
AISC Certification Program for Structural Steel Fabricators

Standard for Steel Building Structures—2002

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under the direction of the
AISC AUDITING COMMITTEE
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by

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1. Purpose

The purpose of the AISC Quality Fabricator Certification Standard is to confirm to owners, the design community and the construction industry that a certified structural steel fabricating facility has the personnel, organization, experience, procedures, knowledge, equipment and commitment to produce fabricated steel of the quality required for normal structural steel building construction.

2. Scope

This Standard is intended to offer assistance to building professionals and owners in assessing Fabricators' capability to satisfy project quality needs. Users of this Standard must evaluate Fabricator capacity independently.

The Standard describes requirements for certification of facilities that fabricate and supply the structural steel frames for buildings. These facilities have quality management systems with defined functions and responsibilities.

The quality management system of fabrication facilities (not products) is certified. The certification should not be understood as a product inspection of fabricated structural steel. Certification includes all functions of providing structural steel fabrication from receipt of contract through final delivery. The scope of this certification does not include design or erection.

The certification program is open to all Fabricators of structural steel, regardless of size and regardless of AISC membership status.

3. References

The Fabricator shall have the reference documents and Standards necessary to make personnel aware of the requirements of the work. The following references shall be readily available to those who need them. References will be current with the requirements of existing contracts. The fabricator must work to and meet the requirements of:

- *AISC Selected ASTM Standards for Structural Steel Fabrication*¹
- *Manual of Steel Construction*, LRFD and ASD, which include the following specifications and codes:
 - *Specification for Structural Steel Buildings*
 - *LRFD Specification for the Design of Steel Hollow Structural Sections*
 - *LRFD Specification for Single-Angle Members*
 - *Specification for Structural Joints Using ASTM A325 or A490 Bolts*
 - *AISC Code of Standard Practice for Steel Buildings and Bridges*
- *AISC A Guide to Engineering and Quality Criteria for Steel Structures: Common Questions Answered* (OPTIONAL Fabricator library item)

- ANSI/AWS D1.1 *Structural Welding Code—Steel*
- ANSI/AWS A2.4 Symbols
- ANSI/AWS A3.0 Terms and Definitions
- *Steel Structures Painting Manual, Volume I, Good Painting Practice*
- *Steel Structures Painting Manual, Volume II, Systems and Specifications*
- *AISC Detailing for Steel Construction* (OPTIONAL Fabricator library item)

4. Definitions

As used in this Standard, the word **shall** or **will** denotes a mandatory requirement. The word **should** denotes a guideline or recommendation. The word **may** denotes an obligation to make a choice.

4.1 AISC

American Institute of Steel Construction, Inc.—the certifying body

4.2 ASTM

American Society for Testing and Materials

4.3 AWS

American Welding Society

4.4 Checker

A person in a detailing organization who, by reason of experience and ability, has advanced successfully to a position of more responsibility with the ability to perform the final verification of shop drawings without direct supervision.

4.5 Checking (of shop drawings and erection drawings)

A detailed review of all sketches and dimensions on a shop drawing by a qualified checker other than the original detailer. Checking of shop drawings will compare the shop drawing to project requirements. Issues to review include, but are not limited to: geometry, use of the correct connections, proper notes, proper material usage, assignment of complete welding symbols, proper coatings and preparation, proper representation on erection drawings including the notation of any necessary instructions and depiction of details necessary to conduct the work in the field.

4.6 Contract Documents[†]

The documents that define the responsibilities of the parties that are involved in fabricating and erecting the structural steel. These documents normally include the design drawings, the specifications and the contract.

4.7 Customer

Entity (potentially the general contractor, owner, specifier or Engineer of Record) contracting with the Fabricator for fabricated structural steel.

[†]from the AISC Code of Standard Practice

4.8 Design Drawings[†]

The graphic and pictorial portions of the contract documents showing the design, location and dimensions of the work. These documents generally include: plans, elevations, sections, details, schedules, diagrams and notes.

4.9 Detailer

Person who performs the function of detailing.

4.10 Detailing

The function that produces shop and erection drawings from contract documents.

4.11 Documented Procedure (quality management system procedure)

A procedure that is documented in writing and/or in drawings or in other graphical format. The documentation provides information about how to perform activities and processes consistently. It can include written procedures or instructions, drawings, diagrams, charts, specifications and excerpts of, or references to, appropriate technical Standards or codes. Documentation must contain the purpose of the procedure, assign responsibilities for completion, responsibility for review of the procedure and identify records that are generated. The term “documented procedure”, where it appears within this Standard, indicates that the procedure is established, documented, implemented and maintained.

4.12 Element

The elements of this Standard are: Management Responsibility, Contract and Project Specification Review and Communication, Detailing, Document and Data Control, Purchasing, Material Identification, Fabrication Process Control, Inspection and Testing, Calibration of Inspection, Measuring and Test Equipment, Control of Nonconformances, Corrective Action, Handling, Storing, and Delivery of Product and Materials, Control of Quality Records, Training and Internal Audit.

4.13 Engineer of Record[†]

The licensed professional who is responsible for sealing the contract documents, which indicate that he or she has performed or supervised the analysis, design and document preparation for the structure and has knowledge of the load-carrying structural system.

4.14 Erection Drawings[†]

Field-installation or member-placement drawings that are prepared by the Fabricator to show the location and attachment of the individual framing pieces.

4.15 Fabrication

The process of preparation and assembly of individual parts into a shipping piece in accordance with all contract documents.

4.16 Fabricator[†]

The entity that is responsible for fabricating the Structural Steel. NOTE: The Fabricator referenced in this document is the entity being certified.

4.17 Material Identification

The ability to determine that the specified material grade and size is being used.

4.18 NDT (NDE)

Nondestructive Testing (Nondestructive Examination)

4.19 Nonconformance

Attributes of materials, consumables and fabricated product (in-process or final) that do not meet contract requirements or the requirements of the Fabricator’s Quality Manual as defined by details, procedures and specifications.

4.20 Objective Evidence

Objective evidence is the data supporting the existence or verification of something. In this context, it is evidence that the quality management system is functioning properly. Evidence can be: an observation of the performance of a task or physical products; a record, document or procedure; or the result of an interview with one or more employees about their duties or performance of a task.

4.21 Owner[†]

The entity that is identified as such in the Contract Documents.

4.22 P.E.

Professional Engineer

4.23 Quality Assurance (QA)

For the purposes of this program, quality assurance is the planned system of procedures and organizational requirements developed and implemented for the purpose of measuring and assuring compliance with customer requirements and providing confidence that quality goals are achieved. Quality Assurance encompasses such areas as compliance with project specification technical requirements, compliance with referenced Standards and achievement of customer service goals. Specific functions included in quality assurance are: determination of quality criteria, establishment of a plan to monitor quality including assignment of quality control (inspection), determination of

[†]from the AISC *Code of Standard Practice*

acceptance criteria, determination of QC personnel qualifications, oversight (periodic monitoring) of QC activities, summarizing and reporting quality conformance measures to management.

4.24 Quality Control (QC)

QC is the inspection of work. This includes receipt, in-process and final inspection. In-process inspection includes confirming that procedures are met, personnel performing the work are properly qualified, equipment is appropriate and in acceptable working order, the proper materials are used as well as compliance with final inspection criteria. Production personnel may perform many inspections but they shall be trained in their responsibilities and acceptance criteria. They must document the performance of their QC duties and they shall be periodically monitored by QA (either by repeating the QC duties or by witnessing their work).

4.25 Quality Manual

A document stating the quality policy and describing the quality management system of the Fabricator's organization. The document addresses all of the requirements of this Standard, as well as applicable reference documents, codes and contract requirements. Elements may be included in one document called the Quality Manual or may be addressed in separate procedures, documents and records referenced by the Quality Manual.

4.26 Quality Management System

A system to establish policy and objectives to direct and control an organization with regard to quality.

4.27 Quality Record

A specific type of quality document that provides objective evidence of activities performed or results achieved.

4.28 RCSC

Research Council on Structural Connections

4.29 S.E.

Structural Engineer

4.30 Shipping Piece

Individual member for field erection carrying a specific identification mark.

4.31 Shop Drawings

Drawings of the individual Structural Steel shipping pieces.

4.32 Specifications[†]

The portion of the Contract Documents that consists of the written requirements for materials, Standards and workmanship.

4.33 Specifier

The entity defining the requirements for fabricated structural steel.

4.34 SSPC

Society for Protective Coatings (formerly known as Steel Structures Painting Council)

4.35 Structural Steel[†]

Elements of the structural frame. (See full list of applicable elements in the AISC Code of Standard Practice.)

4.36 Subcontractor

A firm that performs a portion of the Fabricator's contract work such as fabrication, detailing, coating application, inspection or consulting services.

4.37 Supplier

A firm that supplies materials (including but not limited to: mill materials, process supplies, welding consumables, coatings and process machinery) and completed purchased product (including but not limited to: fasteners, decking, joists and proprietary buy-out items) needed to fulfill the Fabricator's contract requirements.

4.38 Training (documented)

Training in which there is a record of the topics discussed, a record of who attended, who gave the course and when it was given. The course curricula must relate to the subject and cover the key issues of the subject. Training is to be given by personnel with training or experience in the subject they are teaching. An evaluation of the student's comprehension of the material at the end of the course is desirable. Training is documented when the instructor, attendees, course outline and date are recorded.

4.39 WPS, PQR

Welding Procedure Specification

Procedure Qualification Record

5. Management Responsibility

Management of the Fabricator shall be responsible for defining and adopting a commitment to quality; directing and leading the Fabricator to achieve that commitment; determining and providing the personnel and resources necessary; overseeing the procedures and practices necessary and implementing the systems to comply with and to assure that the goals of the commitment have been met.

5.1 Commitment (Policy)

Executive Management shall adopt and document a policy (or policies) defining the quality management system goals of the Fabricator's organization. The document(s) shall state objectives for quality and man-

[†]from the AISC *Code of Standard Practice*

agement's commitment to quality. The policy will, at a minimum, commit to meeting contract requirements.

The policy shall be disseminated to personnel affecting quality. The management shall ensure that the policy is understood, implemented and maintained at appropriate levels of the Fabricator's organization.

5.2 Direction and Leadership

Executive management shall direct the development of systems necessary to achieve the goals of the Fabricator's policies. The systems shall comply with the requirements of this Standard. Executive management will demonstrate that there is a plan to realize the goals and evaluate the current level of the achievement of those goals—the effectiveness of the program. Management shall provide direction and leadership consistent with the policies and monitor the effective implementation of those systems. Management shall provide adequate resources and channels for communication to address and resolve customer complaints. Management shall be responsible for qualification of personnel.

Executive management shall review the organization's quality management system at planned intervals to ensure its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the quality management system, including the quality policy and quality objectives.

Records from management reviews shall be maintained. Management review requirements will be defined by the Fabricator. This will include a specific method to obtain, report and appropriately analyze the following:

- results of internal and AISC audits,
- customer feedback, (examples may include: surveys, letters of recognition, personal interviews, requests for corrective action and complaints),
- process performance and product conformity, (e.g. back charges; internal error trends with fitting, welding, bolting and coating application processes; detailing errors; shipping delays or equipment failures),
- output from previous management reviews.

The output from the management review shall include the record and implementation of any decisions and actions related to:

- improvement of the effectiveness of the quality management system and its processes,
- improvement of product quality,
- resource needs.

5.3 Management Representative

Executive management shall appoint a member of management who may or may not be the chief executive—

and who, irrespective of other responsibilities, shall have responsibility and authority that includes:

- Ensuring that procedures needed for the quality management system are established, implemented and maintained in accordance with this Standard.
- Reporting to executive management on the performance of the quality management system and any need for improvement.
- Ensuring the promotion of awareness of customer requirements throughout the Fabricator's organization.
- Reviewing the quality management system at defined intervals sufficient to ensure the stability of the quality management system and its effectiveness in satisfying this Standard.
- Liaising with external parties on matters relating to the quality management system.

5.4 Resources

The Fabricator will have the resources needed to achieve conformity to contract specifications. Resources will include, but are not limited to, the resources described in the sub-articles of 5.4.

5.4.1 Personnel

The responsibility, authority and the interrelation of personnel who manage, perform and verify work affecting quality shall be defined and documented using organization charts and job descriptions or other suitable means. Personnel performing assigned functions must have qualifications that indicate the ability to successfully perform the function. Unless otherwise noted, personnel can be assigned to more than one task, provided they are qualified and able to accomplish the duties of each position. Specifically, the individual(s) responsible for Quality Assurance and Quality Control management shall not report to production management for items related to quality.

Qualified personnel² will be assigned to manage the functions detailed in Sections 5 through 19 of this Standard and shall include as a minimum:

- Management Representative
- Detailing Management
- Purchasing Management
- Fabrication Process Management³
- Quality Assurance Management
- Quality Control Management

5.4.2 Buildings, Workspace and Associated Utilities

A fabrication facility shall consist of areas and buildings that provide space for the routine functions considered to be part of steel fabrication, including administration. The areas and buildings shall be conducive to achieving consistent quality work.

The fabrication facility shall include suitable areas for administration, quality assurance, quality control, detailing; adequate space for fitting, bolting and welding; provide conditions conducive to acceptable work in all areas of the facility; suitable areas for receipt and storage of raw materials, consumables and hardware, storage and shipping of fabricated materials and coatings if coating application is performed by the Fabricator.

5.4.3 Process Equipment (both hardware and software)

The Fabricator shall have under their control the equipment necessary to perform the functions common to fabrication consistent with the specifications and Standards common to the work. Equipment must be maintained to produce the required quality.

5.5 Internal Communication

Executive management shall ensure that appropriate communication processes are established within the Fabricator's organization and that communication takes place regarding the effectiveness of the quality management system.

5.6 Documentation Requirements

5.6.1 General Requirements

The extent of the quality management system documentation can differ from one organization to another due to the size of organization and type of activities, the complexity of processes and their interactions and the competence of personnel. Quality management system documentation shall include:

- documented statements of a quality policy and quality objectives (as described in 5.1),
- documented procedures and their associated quality records required by this Standard,
- documents needed by the organization to ensure the effective planning, operation and control of its processes and
- a Quality Manual.

5.6.2 Quality Manual

The Fabricator shall establish and maintain a Quality Manual outlining the quality management system implemented in the Fabricator's organization. The documented Quality Manual shall consist of the policies and organizational description⁴.

The Quality Manual will describe the quality management system, including the documented procedures established and a description of the interaction and communication between the processes of the quality management system used by the Fabricator to produce products of the required quality.

5.6.2.1 Organization

Procedures may be issued separately or be an integral part of the Quality Manual. The Fabricator's management determines the level of detail in the Quality Manual, and referenced procedures. At a minimum, these documents must be detailed enough to adequately describe the Fabricator's quality management system that assures the production of quality product. Additionally, these documents must demonstrate compliance with this Standard.

Further required reference documents include: job descriptions and qualifications of key personnel, a facility plan and an equipment list. Management will define what additional required written procedures/drawings or other documents are required beyond the minimum requirements set by this Standard to meet the needs of the Fabricator's organization and its customers.

5.6.2.2 Approval

Executive Management shall approve the Quality Manual, specifically, the approval of the highest-ranking individual in the organization responsible for the facility is required at a minimum.

6. Contract and Project Specification Review and Communication

The Fabricator shall document and implement a procedure for contract and project specification review. The review will identify, determine, plan and record the specific project requirements as well as the distribution to the responsible individuals in the Fabricator's organization. This review will consider any issue that affects the Fabricator's capability to perform the work.

The procedure must provide for review of the original contract documents, revised contract documents and changes received through clarification (e.g. requests for information or other sources) to assure that the Fabricator fully understands the contract requirements.

Evidence of contract review can take the form of technical summaries, signoffs, change orders, schedules and allocation of adequate resources. Such evidence shall indicate consideration of pertinent elements of this Standard managed by the functions listed in 5.4.1 of this Standard and other critical project requirements that, if missed, will have a major impact on project quality. The identified specific project requirements shall be distributed to responsible personnel in the Fabricator's organization.

7. Detailing

7.1 Detailing Procedures

7.1.1 Preparation of Shop Drawings and Erection Drawings

The shop and erection drawings produced must incorporate all customer requirements, specifications, codes and relevant Standards to adequately procure materials, fabricate and erect the structural steel frame. To ensure and verify this, a documented procedure for preparation of shop and erection drawings shall be developed which describe:

- How project requirements are reviewed and incorporated.
- How the Fabricator coordinates, clarifies, resolves, and tracks information with the customer (e.g., construction change documents, Requests for Information [RFI]) and how the associated resolutions are tracked and controlled).

7.1.2 Detailing Standards

The Fabricator will prepare and utilize detailing Standards describing technical preferences and requirements customarily used in the shop. These Standards will show special information required on advance bills such as allowances for cuts, camber or supplementary requirements. The Standards will include how mill order lists are prepared which, at a minimum, include: sizes, appropriate ASTM specification references, special ordering information and any allowances or tolerances.

The Standards will illustrate the Fabricator's preferred methods of drawing layout, including but not limited to views, title block information, the method of designating shipping sequences, the piece marking system, dimensional preferences, commonly used shop abbreviations, the method of showing bolt type and installation requirements, information required on weld symbols including any special NDT requirements, the preferred way to designate coating requirements

The Standards will describe the Fabricator's preferred method for the selection of geometry, connections and material (including sizes and specifications)—the preferred method for detailing holes, fasteners, washers, cuts and copes, assignment of appropriate welding symbols, shop welds, piece marks, bolt placement lists, field welds—and the preferred method for showing surface preparation (including specification of surface finish), coating materials and dry film thickness, shipping sequences and any necessary special instructions to fabricate and erect the structural steel frame.

Finally, the Standards will include necessary information required by the erector to install the members including bolt lists and any other information required by the Fabricator.

7.1.3 Checking of Shop and Erection Drawings

The Fabricator will document a procedure to provide for checking of all shop and erection drawings to ensure compliance with contract documents.

The procedure will describe the method by which the Fabricator performs its final check of shop drawings before release for fabrication. Such methods may include signatures, stamps, logs, files or lists.

For computer-generated shop drawings, the procedure will include a determination of which variables, graphics, calculating formulas and other output must be checked to verify the accuracy of the software.

In the case of subcontracted detailing, the Fabricator will define and document the extent of the review of received details by detailing management.

7.1.4 Customer Approval of Shop Drawings

The procedure will describe the method to document approval of shop drawings released for fabrication or drawings released for field construction. Such methods may include signatures, stamps, logs, files or lists.

This method must have provisions for the customer and/or Engineer of Record to approve shop drawings—whether produced in house or by a subcontractor. Waiver of approval from the Engineer of Record or the customer must be in writing.

7.2 Detailing Function Resources

7.2.1 References (required library)

The Fabricator shall maintain the current references as a library as listed in Section 3 as a minimum.

7.2.2 Personnel

The Fabricator shall employ staff personnel assigned to Detailing Management. Connection Consultation and other detailing functions may either be by employed staff personnel or subcontract services.

7.2.2.1 Detailing Management

Personnel performing Detailing Management are responsible for: overseeing the production of shop and erection drawings, liaising with designers, scheduling, developing company drafting Standards and detailing procedures, coordinating and incorporating construction requirements and training of detailers and checkers. Management personnel must be qualified by one or more of the following:

Experience in sizing connections; detailing and checking shop and erection drawings meeting the approval of designers for a variety of structures representative of projects the company provides. Experience must include training in courses with a written curricula in steel design and connection design. In lieu of this curricula, the Fabricator may describe and determine an appropriate way to demonstrate competence

- Graduate Engineer with experience related to structural steel fabrication.
- Licensed P. E. or S.E., with experience related to structural steel fabrication.

7.2.2.2 Detailing Functions

Personnel who detail and/or check shop and erection drawings must have experience in drawing projects typical of the projects fabricated. Detailers in training must work under the supervision of a trained detailer or checker. A qualified checker must check all shop drawings. Checkers must have training and experience in connection selection.

7.2.2.3 Connection Consultation

Personnel directing detailers performing connection detailing must be qualified by one or more of the following:

- Experience in sizing connections, detailing and checking of shop and erection drawings for steel, approved by an engineer, for a variety of structures representative of the projects the company provides and training in courses with a written curricula in steel design and connection design.
- Graduate Engineer with experience related to structural steel fabrication.
- Licensed P. E. or S.E., with recent experience related to structural steel fabrication.

7.2.3 Subcontract Services

In lieu of employed staff personnel, subcontract services may be used for the following functions: detailing, connection consultation, checking of shop and erection drawings, training of detailers and checkers. However, the Fabricator retains the responsibility for compliance with the requirements of this section.

The Fabricator must define and document the qualification and selection process for choosing subcontract detailers.

7.2.4 Customer Supplied Shop Drawings

When the Fabricator receives shop drawings from the customer, procedures will be documented for the receipt, revision and control of those drawings.

8. Document and Data Control

The Fabricator shall document a procedure to control the Quality Manual, contract documents, shop and erection drawings, all documented procedures required by this Standard and all documented procedures, data and documents affecting quality.

8.1 Review and Approval

Documents affecting quality shall be reviewed and approved by authorized management. Revisions to the Quality Manual and other quality management system documents shall be reviewed for adequacy and approved by the same function and level that authorized the original document. Management shall establish the frequency and requirements for review and updating. A method will be established to identify the changes.

8.2 Customer Requirements

The Fabricator shall document a procedure to receive and document customer requirements⁵ and Fabricator originated changes as they occur throughout the fabricating and detailing process. The system will include records (e.g., logs, files or master lists) that show receipt, incorporation, issue and distribution of revised shop drawings and erection drawings to all necessary departments and personnel at the Fabricator's facility and necessary external organizations, subcontractors or suppliers.

8.3 Revision Control

The Quality Manual shall have a cover page showing the current revision date and the name and location of the Fabricator. The revision will be clearly identifiable on all manuals and procedures and there will be a method for monitoring and identifying the latest revision. The Fabricator will establish a method to ensure that changes to the Quality Manual and/or referenced procedures are identified from the previous revision. Documents must remain legible and easily identifiable.

8.4 Access

Relevant and current procedures and policies pertinent to an area of operation or management shall be available and readily accessible to all personnel responsible for performing work effecting the quality of the product.

8.5 Obsolescence and Transmittal

Controlled documents that are obsolete will be marked, segregated, destroyed or otherwise prevented from inadvertent use in the fabrication or erection process.

A method shall be established and maintained showing the latest revisions and location of the Quality Manual and other quality management system documents, and contract documents including design drawings and shop and erection drawings.

A transmittal system will be established to track the distribution of drawings, documents and specifications to customers, subcontractors and suppliers. These records will indicate the approval and release to shop or field status.

9. Control of Quality Records

The Fabricator shall establish and maintain a documented procedure for identification, collection, storage, maintenance, retention and disposition of quality records. All quality records shall be legible and shall be stored and retained in such a way that they are retrievable from facilities that provide a suitable environment to prevent damage, deterioration or loss. Retention times shall be established and recorded for records retained for any purpose. The retention periods will be at least long enough to permit evaluation of the records during the course of project construction. Where agreed contractually, and contractually by code reference, the Fabricator shall make quality records available for review and evaluation for the agreed time period. Records that document quality typically include: inspection records, NDT Reports, drawing logs, MTRs (material test reports), CofCs (certificates of compliance/conformance), design changes, RFIs (requests for information), mill and consumable purchase orders, records or summaries of nonconformance reports, corrective action reports, internal and external quality management system audits.

10. Purchasing

The Fabricator shall document a procedure to ensure that subcontractors, purchased products, materials and services conform to project requirements. The responsibility for quality of the subcontracted product remains with the Certified Fabricator. Purchase orders, records of the qualification of subcontractors and suppliers and records of the periodic evaluation of suppliers shall be maintained.

10.1 Purchasing Data

The Fabricator shall clearly describe subcontracted work and the purchased products, materials and services ordered in purchasing documents. This will include but not be limited to:

- The type of service, material, class, grade and other unique identification.
- The applicable specifications, drawings, process requirements, inspection instructions and any witness points.
- Delivery instructions and date.
- Certificate of Compliance/Conformance, mill test reports and/or NDT reports required.
- Compliance with ASTM A6, as appropriate.

10.2 Selection of Subcontractors

The Fabricator shall evaluate and select subcontractors on the basis of their ability to meet subcontract requirements, the Fabricator's quality management system, the requirements of this Standard, project requirements and any specific inspection requirements. The structural steel fabricator selected as a subcontractor shall have the required level of AISC Certification on projects requiring AISC Certification.

The Customer or Engineer of Record must approve (in writing) any subcontracted Fabricator that is not an AISC Certified Fabricator on projects requiring AISC Certification.

A written procedure shall be established that describes how the Fabricator evaluates all subcontractors. Subcontractors shall be evaluated in an interval agreed upon by the management. The Fabricator will evaluate the subcontractor via an audit or documented acceptable past experience. Management shall determine the basis of evaluation criteria and the personnel involved in the evaluation process. As a minimum, quality of the finished products and timely, proper delivery of products shall be part of the evaluation procedure.

10.3 Verification of Purchased Product, Materials and Services

The Fabricator shall define the extent of control necessary to conform to the project requirements. This may be dependent upon the type of product, the impact of subcontracted product on the quality of the final product or the records available for the demonstrated capability and performance of previous projects. Test reports, certificates of compliance or other evidence of quality control shall be kept on file.

10.4 Customer Verification of Fabricated Product

The customer or the customer's representative shall be allowed the right to verify the conformance of the final product to the project requirements at the Fabricator's premises.

10.5 Control of Customer-Supplied Material

If materials are supplied by the customer; the Fabricator shall verify, store and maintain materials in an appropriate fashion. Verification shall include confirmation that the material is what is required and meets the quality requirements. Any such product that is lost, damaged, or is otherwise unsuitable for use shall be recorded and reported to the customer.

11. Material Identification

The Fabricator will document a procedure for identification of material as stated in the AISC *Code of Standard Practice* and contract documents. Purchasing documents for materi-

als furnished to ASTM specifications shall include the information required in the “Order Information” section of the ASTM Standard.

The filing and retention of mill test reports, manufacturers’ test reports and certificates of conformance for base materials, bolts, welding consumables and coatings provide minimum material identification. The retention of these records will be defined.

12. Fabrication Process Control

The Fabricator shall document procedures necessary to produce a consistent acceptable level of quality of the furnished product in accordance with the applicable codes or specifications. The Fabricator will include additional “special procedures” that cover fabrication processes done at the facility (e.g., cambering).

Regardless if these processes are habitually performed at the facility, effective implementation of the following documented procedures are required as a minimum:

12.1 Welding

Including WPSs and qualification of welders.

12.2 Bolt installation

Including required inspection and testing.

12.3 Material Preparation for Application of Coatings

12.4 Coating Application

12.5 Equipment Maintenance

A documented preventative maintenance program shall be implemented for equipment critical to product quality and delivery requirements at a minimum.

13. Inspection and Testing

The Fabricator shall document a procedure for inspection and testing activities in order to verify that the product quality meets the project requirements. The Fabricator will establish in the procedure the level and frequency of inspection to assure expected contract quality. The Fabricator will adjust the level and frequency at any time when the required level of quality is not met. The inspection procedure shall include assignments of inspection and QC monitoring duties, showing the required inspection and testing and the required records to meet the project requirements. The inspection procedure shall include receipt, in-process and final inspection of all product furnished to a project. The procedure will include any sampling plan, if less than 100%, for each type of inspection. The fabricator shall enforce its nonconformance procedure when its product is determined to be nonconforming.

13.1 Assignment of QC Inspections and Monitoring

QC inspectors shall be assigned on the basis of experience, training and education. Qualification Standards and Certifications granted by recognized industry organizations related to structural steel fabrication can be used to establish basis for assignment.

Production personnel shall be assigned to inspection duties under the following conditions:

- They shall be trained both in knowledge and practice in proper inspection methods and acceptance criteria specified for the material they are inspecting.
- They are aware of their responsibilities and are given time to perform their inspection responsibilities.
- They do not inspect their own work.
- Their inspections are monitored by qualified QC personnel.

13.2 Inspection Procedure

The procedure shall include provisions for the following:

13.2.1 Material Receipt Inspection

Materials received shall be compared to the purchase order requirements. The receiver shall identify the material, grade and quantity and look for visible shipping damages. The receiver shall inspect shapes and plates for obvious deviations from the requirements of ASTM A6.

13.2.2 In-Process Inspection

The Fabricator shall conduct in-process inspection. In-process inspection plans and practices will provide a level of assurance that specified process requirements and inspection acceptance criteria that are not verifiable at final inspection or can hinder assembly are in compliance. Materials shall be inspected for specification and grade, workmanship and tolerances using appropriate codes, standards or a documented plan before fabrication begins. Compliance with documented bolting procedures, WPSs, preheat and welder qualifications shall be monitored. Production personnel shall be capable of inspecting the product or subassembly before sending it to the next process.

13.2.3 Final Inspection

The Fabricator shall conduct final inspection. QC inspectors shall perform the final inspection of structural steel products after the fitting, welding and coating operations, but prior to delivery. If nonconforming products are found, the nonconformance procedure shall be followed. Personnel specifically trained and responsible for final inspection will perform these inspections.

13.2.4 Inspection Records

The inspection procedure shall indicate what records and marks are used to document inspections. Inspections by production personnel shall be verifiable until the final inspection of the piece. Inspections by QC personnel shall be documented on records. It must be easy to determine which items and aspects of those items were inspected.

14. Calibration of Inspection, Measuring and Test Equipment

The Fabricator shall document a procedure to control, calibrate and maintain inspection, measuring and test equipment used to demonstrate the conformance of product to the specified requirements, including volt/amp meters used to verify welding procedure parameters (may be welding machine volt and amp meters or auxiliary volt/amp meters). Inspection, measuring and test equipment shall be used in a manner, which ensures that it is consistent with the required measurement capability. Where the availability of technical data pertaining to the measurement equipment is a specified requirement, such data shall be made available for verification that the measuring equipment is performing properly. Calibration shall be per project requirement or per manufacturer's recommendation or specification requirement, the latter two of which being traceable to a national Standard.

The calibration procedure shall address:

- Identifying and listing all the inspection, measuring and test equipment—tools with devices for measuring properties of fabricated pieces or process variables shall be calibrated in accordance with the inspection measuring and test equipment procedure;
- determination of the measurements to be made, the accuracy required and the frequency of calibration;
- the use of certified equipment having a known valid relationship to internationally or nationally recognized Standard to calibrate listed equipment. Where such Standards do not exist, the basis used for calibration shall be documented;
- the acceptance criteria;
- the action to be taken when results are unsatisfactory;
- Calibration records maintenance;
- handling, preservation and storage of inspection, measuring and test equipment to maintain accuracy and fitness for use;
- identification of equipment that is not calibrated to prevent inadvertent use where calibrated equipment is required.

15. Control of Nonconformances

The Fabricator shall document a procedure to ensure that product that does not conform to specified requirements is

prevented from reaching the customer. This procedure shall provide for identification, documentation, evaluation, segregation and when practical, disposition of nonconforming product and for notification to the functions concerned.

The responsibility for review and authority for disposition of nonconforming product shall be defined. The disposition of nonconforming product may be:

- reworked,
- repaired,
- used as is (after more detailed analysis or acceptance by engineering or management),
- customer-approved nonconforming product or
- scrapped.

Repaired or reworked product shall be re-inspected in accordance with the drawings, specifications and/or project requirements. Where customer approval is required, it shall be documented.

Nonconforming product shall be clearly marked as soon as practical after it has been discovered. Disposition shall be selected by personnel authorized by the procedure. Records shall be kept of the pieces affected, the nature of the nonconformance, the disposition selection, authorization and inspection results.

16. Corrective Action

The Fabricator shall document a procedure for initiation of corrective action. Any corrective action taken to eliminate the causes of nonconformance shall be to the degree appropriate to the magnitude of problems and commensurate with the risks encountered.

The procedure will include periodic review of records or summaries of nonconformances, internal and external quality audit reports, determination and initiation of corrective actions and periodic monitoring to assure the corrective action is being performed and is effective.

17. Handling, Storage and Delivery of Product and Materials

Material shall be stored, loaded and shipped to avoid damage and deterioration. Material shall be marked with its identification and shall be listed on a manifest or shipping documents.

If a shipping agreement between the Fabricator, the customer or the subcontractors exists, material shall be shipped in compliance with the agreement including sequencing that complies with erection needs. Shipments by subcontractors shall be coordinated and monitored for compliance with shipping instructions.

18. Training

Personnel responsible for functions that affect quality shall receive initial training and periodic training. Training shall

provide the information necessary to inform personnel of sound fabrication practices and to perform their assigned tasks in a manner that shall result in a quality product. It is recommended that training be documented. However, training shall be documented for inspection personnel performing final inspection of the product. Training will be used to inform personnel of any changes to the requirements of their assigned tasks.

19. Internal Audit

The Fabricator shall perform an internal audit of each element of the quality management system at least once a year to verify their compliance and effectiveness. The management representative or a qualified individual, independent of the function being audited, shall perform the audit.

FOOTNOTES

1. This custom compilation created by ASTM for AISC contains the normally applicable and routinely used ASTM Standards for fabricated steel. Alternatively, these Standards are available in other publications offered by ASTM and at www.astm.org.
2. The individuals that perform these functions form the executive management team.
3. Including all production operation performed in the manufacturing and shipping of the product (e.g. assembly and all material preparation processes-e.g. drilling, sawing, milling, thermal and mechanical cutting).
4. As described in this section, it is management's decision to include or reference these items within the Quality Manual or by reference. The requirements of document and data control apply to all information that describes the quality management system.
5. These requirements may be received in original contract documents, or subsequent telcons, letters, transmittals related to product requirements.

