International Accreditation Service, Inc.
3060 Saturn Street, Suite 100
Brea, CA 92821 USA
t: 562.364.8201
t: 866.427.4422
f: 562.699.8031
www.iasonline.org

ACCREDITATION CRITERIA FOR FABRICATOR INSPECTION PROGRAMS FOR REINFORCED AND PRECAST/PRESTRESSED CONCRETE

AC157

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PREFACE

The attached accreditation criteria have been issued to provide all interested parties with guidelines on implementing performance features of the applicable standards referenced herein. The criteria were developed and adopted following public hearings conducted by the International Accreditation Service, Inc. (IAS), Accreditation Committee and are effective on the date shown above. All accreditations issued or reissued on or after the effective date must comply with these criteria. If the criteria are an updated version from a previous edition, solid vertical lines (|) in the outer margin within the criteria indicate a technical change or addition from the previous edition. Deletion indicators (→) are provided in the outer margins where a paragraph or item has been deleted if the deletion resulted from a technical change. These criteria may be further revised as the need dictates.

IAS may consider alternate criteria provided the proponent submits substantiating data demonstrating that the alternate criteria are at least equivalent to the attached criteria and otherwise meet applicable accreditation requirements.

ACCREDITATION CRITERIA FOR FABRICATOR INSPECTION PROGRAMS FOR REINFORCED AND PRECAST/PRESTRESSED CONCRETE

1. INTRODUCTION

1.1. **Scope**: These criteria set forth the requirements for obtaining and maintaining International Accreditation Service, Inc. (IAS), Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete accreditation. These criteria supplement the IAS Rules of Procedure for Accreditation of Fabricator Inspection Programs and specify the minimum requirements for IAS-approved fabricator inspection programs for reinforced and precast/prestressed concrete. Compliance with these criteria will demonstrate the following qualifications as outlined in Section 1704.2.5.2 of the *International Building Code*® (Section 1704.2.2 of the 2009 and earlier editions), published by the International Code Council.

The fabricator has developed and submitted a detailed fabrication management system manual reflecting key quality control procedures that provide a basis for inspection control of workmanship and the fabricator's plant.

The fabricator's quality control capabilities, plant and personnel, as outlined in the fabrication management system manual, have been verified by an initial onsite assessment conducted jointly by IAS and an IAS-accredited inspection agency.

These criteria do not cover the fabricated products or the design or performance characteristics of the products.

1.2. **Normative and Reference Documents**: Publications listed below refer to current editions (unless otherwise stated).

1.2.1. International Building Code®, published by the International Code Council.

1.2.2. ACI 318: Building Code Requirements for Structural Concrete and Commentary™, American Concrete Institute.

1.2.3. IAS Accreditation Criteria for Inspection Agencies (AC98).

1.2.4. IAS Accreditation Criteria for Fabricator Inspection Programs for Structural Steel (AC172).

1.2.5. IAS Rules of Procedure for Accreditation of Fabricator Inspection Programs.

1.2.6. Manual for Quality Control: Structural Precast Concrete™, MNL 116, Precast Concrete Institute.

1.2.7. Manual for Quality Control: Architectural Precast Concrete™, MNL 117, Precast Concrete Institute.

2. DEFINITIONS

For the purposes of these accreditation criteria, the definitions given in ISO/IEC 17000, and the definitions that follow, apply.

2.1. **Approved Fabricator**: An established and qualified person, firm or corporation approved by the building official pursuant to Section 1704.2.5.2 of the IBC (Section 1704.2.2 of the 2009 and earlier editions).

2.2. **Contract Documents**: Documents that describe the fabricator's responsibilities for a given project. These documents include work orders, drawings, and project specifications.

2.3. **Corrective Action**: Implemented action of solutions necessary to eliminate or reduce the root cause of an identified problem.

2.4. **Nonconformance**: An action employed that renders a member or component unacceptable for the intended use as specified in contract specifications or these criteria.

2.5. **Procedure**: An implemented and written document that describes who does what, when, where, why and how.

2.6. **Product**: Result of activities or processes.

Note 1: A product may include service, hardware, processed materials, or a combination thereof.

Note 2: A product can be tangible (e.g., assemblies or processed materials), or intangible (e.g., knowledge or concepts) or a combination thereof.

2.7. **Project**: A process consisting of a set of coordinated and controlled activities undertaken to achieve customer requirements.

2.8. **Quality Assurance**: A planned and systematic pattern of all actions necessary to provide adequate confidence that a product will conform to established requirements.

2.9. **Quality Control**: The act of examination, testing or measurement that verifies processes, services or documents conform to specified criteria.

2.10. **Quality Plan**: A written document prepared by the quality or technical manager that describes the procedures and policies implemented to assure product quality meets specific contract documents. As a minimum, quality plans must meet the requirements of AC157.

3. ELIGIBILITY

Accreditation services are available to fabricator inspection programs of reinforced and precast/prestressed concrete.

4. REQUIRED BASIC INFORMATION

4.1. Fabricators must demonstrate compliance with the following requirements:

4.1.1. The requirements of these accreditation criteria;

4.1.2. IAS Rules of Procedure for Accreditation of Fabricator Inspection Programs.

4.2. **General Requirements**

4.2.1. **Management System**:

4.2.1.1. The fabricator shall establish and implement a management system that is fully documented. This documented management system must describe the fabricator's procedures and quality activities for ensuring that fabricated products meet the specified requirements.

4.2.1.2. The fabricator, in concert with an IAS-accredited inspection agency, shall prepare and submit to IAS its documented management system, including a cross-reference matrix ensuring that the data, Section 4.3, the statements, Section 4.4 and the written procedures Section 4.5 noted in this accreditation criteria have been included.

4.2.1.3. The submitted management system documents must be signed and dated by an authorized representative of the fabricator.

4.2.1.4. The submitted management system documents must be signed and dated by an authorized representative of an IAS-accredited inspection agency, attesting that the inspection agency has reviewed the fabricator's documented management system. The purpose of the agency's review is to ensure that there is adequate detail for the agency to properly perform its inspection functions.

4.2.2. **Key Quality Control Personnel**: The fabricator shall designate (where applicable) the following key personnel who shall:

4.2.2.1. **Quality Control Manager (QCM)**:

4.2.2.1.1. Be a full-time employee of the fabricator.

4.2.2.1.2. Be certified by the Precast Concrete Institute (PCI) as a Level II technician/inspector or be certified by the International Code Council (ICC) as a special inspector in the category of "Reinforced Concrete."

4.2.2.1.3. Have at least five years' experience in reinforced concrete products.

4.2.2.1.4. Be a registered design professional. (Alternatively, the fabricator may obtain the services [subcontracted] of a licensed engineer to assist the fabricator on technical issues, or assure that the design engineer conducts frequent site visits to assure compliance with the intent of the design.)

4.2.2.1.5. Be responsible for the overall quality and the workmanship of the reinforced concrete product.

4.2.2.1.6. Be responsible for maintaining the fabricator's documented management system.

4.2.2.1.7. Be responsible for monitoring the effective implementation of the fabricator's documented management system.

4.2.2.1.8. Be responsible for assuring that periodic internal audits are conducted and documented, and that corrective actions are implemented.

4.2.2.1.9. Be responsible for assuring that annual management reviews are conducted and documented.

4.2.2.2. **Quality Control Inspector (QCI)**:

4.2.2.2.1. Be a full-time employee of the fabricator.

4.2.2.2.2. Be certified by American Concrete Institute (ACI) as a Concrete Construction Inspector or by Precast/Prestressed Concrete Institute (PCIP) as follows:

4.2.2.2.2.1. Level I technician/inspector when the fabricator does not perform prestressing.

4.2.2.2.2.2. Level II technician/inspector when the fabricator does perform prestressing.

4.2.2.2.3. Be certified by American Concrete Institute (ACI) as a Concrete Field Testing Technician—Grade I, or equivalent, where in-house quality control testing is performed.

4.2.2.2.4. Demonstrate experience inspecting concrete mix design, formwork and placement of reinforcing steel as it relates to reinforced concrete products.

4.2.2.2.5. Demonstrate experience inspecting the test procedures and evaluating test results as it relates to in-house testing of concrete.

4.2.2.3. **Quality Control Technicians (QCTs)**:

4.2.2.3.1. Concrete Sampling Technician: Be certified by the American Concrete Institute (ACI) as a "Concrete Field Testing Technician" (Grade I), or equivalent.

4.2.2.3.2. Concrete Strength Testing Technician: Be certified by the American Concrete Institute (ACI) as a "Concrete Strength Testing Technician," or equivalently trained by the fabricator for the testing of concrete strength.

4.2.2.3.3. Steel Reinforcement Technician: Be trained by the fabricator for the placement of reinforcing steel.

4.2.3. **Structural Welding**: Structural welding shall be done in general accordance with the IAS Accreditation Criteria for Fabricator Inspection Programs for Structural Steel (AC172) and qualified by the American Welding Society (AWS) qualification criteria for the types of welds and welding positions utilized.

4.2.4. **Daily Production Log**

4.2.4.1. A daily production log shall be maintained detailing activities as they relate to setting forms, placing reinforcement, structural welding, prestressing operations, casting, curing and quality control inspections.

4.2.4.2. The daily production log shall describe any problems or deficiencies discovered, and any testing or repair work performed.

4.2.5. **Quality Control Testing**

4.2.5.1. The fabricator shall have documented test procedures for all tests conducted in-house.

4.2.5.2. Calibration of all in-house test equipment shall be traceable to nationally recognized measurement standards.

4.2.5.3. When testing is contracted to an outside laboratory, tests should be conducted by an IAS-accredited testing laboratory or by a laboratory accredited by an IAS MRA partner.

4.3. **Required Data**

The following information shall be included in the management system submittal:

4.3.1. The name, street address and telephone number of the fabrication facility.

4.3.2. A floor plan of the fabrication facility.

4.3.3. A list of major production equipment, keyed to the floor plan.

4.3.4. A list of typical items fabricated.

4.3.5. The required qualifications of the quality control manager.

4.3.6. The required qualifications of the quality control inspectors.

4.3.7. The required qualifications of the quality control technicians.

4.3.8. An organizational chart for the fabricator. This chart must show the relationships among the management, quality control manager, quality control inspector, and quality control technicians.

4.3.9. A list of approved vendors, including any testing agencies.

4.3.10. A list of test and measuring equipment used for the quality functions of the fabricator.

4.3.11. An example of each form and report utilized in the management system including the daily production log.

4.3.12. An example of the data sheet used in contract review.

4.4. **Required Statements**

The following statements shall be provided in the management system submittal:

4.4.1. A policy statement that includes the following elements:

4.4.1.1. All activities of the organization shall be directed in such a manner as to ensure that the quality requirements of these criteria will be met.

4.4.1.2. The elements of the quality assurance program will be made known to all responsible personnel.

4.4.2. The quality system shall, at a minimum, be reviewed annually.

4.4.3. IAS will be notified, in writing, prior to any cancellation of the inspection agreement with the inspection agency.

4.4.4. Copies of reports of inspections conducted by the inspection agency, if they note major quality control variations, will to be forwarded to IAS by the fabricator within 10 days of the major deficiency(s) being reported.

4.4.5. The fabricator will notify the inspection agency when the fabrication facility is to be closed for extended time periods other than for normally scheduled periods for maintenance, holidays or vacations. IAS and the agency will be notified prior to resumption of operations.

4.4.6. IAS will be notified in writing if unannounced follow-up inspections have not been conducted by the inspection agency.

4.4.7. The fabricator will promptly investigate and respond to IAS or a building official when apprised of complaints regarding the noncompliance of finished product with stated specifications.

4.5. **Required Written Procedures**

The fabricator shall submit written procedures for the following:

4.5.1. **Contract Review**: Review of new work to ensure the needed resources exist to fulfill the contract requirements.

4.5.2. **Document Control**: Control of documents and data relating to the quality functions of the fabricator. Controls must include the following:

4.5.2.1. A means of document approval.

4.5.2.2. A means to ensure that only current, approved documents are used.

4.5.2.3. A means of ensuring that documents are available at all locations where necessary for the proper functioning of the quality system.

4.5.3. **Purchasing**: Determining that purchased products will conform to specified requirements.

4.5.4. **Subcontracting**: Reinforced and precast/prestressed concrete subcontractors shall be evaluated for the fabricator inspection program for their ability to meet subcontract requirements and the conditions of these criteria. When reinforced and

precast/prestressed subcontracting for inspection is performed, such work shall be conducted in the shop of an IAS-accredited fabricator inspection program.

4.5.5. **Product Traceability**: Traceability of the finished product to:

4.5.5.1. Incoming raw materials.

4.5.5.2. Responsible quality control personnel.

4.5.5.3. Plans and specifications.

4.5.5.4. Quality records.

4.5.6. **Process Control**

4.5.6.1. **Placement of Reinforcing Steel**

4.5.6.1.1. Method to ensure reinforcing steel is free of contamination.

4.5.6.1.2. Method of splicing and tying.

4.5.6.1.3. Method of applying initial load in prestressing operations to straighten the individual strands and eliminate slack.

4.5.6.1.4. Method of applying final load in prestressing operations.

4.5.6.1.5. Method of determining stresses and elongation in prestressing operations.

4.5.6.1.6. Method of determining compressive strength of the reinforced concrete product prior to detensioning.

4.5.6.1.7. Method of detensioning to ensure the following:

4.5.6.1.7.1. That sudden shock or loading is minimized.

4.5.6.1.7.2. That eccentricity about the vertical axis of the member is limited.

4.5.6.2. **Concrete Mixtures**

4.5.6.2.1. Identify the method of designing and verifying the concrete mix.

4.5.6.2.2. How the mix will be verified before it is used. This verification must ensure the batching, mixing equipment, construction methods and curing environment are representative of actions performed at the fabrication facility.

4.5.6.3. **Batching and Mixing**

4.5.6.3.1. Method of proportioning the components of the design mix.

4.5.6.3.2. Method used to mix the components of the design mix to ensure a uniform consistency.

4.5.6.4. **Placing Concrete**

4.5.6.4.1. Method of transporting the concrete from the mixer to the forms.

4.5.6.4.2. Method of placing the concrete to avoid separation of the coarse aggregate from the mix.

4.5.6.4.3. Method of consolidation of the concrete.

4.5.6.4.4. Method to make sure density of the concrete strength test specimens are representative of the reinforced concrete product.

4.5.6.5. **Curing Concrete**

4.5.6.5.1. Method of curing the reinforced concrete product.

4.5.6.5.2. Method of curing the concrete strength test specimens.

4.5.6.6. **Finishing**

4.5.6.6.1. Method of finishing unformed surfaces.

4.5.6.6.2. Method of finishing surfaces of composite members.

4.5.6.6.3. Method of finishing formed surfaces.

4.5.6.6.4. Method of patching minor defects.

4.5.7. **Inspection and Testing**

4.5.7.1. **Inspection of Incoming Raw Materials**: Inspection method used to ensure that all incoming raw materials comply with the specifications before they are placed into service.

4.5.7.2. **Inspection of Production Methods**

4.5.7.2.1. Inspection frequency and method used to ensure proper placement of reinforcing steel.

4.5.7.2.2. Inspection frequency and method used to ensure reinforcing steel is not contaminated.

4.5.7.2.3. Inspection method to verify proper stressing and elongation of reinforcing steel.

4.5.7.2.4. Inspection frequency and methods used to ensure proper concrete mix design, including:

4.5.7.2.4.1. Sieve analysis and unit weight of aggregates.

4.5.7.2.4.2. Moisture content of aggregates.

4.5.7.2.4.3. Slump of concrete.

4.5.7.2.4.4. Air content.

4.5.7.2.4.5. Density (unit weight) of concrete.

4.5.7.2.4.6. Temperature of concrete during placement.

4.5.7.2.4.7. Ambient temperature during placement.

4.5.7.2.4.8. Compressive strength.

4.5.7.2.5. Inspection method used to ensure proper curing conditions of the reinforced concrete product.

4.5.8. **Control of Inspection, Measuring and Test Equipment**

4.5.8.1. **Control Procedures**

4.5.8.1.1. Procedures used for the calibration of measuring and test equipment.

4.5.8.1.2. Procedures to ensure the traceability of calibration records to nationally recognized standards.

4.5.8.2. **Control of Nonconforming Products**

4.5.8.2.1. Method of identifying nonconforming products.

4.5.8.2.2. Method of assigning the disposition of nonconforming products.

4.5.9. **Corrective Action**: Investigating, documenting and correcting nonconformances.

4.5.10. **Handling and Storage**: Identifying and storing incoming materials and finished products.

4.5.11. **Internal Audits**: The frequency, method of documentation and the content of internal audits to determine the effectiveness of the management system.

4.5.12. **Control of Quality Records**: Methods for storing, maintaining and accessing the following quality control records for a minimum of two years:

4.5.12.1. In-house quality inspection reports, forms, checklists.

4.5.12.2. Mill test reports and certificates of compliance from vendors for incoming raw materials.

4.5.12.3. Copies of inspection reports by the inspection agency.

4.5.12.4. Records of internal audits.

4.5.12.5. Training records.

4.5.12.6. Evaluations of vendors and subcontractors.

4.5.13. **Training**

4.5.13.1. Procedure for training all personnel who have an effect on the quality of the finished product.

4.5.13.2. Procedure for maintaining current personnel qualifications.

5. ADDITIONAL INFORMATION (AS APPLICABLE)

5.1. State of California Department of Transportation Standard Specifications–2015™, Department of Transportation.

5.2. Standard ISO 9001:2015, Quality management systems – Requirements.

6. LINKS TO ADDITIONAL REFERENCES

6.1. IAS – www.iasonline.org

6.2. International Code Council – www.iccsafe.org

6.3. Precast/Prestressed Concrete Institute – www.pci.org

This criteria was previously issued October 1999, April 2002, July 2002, June 2003, May 2004, September 2008, February 2010, September 2013, September 2014 and July 2016