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ACCREDITATION CRITERIA FOR INSPECTION PROGRAMS FOR MANUFACTURERS OF COLD-FORMED STEEL STRUCTURAL AND NONSTRUCTURAL COMPONENTS NOT REQUIRING WELDING

AC473

**May 2010
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PREFACE

The attached accreditation criteria has been issued to provide all interested parties with guidelines on implementing performance features of the applicable standards referenced herein. The criteria was developed and adopted following public hearings conducted by the International Accreditation Service, Inc. (IAS), Accreditation Committee and is effective on the date shown above. All accreditations issued or reissued on or after the effective date must comply with criteria. If the criteria is 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. This 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.

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1.0 INTRODUCTION

1.1 Scope: This document sets forth the requirements for obtaining and maintaining International Accreditation Service, Inc. (IAS), accreditation under the Inspection Program for Manufacturers of Cold-formed Steel Structural and Nonstructural Components Not Requiring Welding, and for the qualifying data that must be submitted. This document supplements the IAS Rules of Procedure for Inspection Programs for Manufacturers of Cold-formed Steel, Structural and Nonstructural Components Not Requiring Welding.

1.2 Overview: Accredited entities complying with this criteria will have demonstrated that they have the personnel, organization, experience, knowledge, quality procedures and commitment to fabricate in accordance with specified requirements. IAS-accredited inspection programs for manufacturers of cold-formed structural and nonstructural components not requiring welding operate under a documented quality system developed in concert with an IAS-accredited inspection agency which conducts unannounced inspections to verify continued compliance with this criteria. Accredited entities are evaluated for their ability to consistently produce products of the required quality mandated by specified requirements. This criteria does not cover the products or the design or performance characteristics of the products.

2.0 REFERENCES

All references herein, unless otherwise specified, require the latest revision/edition, as applicable

2.1 *International Building Code*[®], published by the International Code Council.

2.2 IAS Accreditation Criteria for Inspection Agencies (AC98).

2.3 IAS Rules of Procedure for Inspection Programs for Manufacturers of Cold-formed Steel Structural and Nonstructural Components Not Requiring Welding (under construction).

2.4 ISO/IEC (International Organization for Standardization/International Electrotechnical Commission) Standard 17020:1998, General criteria for the operation of various types of bodies performing inspection.

2.5 SSPC, The Society for Protective Coatings.

2.5.1 Steel Structures Painting Manual, Volume I, Good Painting Practice.

2.5.2 Steel Structures Painting Manual, Volume II, Systems and Specifications.

2.6 ANSI/AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members.

3.0 DEFINITIONS

For the purposes of this accreditation criteria, the definitions given in ISO/IEC Standards 2:2004 and 17000:2004, and the definitions that follow, apply.

3.1 Approved Fabricator: An established and qualified person, firm or corporation approved by the building official pursuant to the approved fabricator designation in Section 1702 of the *International Building Code*[®].

3.2 Cold-formed Products: Shapes manufactured by press-braking or press-forming blanks sheared from steel sheets, cut lengths of steel coils or plates, or by roll forming cold- or hot-rolled steel coils or sheets; both forming operations being performed at ambient plant temperature, without the addition of heat such as is required for hot forming. Products such as but not limited to cold-formed Z- or C-shaped structural members or roll-formed sheeting or deck designed to resist vertical and/or lateral loads as supplied to metal building manufacturers whose inspection programs have been accredited by International Accreditation Service, Inc. (IAS).

3.3 Contract Documents: Documents that describe the cold-formed structural and nonstructural components not requiring welding to be supplied in their entirety for a given project. These documents include work orders, drawings, specifications, and buyer sketches.

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

3.5 General Manager: The person occupying the highest position of authority within a facility's organization.

3.6 Component Manufacturer: An entity that may be a company, division, subsidiary or similar organization that manufactures cold-formed products.

3.7 Nonconformance: An action employed that renders a component unacceptable for the intended use as specified in contract documents or this criteria.

3.8 Nonstructural Component: Any cold-formed component regardless of configuration used in a nonstructural application so as to neither support loads nor transfer loads.

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

3.10 Product: Result of activities or processes.

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

3.12 Project Documents: Documents produced for the buyer's use to support the implementation of the project.

3.13 Quality Assurance: Measurable systematic actions to assure confidence that the implementation of planned activities result in meeting objectives, goals and contract documents.

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

3.15 Quality Plan: A written document that describes the procedures and policies implemented to assure product quality meets requirements of specific contract documents. As a minimum, quality plans must meet the requirements of Sections 8.2.13 and 8.2.14 of this criteria.

3.16 Quality System Management: A management approach to quality improvement based on the participation of corporate management in improving processes, products and services provided to the customer.

3.17 Repair: Action taken to render a member or component acceptable for the intended use.

3.18 Shop Documents: Documents produced that describe the individual components to be fabricated in the fabrication facility. These documents include shop details, bills of material, manifests, bills of lading, etc.

3.19 Specification: A document that states the obligatory requirements to which the product must conform.

3.20 Vendor: An entity that provides inventoriable, proprietary buy-out items that are available for sale. These items are typically chosen from a catalogue or list and are finite in terms of available options and quantity. Examples of vendors are bolt manufacturers and steel mills.

4.0 GENERAL REQUIREMENTS

4.1 Quality System

4.1.1 Entities accredited under this criteria shall establish and implement a quality system that is fully documented. This documented quality system must describe the procedures and quality activities for ensuring that fabricated products meet the specified requirements.

4.1.2 A documented quality management system manual shall be prepared and submitted to IAS. The documentation shall include a cross-reference matrix prepared in concert with an IAS-accredited inspection agency, ensuring that the general requirements in Section 4.0, personnel requirements in Section 5.0, data in Section 6.0, the statements in Section 7.0, and the written procedures noted in Section 8.0 of this accreditation criteria have been included.

4.1.3 The submitted quality assurance document must be signed and dated by the highest level of authority within the organization.

4.1.4 The submitted quality assurance document must be signed and dated by an authorized representative of an IAS-accredited inspection agency, attesting that the inspection agency has reviewed the documented quality system and that it is sufficient to allow scheduling of an on-site joint assessment with IAS.

4.2 The submitted quality assurance document must be reviewed at least annually.

4.3 Follow-up Inspections: Entities accredited under this criteria must obtain the services of an IAS-accredited inspection agency, which is accredited for the specified discipline, to conduct, at a minimum, biannual unannounced inspections (two per year) of the fabrication facility. The IAS-accredited inspection agency may perform one of the two inspections per year as a joint review with IAS.

4.4 Assessment by IAS: Prior to accreditation, an on-site assessment by IAS is required. This assessment will be conducted jointly with the accredited inspection agency. The purpose of this joint assessment is to determine compliance with the documented quality system, and to assess the inspection procedures of the inspection agency.

5.0 PERSONNEL

5.1 Quality Manager: Entities accredited under this criteria shall designate a quality manager who has the necessary training and experience to complete the tasks listed in Sections 5.1.1.1 through 5.1.1.5. The quality manager shall report directly to the highest level of authority within the organization. The quality manager shall have the following responsibilities:

5.1.1 Maintaining the documented quality system in accordance with this criteria.

5.1.2 Monitoring the effective implementation of the documented quality system.

5.1.3 Assuring that periodic internal audits are conducted and documented, and that corrective actions are implemented.

5.1.4 Assuring that annual management reviews are conducted and documented to assure the adequacy and effectiveness of the quality system. Annual management reviews must produce a summary and a documented plan of action for improvement. Documents to be considered during the annual management review must include, but are not limited to, customer complaints, back charges, internal audit results and corrective actions.

5.1.5 Developing quality plans that meet contract documents, and having knowledge of and access to the appropriate documents to meet this requirement.

5.2 In-house Quality Control Inspector: Entities accredited under this criteria shall designate an in-house quality control inspector who, as a minimum, must have verifiable work related experience and documented training.

5.2.1 Be familiar with and demonstrate knowledge of codes and specifications, as appropriate, for the scope of work specified in the contract documents.

5.2.2 Be responsible for overall workmanship and for making sure that all cold-formed structural and nonstructural components are 100% visually inspected. Although inspections may be delegated to qualified personnel during the receipt and in-process stages of assembly, it is the responsibility of the in-house quality control inspector to ensure that inspections are performed and documented and that the product meets project

requirements. Qualified personnel must meet the requirements of Section 5.2.1 of this criteria or demonstrate competence to perform inspections by appropriate training and/or experience in metals fabrication, inspection and testing. The basis for designating qualified personnel shall be documented by the in-house quality control inspector.

5.2.3 Be responsible for ensuring that incoming raw materials are properly identified and inspected for compliance with quality plans and specifications.

5.2.4 Be responsible for ensuring and documenting that the final assembly can be traced back to the incoming materials, the quality assurance records and the individual who performed the work.

5.2.5 Be responsible for ensuring that fabrication of cold-formed products meets the fabrication tolerances outlined in Table 10.0.

6.0 REQUIRED DATA

The name of the facility, the physical street address, mailing address (if different), information on the person serving as the IAS contact (including the telephone number and e-mail address), and the telephone number of the facility.

6.1 A floor plan of the fabrication facility. The floor plan need not be to scale.

6.2 A list of major production equipment.

6.3 A list of typical items fabricated.

6.4 The name of the deputy in-house QC inspector who assumes the position in the absence of the primary in-house QC person.

6.5 An organizational chart including the names of the responsible quality managers. This chart must show the relationships among the CEO, general manager, quality manager, in-house quality control inspector, deputy in-house inspector, production manager.

6.6 A list of approved vendors.

6.7 A list of test and measuring equipment. Test and measuring equipment must be calibrated and traceable to a national standard. The equipment list must include sufficient testing instruments to assure quality compliance as appropriate for the items being fabricated.

7.0 REQUIRED STATEMENTS

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

7.1 A quality policy statement that includes the following elements:

7.1.1 All activities of the organization shall be directed in such a manner as to ensure that the quality requirements of AC473 will be met.

7.1.2 The elements of the quality assurance program will be disseminated to all personnel assigned activities that affect the quality of the product.

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

7.3 Copies of reports of inspections conducted by the inspection agency, if they note major quality control variations, will be forwarded to IAS within 10 days of the major deficiency's having been reported.

7.4 Entities accredited under this criteria will notify the inspection agency when the facility is to be closed for extended time periods other than for normally scheduled periods for maintenance or vacations, or for two or more weeks regardless of the circumstances of the closure. IAS and the inspection agency will be notified 10 days prior to resumption of operations.

7.5 IAS will be notified in writing by the accredited entity and the inspection agency if unannounced, follow-up inspections have not been conducted by the inspection agency.

7.6 IAS and the accredited inspection agency must be notified within 30 days of any changes in management personnel. As a minimum, this would include the president, general manager, purchasing manager, production manager, or quality manager.

8.0 REQUIRED WRITTEN PROCEDURES

Entities accredited under this criteria shall submit written procedures for the following:

8.1 Document Control: Control of documents and data relating to the quality functions must be provided. This control shall include the following:

8.1.1 A document approval procedure.

8.1.2 A procedure to ensure that only current, approved documents are used.

8.1.3 A procedure to ensure that documents are available at all locations where necessary for the proper functioning of the quality system.

8.2 Purchasing

8.2.1 Determining that purchased products will conform to specified requirements. The procedure must include a requirement that the type and grade of material be documented on the purchase order agreement.

8.2.2 Evaluation of subcontractors for their ability to meet subcontract requirements. Evaluations may contain summaries or logs, but must include a means of quantifying and measuring the ability of the subcontractor or supplier to provide quality products or services consistent with the required shop documents.

8.3 Product Traceability: The traceability procedure must describe the method used to ensure items are traceable as specified in the contract documents. Items that typically require traceability are materials and consumables that are incorporated into the final product. The project documents will determine if full materials traceability is required; however, the accredited entity must have a procedure to meet the project needs for the type of fabrication performed. In addition to project requirement needs, the accredited entity, as a minimum, must have in their control traceability of the finished product to incoming materials, plans and specifications. The procedure must make provision for documentation of this traceability on inspection forms or on a controlled copy of the detail drawing.

As a minimum, all steel used and incorporated into the final cold-formed product must be traceable to the type and grade of material.

8.4 Process Control: There must be a procedure that identifies how process control is communicated to appropriate personnel. Process control includes procedures such as press-braking, press-forming, roll forming, cutting or saw operations, cambering and coating. Examples of forms used in the process control procedure are cut lists, standard drawings or detail drawings. The procedure must describe the accredited entity's method of communicating and establishing priorities of such operations.

8.5 Inspection and Testing: The inspection procedure shall include provisions for receipt, in-process and final inspections as appropriate to provide a level of assurance that products are fabricated in accordance with contract documents by qualified personnel. Final inspections shall include a record of the results and resolution of nonconformances identified by subsequent inspections. As a minimum, inspection procedures shall include the following:

8.5.1 Receiving inspection of incoming materials to the required specification, including review of mill test reports and certificates of conformance to ensure compliance with contract documents.

8.5.2 In-process inspection for workmanship that can affect subsequent operations. (Examples of in-process inspections are areas requiring coatings that will not be accessible during final inspection; monitoring of operations as appropriate; fabrication tolerances and monitoring of roll-forming operations for shape tolerances. There must be documentation ensuring personnel performing assigned inspections have been trained on the specific tasks that are delegated.

8.5.3 There must be a record of the final inspection ensuring that receiving, in-process and final inspections have been performed.

8.6 Control of Inspection, Measuring and Test Equipment: There must be a maintenance schedule, including calibration procedures for testing equipment. Wherever possible, calibration services shall be provided by a calibration laboratory accredited by IAS or by an accreditation body that is a partner with IAS in a mutual recognition arrangement.

It is recognized there may not be nationally recognized standards available for unique testing equipment. When such instances exist, calibration procedures must be in compliance with manufacturer's recommendations to the extent that such testing equipment is calibrated to ensure consistency with the required measuring capabilities. It is the accredited entity's responsibility to ensure that such testing equipment is approved prior to use.

8.7 Control of Nonconforming Workmanship: Procedures shall be established for identifying, documenting and assigning the disposition of nonconforming items.

8.8 Corrective Action: The procedure for corrective action shall include investigating, documenting and

correcting nonconformances. The procedure must include a provision to preclude repetition.

8.9 Handling, storage and delivery procedures shall include identifying and storing of incoming materials and finished products as appropriate to minimize damage and deterioration.

8.10 Internal Audits: Entities accredited under this criteria shall identify the frequency, method of documentation and the content of internal audits to determine the effectiveness of the quality system. Audits shall include a summary that compares the most recent audit to the previous audit, and shall include the elements of AC473. Internal audit frequency shall not be less than once per year.

8.11 Control of Quality Records: Entities accredited under this criteria must determine methods for storing, maintaining and accessing quality records for a minimum of two years. Quality records must include at least the following:

- Completed in-house quality inspection reports, forms, and checklists.
- Manufacturer test reports and certificates of compliance from vendors, for incoming materials and consumables.
- Copies of inspection reports by the inspection agency.
- Records of internal audits.
- Training records.
- Evaluations of vendors and subcontractors.

8.12 Training: There must be a procedure for the training of personnel who have an effect on the quality of the finished product. The procedure must include provision for maintaining current personnel qualifications. As a minimum, there must be training requirements established for inspectors, assistant inspectors, and machine operators.

9.0 CONTROL OF REQUIRED PROCEDURES

Contract Review: The quality manager must ensure that contract quality requirements are met. The quality manager will be responsible for reviewing any instructions and/or procedures relative to activities affecting quality to determine if they are properly understood and implemented.

As a minimum, the following elements must be documented to ensure that contract reviews are managed, controlled, and successfully implemented and communicated to appropriate personnel:

9.1 Quality plans to ensure that fabrication conforms to the most recent project specifications.

9.2 As a minimum, quality plans shall address the following:

9.2.1 Material: ASTM Grade and Type:

1. Origin of materials
2. Substitution requirements
3. Material test report requirements

9.2.2 Workmanship:

1. Cutting of components
2. Drilling or punching of holes
 - Edge distance
3. Cambering, bending, straightening
4. Dimensional tolerances (see Table 10.0)

9.2.3 Coating/Painting/Galvanizing:

1. Surface preparation
2. Manufacture and type of coating
3. Application of coating
4. Protection of coating

9.3 Required inspections and sequence of inspections to verify conformance of an item or activity to specified requirements.

Procedures

1. Receiving
2. In-process
3. Final
4. Records and reports

9.4 Acceptance criteria for inspections required in the contract documents for the scope of the project.

9.5 Shipping, packaging, and handling requirements.

10.0 FABRICATION TOLERANCES

Cold-form Structural Members: The fabrication tolerances for each dimensional element are defined in Table 10.0. The fabrication dimensional elements are indicated in Figure 10.0.

Table 10.0
Cold-formed Structural Member Tolerances

Formed Structural Members			
	Dimension	Tolerances	
		+	-
Geometry	D	3/16"	3/16"
	B	3/16"	3/16"
	d	3/8"	1/8"
	θ_1	3°	3°
	θ_2	5°	5°
Hole Location	E ₁	1/8"	1/8"
	E ₂	1/8"	1/8"
	E ₃	1/8"	1/8"
	S ₁	1/16"	1/16"
	S ₂	1/16"	1/16"
	F	1/8"	1/8"
	P	1/8"	1/8"
Length (L)		1/8"	1/8"
Camber (C)		1/4" x L (ft)/ 10	
Minimum Thickness (t)		0.95 (Design t)	

