by the code, or of the obligation of the contractor to notify the Building Department when the work is ready for inspection. Building Department inspections of items also requiring special inspection should not be signed off without the concurrence of the special inspector.

The specific duties and responsibilities of the Building Official relating to special inspection include the following:

1. **Review submittal documents for compliance with special-inspection requirements.** The Building Official is charged with the legal authority to review the plans, specifications, special-inspection program, and other submittal documents for compliance with code requirements. [26-4 of the Des Moines Ordinance, IBC Sec. 106.3 through 106.5]
2. **Approve special inspection program.** The Building Official is responsible for approving the special-inspection program submitted by the design professional in responsible charge [IBC 1704.1] and may require a preconstruction conference to review the program with all appropriate members of the construction team.
3. **Approve special inspectors/inspection agencies.** The Building Official is responsible for determining the competence of special inspectors for the types of work they will be inspecting. [IBC Sec. 1704]
4. **Monitor special inspection activities.** The Building Official should monitor the special-inspection activities at the job site to assure that qualified special inspectors are performing their duties when work requiring special inspection is in progress.
5. **Review inspection reports.** The Building Official receives and reviews special-inspection progress reports and final reports for conformance with the approved plans, specifications, and workmanship provisions of the code. [IBC Sec. 1704.1.2]
6. **Perform final inspection.** The Building Official should not perform the final inspection and approval of a project [IBC Sec. 109.3.10] until the final special-inspection report has been reviewed and approved.

Appendix A

Special-inspection Forms & Schedules

Special-inspection Forms

- Daily Report Form
- Weekly Report Form
- Discrepancy Notice
- Final Report Form

(THESE FORMS MAY BE PHOTOCOPIED)

SPECIAL-INSPECTION DAILY REPORT

City of Des Moines Permit & Development Center

Permit No. _____

Date _____

Project Name/Address: _____

"Inspection Type(s)/Coverage: _____

↑ Continuous ↑ Periodic; frequency: _____

Inspections made, including locations: _____

Tests performed: _____

Items requiring 1) Correction, 2) Correction of previously listed items, and 3) Previously listed uncorrected items:

Changes to approved plans authorized by engineer or architect of record: _____

Comments: _____

To the best of my knowledge, work inspected was in accordance with the building department-approved plans, specifications, and applicable workmanship provisions of the IBC except as noted above.

Signed: _____

Inspection Agency: _____

Print full name: _____

ID Number: _____

SPECIAL-INSPECTION WEEKLY REPORT

City of Des Moines Permit & Development Center

Permit No. _____

Date _____

Project Name/Address: _____

Inspection Type(s)/Coverage: _____

Continuous Periodic; frequency: _____

Total inspection time each day:

Date							
Hours							
Inspector							

Inspections made, including locations: _____

Tests performed: _____

Items requiring 1)Correction, 2)Correction of previously listed items, and 3)Previously listed uncorrected items:

Changes to approved plans authorized by engineer or architect of record: _____

Comments: _____

To the best of my knowledge, work inspected was in accordance with the building department-approved plans, specifications, and applicable workmanship provisions of the IBC except as noted above.

cc: Building Department
 Engineer/Architect

SPECIAL-INSPECTION FINAL REPORT

City of Des Moines Permit & Development Center

Permit No. _____

Date _____

Attention: _____

Project Name/Address: _____

In accordance with Section 1704 of the *International Building Code*, special inspection has been provided for the following items:

Based upon inspections performed and our (my) substantiating reports, it is our ("my) professional judgment that, to the best of our (my) knowledge, the inspected work was performed in accordance with the approved plans, specifications, and applicable workmanship provisions of the International Building Code.

Signed: _____

Inspection Agency: _____

Print full name: _____

ID Number: _____

or Agency Responsible Engineer's stamp:

cc: Client/Project Owner
Engineer/Architect

Appendix B

Task Lists for Special Inspectors:

- General Requirements
- Reinforced Concrete
- Prestressed Concrete
- Structural Masonry
- Structural Steel and Welding
- Spray-applied Fireproofing

TASK LISTS FOR SPECIAL INSPECTORS

A. General Requirements [For all inspection disciplines]

Includes the general duties and responsibilities of the special inspector as follows: Review approved plans and specifications for special-inspection requirements. Comply with special-inspection-requirements of the enforcing jurisdiction. Notify the contractor of deviations from approved plans and specifications. If the deviations are uncorrected, notify the architect or engineer of record and the building official. Submit progress reports to the architect or engineer of record and the building official, describing tests, which were performed, and compliance of work. Submit final summary report stating whether work requiring special inspection was in conformance with the approved plans and applicable provisions of the building code.

B. REINFORCED CONCRETE

1. General Requirements [See item A above]

2. Concrete Quality

Verify that individual batch tickets indicate delivery of the approved mix as specified. Verify time limits of mixing, total water added, and proper consistency and workability for placement. Determine the required type, quantity, and frequency of tests to be performed on fresh and hardened concrete. Observe sampling of concrete, field testing of fresh concrete, and making of test specimens. Provide or arrange for proper specimen identification, site storage and protection, and transportation to the testing laboratory. Provide or arrange for communication of field-testing results to the architect or engineer of record and to the Building Official.

3. Reinforcement

Verify that reinforcing steels are of the type, grade, and size specified and are in conformance with acceptable quality standards. Ensure that reinforcing steel is free of oil, dirt, and rust, and that steel is properly coated and/or sheathed as specified. Verify that reinforcing steels are located within acceptable tolerances, and are adequately supported and secured to prevent displacement during concrete placement. Verify that minimum concrete 'cover is provided. Verify that placement of reinforcing steel (or ducts) complies with required spacing, profile and quantity requirements, as indicated by both the approved plans and installation drawings. Verify that hooks, bends, ties, stirrups, and supplemental reinforcement are fabricated and placed as specified. Verify that required lap lengths, stagger, and offsets are provided. Verify proper installation of approved mechanical connections per the / manufacturer's instructions and/or evaluation reports. Ensure that all welds of reinforcing steel and other weldments are as specified, and have been inspected and approved by an approved welding inspector.

4. Formwork, Joints, and Embeds

Verify that formwork will provide concrete elements of the specified size and shape. Verify that the location and preparation of construction joints are in accordance with the approved plans, specifications, and building code requirements. Verify that the type, quantity, size, spacing, and location of embedded items are as specified.

5. **Concrete Placement, Protection, and Curing**

Verify acceptable condition of the place of deposit before the concrete is placed. Verify that methods of conveying and depositing concrete avoid contamination and segregation of the mix. Verify that concrete is being properly consolidated during placement. Verify that concrete is protected from temperature extremes and determine that proper curing is initiated.

C. PRESTRESSED CONCRETE [All items listed above under Reinforced Concrete are considered prerequisite to the knowledge for special inspection of prestressed concrete.]

1. **General Requirements** [See item A above]

2. **Concrete Quality**

Includes verification of concrete ingredients, delivery of the approved mix, mix-time limits and water content; determination of the required type, quantity, and frequency of tests to be performed; sampling and field testing of fresh concrete; making and handling of test specimens; and verification of concrete strength prior to tendon stressing.

3. **Reinforcement**

Includes verification of prestressing steel type, grade, size and quality; tendon system fabrication; prestressing steel condition; location and placement of prestressing steel, tendons or ducts; fabrication and placement of hooks, bends, ties, stirrups and supplemental reinforcement; and lap splices, proper installation of mechanical connections, weldments, and rock and soil anchors.

4. **Prestressing and Grouting**

Includes inspection for proper equipment calibration, stressing/tensioning sequences, jacking forces and acceptable elongations; requirements for protection of tendons and anchorages; size and placement of post-tensioning ducts; and compliance with specifications for grout materials, strength, and grouting pressures.

5. **Formwork, Joints and Embeds**

Verification that formwork will provide concrete elements of specified size and shape; location and preparation of construction joints are as specified and comply with the building code; and the type, quantity, size, spacing, and location of embedded items are as specified.

6. **Concrete Placement, Protection, and Curing**

Includes verification of acceptable preplacement conditions; methods of conveying and depositing concrete avoid contamination and segregation of the mix; concrete is being properly consolidated during placement; concrete is protected from temperature extremes; and proper curing is initiated.

D. STRUCTURAL MASONRY

1. **General Requirements** [See item A above]

2. **Masonry Quality**

Verification that masonry materials are the type specified; mortar and grout are properly mixed, placed within time limits and properly stored; masonry unit prism strength meets specifications and that appropriate type and frequency of material strengths tests are performed; and field testing and sampling are observed and samples are correctly identified, stored, protected and transported to the laboratory.

3. **Reinforcement**

Inspects to ensure quality, tolerances, clearances, placement, spacing, and quantity of reinforcing steel comply with codes and specifications; verifies reinforcement details are fabricated and placed as specified; and verifies approved lap splices are installed as specified.

4. **Masonry Placement**

Includes substrate condition, mortar joints, and masonry unit placement per approved plans, type, quantity, size, spacing, and location of embedded items; weldments inspection; location and preparation of construction joints; and protection of masonry from temperature extremes and adverse weather conditions.

5. **Grout Placement**

Inspection of grout spaces prior to placement, provision of clean outs, masonry unit condition; utilization of proper methods of conveying and depositing grout; grout lift and time limit requirements; and adequate consolidation of grout.

E. STRUCTURAL STEEL AND WELDING

1. **General Requirements** [See item A above]

2. **Material Sampling, Testing, and Verification**

Includes identification and inspection of structural steel and welding materials; determination of type, quantity and frequency of destructive and nondestructive tests to be performed; and sampling.

3. **High-strength Bolting**

Verification that faying surfaces at connections utilizing high-strength bolts are in compliance with applicable standards; correct type, size and location of bolts and bolt holes, nuts and washers are specified for type of connection; bolts are installed using approved method and sequence of tightening; and bolt tension tests are performed per applicable standards.

4. **Structural, Reinforcing, and Sheet Steel Welding**

Includes job safety, welding qualification requirements, welding types and locations, joint preparation and fit-up, welding procedures and processes, welding equipment calibration; inspection of weld repairs and heat straightening of structural members, and verification of weld quality and that fabricated elements are within tolerances.

5. **Erection (plan reading)**

Verify that structural steel erection sequence tolerances, orientation and frame member sizes comply with plans and specifications; column base plates are seated and fastened correctly; and specified clearance is provided for grouting.

F. SPRAY-APPLIED FIREPROOFING

1. **General Requirements** [See item A above]

2. **Materials, Preparation, Application, and Testing**

Verification that materials are of type specified, properly stored and approved; verification that the substrate has been properly prepared and free of conditions that may prevent adhesion; identification of members to be fireproofed, the minimum required coverage and thickness of the fireproofing, and the condition of the finished application; and determination of the required tests and observation of sampling, field testing, and fabrication of test specimens.