****

**AISC 207-20 AUDIT GUIDE**

**All Fabricator, Manufacturer and Erector Programs and Endorsements**

**Purpose**

This audit guide will help you transition between the *Certification Standard for Steel Fabrication and Erection, and Manufacturing of Metal Components* (AISC 207-16) and the updated *Standard for Certification Programs* (AISC 207-20).

**Scope**

This audit guide can be used during internal audits to identify “gaps” between your management systems and the updated standard or as a starting point for implementing management systems to meet the certification requirements. It can also be useful if you are considering adding additional certifications and/or endorsements. This audit guide includes all certification programs and endorsements. **The Governing *Requirements for Certification Programs* and the program specific Supplemental Requirements are not included but should be reviewed as part of the internal audit to ensure compliance.** For users of the *Certification Standard for Shop Application of Complex Protective Coating* *Systems* (AISC 420-10/SSPC-QP 3) the additional criteria are included with a reference to the general sections of 207-20.

**Use Instruction**

Explanation of the column layout:

* **Ref# -** identifies the section or subsection of new standard 207-20
* **Criteria -** notes the text from the new standard and each “shall” is required for implementation of the management system(s)
* **MS Ref -** record the reference of the management system which contains these criteria. (procedure number, Quality Manual section, etc.)
* **Audit Findings -** use this space to indicate what was observed, which provides evidence of what was reviewed to determine conformance
* **Results -** use to indicate the result of comparing the evidence observed versus the criteria. A key is provided in the footer of each page.

When a section contains new criteria or of significant change, the revised portion of the criteria will be in **RED** to make identification of potential changes or gaps easy to identify. Chapter 6 is all new criteria and is not highlighted in red.

Please note the following changes that were included throughout the 207-20 but are **not** highlighted in red:

* The word “product” has been replaced by “work” where applicable. Work encompasses any work done in fabrication, the work accomplished by the erectors and the work performed by subcontractors or suppliers.
* The phrases “shop drawings”, “erection drawings”, and “manufacturing drawings” have been replaced by “fabrication documents”, “erection documents”, and “manufacturing documents”. This allows for a broader use of how this information is conveyed.
* Many terms have been revised or added to the Glossary and this section should be reviewed and used in conjunction with this guide to gain a more complete understanding of the terminology in the Standard.

Customize to Your System

If you have multiple certifications and/or endorsements, you may want to copy and paste the criteria from the supplemental Chapters of 207-20 provided in this guide into the row of the associated general section. Criteria that do not apply to your certifications can be deleted making a custom internal audit guide for your company.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1.1** | **Purpose**  The purpose of this Standard is to confirm to *owners*, the design community, the construction industry, and public officials that certified participants who adhere to the requirements in this Standard have the personnel, organization, experience, *documented procedures*, knowledge, equipment, and commitment to quality to perform *fabrication*, manufacturing, and/or *erection* as described in this Standard. |  |  |  |
| **1.2** | **Scope**  The requirements in this Standard shall apply as follows:   1. Chapters 1 and 2 shall apply to building *fabricators*, who fabricate and supply the *structural steel* frames for buildings where elements of the frames are as defined in AISC *Code of Standard Practice* Section 2.1. 2. Chapters 1 and 3 shall apply to metal *component manufacturers*, who *manufacture components* that include bracing not designed for primary loads (diaphragms, cross frames, and lateral bracing); camera, light, sign, and signal support structures; bridge rail; stairs; walkways; grid decks; drains; scuppers; expansion joints; bearings; ballast plates; and mechanical movable bridge equipment. *Manufacturers* of camera, light, sign, and signal support structures; high mast light towers; bridge rail; complex expansion joints; high load multi- rotational (HLMR) bearings; and mechanical movable bridge equipment shall also be required to meet specific supplemental requirements to this Standard. 3. Chapters 1 and 4 shall apply to bridge *fabricators*, who fabricate and supply steel highway or railroad bridges. 4. Chapters 1 and 5 shall apply to *erectors* of *structural steel*. 5. Chapters 1 and 6 shall apply to hydraulic metal structure *fabricators*.   In Chapters 2 through 6, only those subsections that are supplementary to Chapter  1 are indicated.  The Glossary is an integral part of this Standard. Nonmandatory Commentaries are  provided for background, and the user is encouraged to consult them.  NOTE: The terms listed in the Glossary are to be used in addition to those in the AISC *Code of Standard Practice for Steel Buildings and Bridges*, hereafter referred to as the *Code of Standard Practice*; some commonly used terms are repeated here for convenience and marked with an †. Where used, terms are italicized to alert the user that the term is defined in this Glossary. |  |  |  |
| **1.3** | **References**  The reference documents and standards necessary to make personnel aware of work requirements shall be consistent with the requirements of existing contract documents and shall be readily available to those who need them. The ability to work to and meet the requirements of the latest edition of the following documents shall be demonstrated:   1. ANSI/AISC 303 Code of Standard Practice for Steel Buildings and Bridges 2. RCSC Specification for Structural Joints Using High-Strength Bolts 3. Selected ASTM Standards for Structural Steel Fabrication, as published for   AISC, or equivalent content   1. AWS A2.4 Symbols 2. AWS A3.0M/A3.0 Terms and Definitions 3. AWS D1.1/D1.1M Structural Welding Code—Steel |  |  |  |
| **1.4** | **Definitions**  As used in this Standard, the words **shall**, **must**, or **will** denote a mandatory requirement. The word **should** denotes a guideline or recommendation. The words **may** or **can** denote an opportunity to make a choice. |  |  |  |
| **1.5** | **MANAGEMENT RESPONSIBILITY** |  |  |  |
| **1.5.1** | **Policy for Quality**  Executive management shall ensure that a policy for quality is communicated, implemented, and maintained. The policy for quality shall include:   1. A commitment to quality that includes a commitment to meet the requirements in contract documents. 2. A quality management system that provides a framework for establishing, communicating and reviewing quality goals.   Executive management shall establish goals to improve quality. Goals shall be measurable and documented through objective evidence . As quality goals are achieved, new goals shall be set that demonstrate commitment to continuous improvement. |  |  |  |
| **1.5.2** | **Quality Management System**  The quality management system shall satisfy all of the requirements of this Standard and the requirements of the contract documents and referenced standards. The quality management system shall include a quality manual , documented procedures and records. |  |  |  |
| **1.5.3** | **Management Review**  Executive management shall conduct periodic review of the quality management system at planned intervals, but annually at a minimum. Further, at a minimum, management review shall include assessment and documentation of the following:   1. A summary of previous management reviews. 2. Results of any internal and external audits conducted since the previous management review. 3. Customer feedback and feedback mechanisms, identifying opportunities for improving quality. 4. Work nonconformances. Both the number and severity of nonconformances shall be assessed. 5. Process nonconformances, including compliance with the documented procedures comprising the quality management system. 6. Effectiveness of the corrective actions taken. 7. Results of equipment inspections, including the adequacy of equipment resources. 8. Adequacy of the training program with respect to the levels of qualification required as appropriate. 9. Proposed or required modifications to the quality management system.   The management review record shall include the decisions and actions required for  implementation of:   1. Improvement of the effectiveness of the quality management system and its processes 2. Improvement of quality 3. Resource needs   Records from management reviews shall be maintained in accordance with the  *documented procedure* as required in Section 1.9. |  |  |  |
| **1.5.4** | **Responsible Quality Personnel**  Executive management shall designate a management representative or representatives for quality who shall report directly to (or be a part of) executive management. The designated management representative(s) for quality may perform other functions within the company, provided that those functions do not conflict with the quality responsibilities. The designated management representative(s) shall have the ability, responsibility, and authority to:   1. Ensure that documented procedures needed for the quality management systems are established, implemented and maintained in accordance with this Standard. 2. Report to executive management on the performance of the quality management system and any need for improvement. 3. Communicate with external parties on matters relating to the quality management system. |  |  |  |
| **1.5.5** | **Resource Management**  Resources necessary to comply with the *contract documents* shall be available. Resources are applicable to both personnel and non-personnel. The qualification requirements, responsibility, authority, and the interrelation of functional positions that manage, perform, and verify work affecting quality shall be defined as required in Section 1.5.4 and in the industry-specific chapters. Other provisions relating to personnel are found elsewhere in the Standard. See Sections 2.5.4, 3.5.4, 4.5.4, 4.I.5.4, and 5.5.4.3, and 6.5.4.2 for non-personnel, industry-specific resource requirements. |  |  |  |
| **1.5.6** | **Internal Communication**  Executive management shall ensure that appropriate communication processes are established and that communication takes place on a regular basis regarding the effectiveness of management systems. |  |  |  |
| **1.5.7** | **Quality Manual**  The quality manual shall include a page showing the current revision date and the name and location of the facility or organization. The quality manual shall include or incorporate by reference the following documents at a minimum:   1. Documented statements of a quality policy and quality objectives as required by this Standard. 2. Documented procedures established for the quality management system (or references to them), along with their associated quality records. 3. Documents needed by the organization to ensure the effective planning, operation and control of its processes. 4. Organizational chart describing the interrelationship of functional positions that manage, perform and verify work affecting quality. 5. Job descriptions outlining responsibilities, authority and required qualifications for key positions. 6. Qualification evidence for individuals in key positions /functions.   Executive management shall define additional documented procedures , drawings or other documents that are required beyond the minimum requirements set by this Standard to meet the needs of the organization and its customers. The highest ranking member of executive management shall sign and date the quality manual . |  |  |  |
| **1.6** | **Construction Document Review and Communication**  A *documented procedure* shall be developed for contract and project specification review. The *procedure* shall require these reviews for each project, and the review shall begin no later than the acceptance of responsibility for performing the work. Records of this review shall be maintained in accordance with the *documented procedure* as required in Section 1.9. |  |  |  |
| **1.7** | **DETAILING -** Section 1.7 does not apply to erectors. |  |  |  |
| **1.7.1** | **Detailing Standards**  The fabricator or manufacturer shall prepare and use detailing standards describing technical preferences and requirements. These standards shall show special information required on advance bills such as allowances for cuts, camber, or supplementary requirements. The detailing standards shall include how bills of material are prepared which, at a minimum, include:   1. Sizes and quantities 2. Appropriate specification references 3. Special ordering information 4. Any allowances or tolerances   The detailing standards shall describe the fabricator’s or manufacturer’s methods of drawing layout, including, but not limited to:   1. Sections and views. 2. Title block information. 3. The method of designating shipping sequences. 4. The piece marking system. 5. Commonly used shop abbreviations. 6. Fabricators: Showing bolt placement lists (including bolt type and installation requirements). 7. Fabricators: Information required on weld symbols including any special NDT requirements. 8. Fabricators: The detailing standards shall describe the method for:    1. Selection of connection type, connection geometry and connection material.    2. Detailing holes, fasteners, washers, cuts and copes.    3. Assignment of appropriate welding symbols (shop and field welds).    4. Selecting bolt installation method (for shop-installed bolts).    5. Showing surface preparation (including specification of surface finish).    6. Designating coating requirements (including coating materials and dry film thickness).    7. Showing any necessary special instructions to fabricate and erect the steel. 9. Manufacturers: If applicable, illustrate information to be included on weld symbols and the preferred way to designate surface preparation and coating requirements. |  |  |  |
| **1.7.1.1** | **Digital Document Production**  For digital *fabrication*, manufacturing, *erection*, and *installation documents*, the  *documented procedure* for producing these documents shall identify the data,  variables, graphics, calculating formulas, and other output as appropriate that are checked to determine that the software is functioning correctly.  NOTE: Moved from 1.7.2. |  |  |  |
| **1.7.2** | **Checking**  The *fabricator* shall develop a *documented procedure* to provide for *checking* of  all *fabrication* and *erection documents*. The *documented procedure* for *checking*  of these documents shall describe the method used by the *fabricator* or its *subcontractor* to perform and record the final check to ensure compliance with *contract documents*. Records shall provide means for identification of the individual  *checker* who performed the final check of each document.  When detailing is performed by a subcontractor, the documented procedure shall define the extent of review required by management and the extent of checking required of received detailing products before release.  The *documented procedure* for *checking fabrication* and *erection documents* shall  include comparison and compliance with project requirements.  During the *checking* process, the following shall be verified:   1. Geometry. 2. Use of connections as specified in the contract documents. 3. Appropriate notes are included. 4. Material usage as specified in the contract documents. 5. Shop bills contain all required information. 6. Use of appropriate and complete welding symbols. 7. Use of *coatings* and surface preparations as specified in the contract documents. 8. Proper representation on *erection drawings*, including the notation of any necessary instructions and depiction of details necessary to conduct the work in the field. 9. All information is accurately presented and in compliance with the *Code of Standard Practice* requirements. 10. All steel included in the *contract documents* has been detailed. |  |  |  |
| **1.7.3** | **Control of Approval Documents and Release for Fabrication**  A documented procedure shall be developed for the control of approval documents and shall describe the method used to document owner approval of approval documents released for fabrication whether produced in-house or through a subcontractor. |  |  |  |
| **1.7.4** | **Shop Drawings Supplied by Others**  A documented procedure shall be developed for the approval of approval documents and shall describe the method used to document owner approval of approval documents released for fabrication whether produced in-house or through a subcontractor. |  |  |  |
| **1.7.5** | **Management of Detailing**  The fabricator’s or manufacturer’s staff shall manage detailing. Responsibilities for detailing management shall include:   1. Overseeing the production of shop and erection drawings , including the work of subcontractors 2. Communicating with owners’ representatives for design 3. Scheduling 4. Developing and maintaining company detailing standards and documented detailing procedures 5. Preparing and sending transmittals related to obtaining approval from the owner’s designated representative for design or construction. 6. Coordinating and incorporating construction requirements 7. Training of employed detailers and checkers   Qualification requirements for detailing management personnel shall include experience in detailing and checking fabrication and erection documents that have been approved for a variety of structures representative of projects the fabricator or manufacturer provides.  The fabricator or manufacturer shall determine and describe methods to demonstrate competence of detailing management personnel. Detailing management shall be familiar with the requirements of pertinent codes and specifications. |  |  |  |
| **1.7.6** | **Detailing Functions**  Personnel who perform detailing or checking of shop, manufacturing and erection drawings shall have experience in drawing projects similar to the projects the fabricator or manufacturer provides and shall have knowledge of applicable material specifications and of mill rolling practices as they affect the detailing of structural steel.  Detailers in training shall work under the supervision of a trained detailer or checker.  A qualified checker shall check the fabrication and erection documents before release for fabrication. Qualification requirements for checkers shall be defined and documented and include training and experience in connection selection. Demonstrated experience and competency of employed and subcontracted individuals performing final checks shall be documented by detailing management. |  |  |  |
| **1.7.7** | **Subcontract Services**  Subcontractors may be used for the following functions: detailing, connection shop standards, delegated connection design as applicable; checking of shop, manufacturing, and erection drawings; and training of detailers and checkers. The fabricator or manufacturer shall define and document the qualification and selection process for choosing subcontractors. |  |  |  |
| **1.8** | **CONTROL OF MANAGEMENT SYSTEM DOCUMENTS AND PROJECT DOCUMENTS** |  |  |  |
| **1.8.1** | **Management System Documents**  A documented procedure shall be developed to control quality management system documents. |  |  |  |
| **1.8.1.1** | **Quality Management System Documents**  Documents covered by this Section shall include, but not be limited to, the quality manual, the safety manual as applicable, and any documented procedures. |  |  |  |
| **1.8.1.2** | **Review and Approval**  Documents shall be reviewed and approved by the same function and authority level that authorized the original document.  The function and authority levels that have responsibility for review and approval of internal standards and documented procedures shall be designated.  The documented procedure shall describe the frequency and requirements for review and updating, and establish a method to identify changes. |  |  |  |
| **1.8.1.3** | **Revision Control**  Revisions to quality management system documents shall be clearly identifiable and there shall be a method for monitoring and identifying the latest revision.  Revisions shall be reviewed for adequacy and approved by the same function and authority level that authorized the original document.  Quality management system documents shall remain legible and easily identifiable. |  |  |  |
| **1.8.1.4** | **Access**  Documents shall be available and readily accessible to all personnel responsible for performing functions affecting the quality of the completed work. |  |  |  |
| **1.8.1.5** | **Communication**  Changes and revisions shall be clearly communicated to all personnel responsible for performing functions affecting the quality of the completed work. |  |  |  |
| **1.8.2** | **Project Documents**  A documented procedure shall be developed to control project documents. Documents covered by this Section shall include, but not be limited to, contract documents, revised contract documents, shop drawings, erection drawings, RFIs, and any quality assurance documents received. |  |  |  |
| **1.8.2.1** | **Tracking** Project documents and changes to project documents shall be tracked.  Tracking information shall indicate, at a minimum, date of receipt, summary of issue, and ultimate disposition of the change, including distribution of the final decision to the appropriate parties. The documented procedure shall define methods for receipt and documentation of owner and general contractor requirements and fabricator -originated changes as they occur throughout the fabrication and detailing process. Requirements may be received in original contract documents; in subsequent telecommunications, letters, and related transmittals; and in change orders or contract addenda.  The documented procedure shall require records (e.g., logs, files or master lists) that show receipt of change data, incorporation, issue, and distribution of approved and revised approval documents to all necessary departments and personnel at the fabricator’s facility and necessary external organizations, subcontractors or suppliers. |  |  |  |
| **1.8.2.2** | **Revision Control**  For project documents that the fabricator, erector or manufacturer produces, revisions shall be clearly identifiable and there shall be a method for monitoring and identifying the latest revision.  The documented procedure shall include provisions to prevent inadvertent use of obsolete documents.  Project documents shall remain legible and easily identifiable. |  |  |  |
| **1.8.2.3** | **Access Project**  Documents shall be available and readily accessible to all personnel responsible for performing functions affecting the quality of the completed work. |  |  |  |
| **1.8.2.4** | **Communication**  Changes and revisions shall be clearly communicated to all personnel responsible for performing functions affecting the quality of the completed work. |  |  |  |
| **1.9** | **MAINTENANCE OF QUALITY RECORDS**  A documented procedure shall be developed for the maintenance of quality records that provide for record identification, collection, storage and retrieval, retention, and disposition. |  |  |  |
| **1.9.1** | **Retention**  The documented procedure for the maintenance of quality records shall define the retention policy and provisions for the disposition of the records at the end of the retention period. |  |  |  |
| **1.9.2** | **Storage**  Quality records shall be stored in a manner that minimizes damage, deterioration or loss. |  |  |  |
| **1.9.3** | **Retrieval**  Quality records shall be accessible in a reasonable time frame. |  |  |  |
| **1.10** | **PURCHASING**  A documented procedure shall be developed to ensure that subcontractors and suppliers provide contracted services and materials conforming to project requirements. |  |  |  |
| **1.10.1** | **Purchasing Data**  Purchasing documents shall clearly describe subcontracted work, purchased materials and services ordered in written purchasing documents. This information shall include, but shall not be limited to:   1. The type of service, material, class, grade, and other unique identification 2. The applicable specifications , drawings, process requirements, and inspection instructions and any witness points 3. Delivery instructions and date 4. Required quality reports, certified test reports, and certificates of compliance/conformance of purchased materials |  |  |  |
| **1.10.2** | **Selection of Subcontractors and Suppliers**  A documented procedure shall be developed that describes how the certified company conducts initial and ongoing evaluation of all subcontractors and suppliers.  Subcontractors and suppliers shall be evaluated and selected on the basis of their ability to meet subcontract requirements, the management system requirements, the applicable requirements of this Standard, and the requirements of the approved construction documents and referenced standards.  Management shall determine:   1. Evaluation criteria 2. Reevaluation interval 3. Personnel involved in the evaluation process   Subcontractors and suppliers shall be evaluated via an audit or documented acceptable past experience. As a minimum, their quality and timely, proper delivery shall be part of the evaluation.  The *documented procedure* for the selection of *subcontractors* for *fabrication*,  manufacturing, or *erection* shall include a provision that requires that these entities have current AISC Certification for the type of work that is being subcontracted. The *procedure* shall also include provisions for obtaining approval to retain a *subcontractor* who is not certified on a project-specific basis from the *owner*, *owner’s designated representative for design*, and the *owner’s designated representative for construction* when certification is required in the contract. |  |  |  |
| **1.10.3** | **Verification of Purchased Product, Materials and Services**  The documented procedure for verification shall identify the activities necessary for ensuring that purchased products, materials and services meet project requirements. |  |  |  |
| **1.10.4** | **Control of Customer-Furnished Work and Material**  If work or materials are furnished by the customer, the organization shall verify, store, and maintain them in an appropriate fashion. Customer-furnished work or material shall be protected to prevent use for other than its intended purpose. Any such work or material that is lost, damaged, or otherwise unsuitable for use shall be recorded and reported to the customer. |  |  |  |
| **1.10.5** | **Purchasing Records**  Purchasing documents, subcontractor and supplier qualification records, and records of the periodic evaluation of subcontractors and suppliers shall be maintained as required by Section 1.9. |  |  |  |
| **1.11** | **MATERIAL IDENTIFICATION**  A documented procedure shall be developed for the identification. Records that provide a basis for material identification shall be maintained as required by Section 1.9.  .  Structural steel material shall be identified as stated in the Code of Standard Practice, unless otherwise noted in the contract documents.  Welding consumables shall be identified in accordance with the appropriate AWS specification and classification.  Coating materials (excluding metallic coating) shall be identified on the container by, at a minimum, color (pigment description and federal standard number, or manufacturer’s number), lot/batch number, ID/stock number, quantity of coating in container, date of manufacture, date of expiration, and manufacturer’s name and address.  Metallic coatings shall be identified by composition and the appropriate ASTM specification, including thermal spray coating.  Fasteners shall be stored in containers clearly identified by type, grade, size and lot number(s).  Material traceability to corresponding MTRs is necessary only when specifically required by contract. The fabricator or manufacturer shall develop a documented procedure to maintain traceability, when required, of materials from the point of receipt and throughout the course of fabrication. |  |  |  |
| **1.12** | **PROCESS CONTROLS**  Documented procedures shall be developed for the processes necessary to produce a consistent, acceptable level of quality of the completed work in accordance with applicable codes and project requirements.  Regardless if these processes are routinely performed, effective implementation of the following documented procedures is required as a minimum. |  |  |  |
| **1.12.1** | **Welding**  The documented procedure for welding shall be developed that addresses the management of:   1. WPSs 2. Preheat requirements 3. PQRs 4. Storage (including ovens) and identification requirements for welding consumables 5. Welder, welding operator, and tack welder qualifications and qualification test records in accordance with appropriate AWS requirements 6. Welder, welding operator, and tack welder performance records—to provide objective evidence that the “period of effectiveness” has not been exceeded and satisfactory performance is consistently achieved 7. Traceability of welds to the welders who produce them, as applicable.   WPSs shall be in close proximity to and used by the welders, welding operators or tack welders. |  |  |  |
| **1.12.2** | **Bolt Installation**  A documented procedure shall be developed for bolting. The procedure shall meet the requirements of the RCSC Specification for Structural Joints Using High-Strength Bolts and the requirements of approved construction documents and referenced standards. The documented bolting procedure shall include storage, pre-installation verification, installation, and inspection of fastener assemblies for snug-tightened, pretensioned and slip-critical joint types. |  |  |  |
| **1.12.3** | **Material Preparation for Application of Coatings**  The documented procedure for surface preparation shall support achievement of cleanliness and surface profile required by coating manufacturer recommendations, product data sheets, and contract documents. |  |  |  |
| **1.12.4** | **Coating Application**  The documented procedure shall support application and curing of coatings in accordance with manufacturer recommendations and product data sheets and with contract documents.  . |  |  |  |
| **1.12.5** | **Equipment Maintenance**  The documented procedure for equipment maintenance shall, at a minimum, define the evaluation of and preventive maintenance for equipment necessary to meet product or work quality and delivery requirements. |  |  |  |
| **1.13** | **INSPECTION AND TESTING**  A documented procedure for inspection and testing shall be developed to ensure that the completed work meets the requirements of the contract documents.  The *procedure* shall define receipt, in-process, and final inspection of work furnished for a project. Work determined during inspection and testing to be nonconforming shall be addressed following the *nonconformance procedure* requirements in Section 1.1.5.  When inspecting less than 100% of the work, the *procedure* shall describe the  sampling plans for each type of inspection. The plans will adjust the level and  frequency of inspection at any time the required level of quality is not met. |  |  |  |
| **1.13.1** | **Assignment of QC Inspections and Monitoring**  Qualification requirements for QC inspectors shall be defined and documented as required in Section 1.5.4. Production personnel may be assigned to QC inspection duties under the following conditions:   1. They are knowledgeable in proper inspection methods and acceptance criteria specified for the material or products they are inspecting and hold the required certification as applicable. 2. They are aware of their responsibilities and are given time to perform them. 3. They inspect other’s work. 4. Their inspections are monitored by qualified quality control personnel. |  |  |  |
| **1.13.2** | **Receipt Inspection**  Materials received shall be compared to the purchase order requirements and the  receiving documents. The receiver shall identify the material and quantity and  check for visible shipping damages. The receiver shall inspect shapes and plates for obvious deviations from the project requirements. |  |  |  |
| **1.13.3** | **In-Process Inspection**  Materials shall be inspected before the work begins. The fabricator, manufacturer or erector shall employ in-process inspection plans and practices for specified process requirements and inspection acceptance criteria that are not verifiable at final inspection or for which final inspection can hinder subsequent work. In-process inspection is appropriate for processes including, but not limited to, welding, bolting, coating surface preparation, and coating application, as applicable.  Compliance with documented process control procedures shall be monitored. |  |  |  |
| **1.13.3** | **Final Inspection**  Final inspection shall be conducted. QC inspectors qualified and responsible for final inspection shall perform the final inspection of structural steel products and metal components prior to shipping in the case of fabrication, or after the completion of work in the case of erection. Final inspections shall be recorded and maintained as required by Section 1.9. |  |  |  |
| **1.13.4** | **Inspection Records**  The procedure shall indicate what records and marks are used to document inspections. In-process inspections shall be verifiable until the final inspection of the piece.  The quality records produced shall be filed and retained as defined in the procedure required by Section 1.9. Inspection records shall clearly show what was inspected, the result of the inspection, and who performed the inspection. |  |  |  |
| **1.14** | **CALIBRATION OF INSPECTION, MEASURING AND TEST EQUIPMENT**  A documented procedure shall be developed to calibrate and maintain inspection, measuring and testing equipment. The procedure shall define equipment calibration frequency. However, the volt/amp meters used to verify compliance with WPS parameters (may be welding machine volt and amp meters or auxiliary volt/amp meters) shall be calibrated at a minimum every 12 months, unless a more frequent interval is required. The procedure shall include provisions for:   1. A unique identifier for each piece of equipment. 2. A list of equipment that requires calibration. 3. Service use for each piece of equipment, including the required precision for the types of inspections, measurements or tests made. 4. Calibration or adjustment instructions in accordance with the manufacturer’s recommendations. 5. Frequency of calibration or adjustment. 6. Tracking calibrations, adjustments and repairs. 7. Storage and handling of inspection, measuring, and test equipment to maintain accuracy and fitness for use. 8. Identification of standards or certified equipment having a known valid relationship to internationally or nationally recognized standards used to calibrate each listed piece of equipment. Where such standards do not exist, the basis used for calibration shall be documented. 9. The action to be taken when equipment does not meet the calibration requirements. This action includes disposition of the equipment and an evaluation of the impact to work that was measured using it. 10. Method of preventing inadvertent use of uncalibrated equipment where calibration is required.   Calibration and adjustment history shall be available.  Rented or borrowed equipment must be accompanied by a valid calibration certificate and is subject to the requirements of this Section. For equipment that is damaged, dropped, knocked over or functioning improperly, the procedure shall include provisions for prominently marking or tagging such equipment to preclude usage and removing the equipment from service until it can be recalibrated, adjusted, or repaired.  Whenever the accuracy of inspection, measuring and test equipment is in question, proactive calibration shall occur, independent of the manufacturer’s recommendations. The precision required of any piece of equipment shall be sufficient to satisfy the acceptance standards of the project specifications or industry standards. |  |  |  |
| **1.15** | **CONTROL OF NONCONFORMANCES**  A documented procedure shall be developed to identify and control nonconformances. Records of nonconformances shall be maintained as required by Section 1.9. |  |  |  |
| **1.15.1** | **Nonconformance with Management Systems**  A nonconformance related to the performance of the management system shall be documented to the detail level described by the procedure. These nonconformances may be identified by the management systems during external audits, or by quality assurance inspections. |  |  |  |
| **1.15.2** | **Nonconforming Work**  The procedure for nonconforming work shall provide for identification, documentation, evaluation, treatment of nonconforming work, and notification of the relevant functions concerned. Nonconforming work may also be identified in a quality assurance inspection report. These reports, when received, become quality assurance inspection records.  Nonconforming work shall be clearly marked as soon as practical after it is discovered. Records shall be kept of the pieces affected, the nature of the nonconformance, the treatment selection, authorization, and reinspection results if applicable. The treatment of nonconforming work may include:   1. Redesign and rework , as approved by the responsible party, and as required in the contract documents 2. Repair , as approved by the responsible party, and as required in the contract documents 3. Use as-is, as approved by the responsible party, and as required in the contract documents 4. Scrap   If the treatment is rework or repair, the result will be inspected per project requirements, as well as per the quality control process. |  |  |  |
| **1.16** | **CORRECTIVE ACTION**  A documented procedure shall be developed for corrective action to improve quality. Any corrective action taken shall be to the degree appropriate to the magnitude of problems and commensurate with the risks to quality. The documented procedure shall include periodic review of records or summaries of nonconformances and of internal and external quality audit reports for determination and initiation of corrective actions. The corrective action procedure shall address these steps:   1. Document a corrective action request (CAR) that includes the nonconformance to be addressed by the corrective action and the requirement that has not been met. The corrective action procedure shall define the functional positions authorized to issue a CAR and initiate the corrective action process. 2. Assign responsibility and establish a time frame for the response to a CAR. 3. Investigate and document the scope of the nonconformance, root causes, corrective measures taken, and list the actions to be taken to prevent recurrence. 4. Communicate the corrective action request and resolution to executive management and appropriate members of the organization. 5. Follow up the corrective action taken with periodic monitoring to assure the corrective action is implemented and is effective.   Corrective action shall be applied when:   1. There is a nonconformance that is repetitive in nature as identified by periodically reviewing nonconformance reports or summaries for negative trends. 2. Process nonconformances are found during the internal and external quality audits indicating that the quality management systems may not be implemented and functioning as stated in the quality manual. 3. Nonconformance with the quality management system is found during the day-to-day execution of the system. 4. Nonconformance is unacceptable as determined by management. 5. A customer complaint has been investigated and corrective action has been determined necessary. |  |  |  |
| **1.17** | **HANDLING, STORAGE AND DELIVERY OF MATERIALS, FABRICATED WORK, AND COMPONENTS**  Materials, fabricated work, and components shall be stored, and shipped to avoid damage and deterioration as required by the Code of Standard Practice. Materials, fabricated work, and components shall be protected to prevent use in other than its intended purpose. Any such material that is lost, damaged, or otherwise unsuitable for use shall be recorded and reported as appropriate. |  |  |  |
| **1.18** | **TRAINING**  Personnel responsible for functions that affect quality, including, but not limited to, project managers, field/shop supervisors, detailers , inspectors, welding personnel, fitters, painters, riggers, signal persons, and crane operators, shall receive appropriate initial and periodic documented training . Training records shall be controlled in the same manner as quality records. Personnel providing training shall have appropriate training or experience in the subject they are teaching. Training course outlines include the subject and the key points. |  |  |  |
| **1.19** | **INTERNAL AUDIT**  A documented procedure shall be developed for the control and management of internal audits. An internal audit of each section of the quality management system shall be performed at least once a year to evaluate the compliance and the effectiveness of implementation. Different parts of the management systems may be audited at different times and different frequencies, as long as all sections of the management systems are audited annually.  The management representative or a qualified individual, independent of the function being audited, shall perform the audit and produce a written record of the audit result from each section.  Internal audit records shall be controlled in the same manner as quality records. |  |  |  |
|  | **CHAPTER 4**  **BRIDGE FABRICATOR REQUIREMENTS** |  |  |  |
| **4.2** | **Scope**  This Standard establishes three categories of bridges: simple, intermediate and advanced. Fabricators producing intermediate bridges, advanced bridges, or fracture-critical members shall be required to meet supplemental requirements in Chapters 4.I, 4.A and 4.F, as applicable.  Bridge Category Descriptions:  Simple bridges consist of unspliced rolled sections.  Intermediate bridges are typical bridges that do not require extraordinary measures.  Advanced bridges are more complex bridge structures than simple or intermediate  bridges, and they require a higher level of *fabrication* expertise. |  |  |  |
| **4.3** | **References**  The ability to work to and meet the requirements of the latest edition of the following documents shall be demonstrated:   1. AASHTO/AWS D1.5 Bridge Welding Code 2. ASTM F3125/F3125M Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength |  |  |  |
| **4.5.4.1** | **Personnel**  In addition to the requirements in Section 1.5.4, the following additional qualification requirements shall apply:   1. For production and QA management functions, at least five years steel fabrication experience or training 2. For QC and purchasing management functions and for detailing checkers , at least three years steel fabrication experience or training   The fabricator shall have the following personnel on staff or available under contract, who are certified in accordance with the fabricator’s NDT program:   1. At least one Certified Level III NDT administrator for each NDT method performed in the shop 2. At least one Certified Level II technician for each NDT method performed in the shop   The fabricator shall have documented procedures for certifying and updating NDT personnel. Alternately, the *fabricator’s documented procedures* shall describe how they review the methods and/or written practice of contractors as suitable to subcontract to their organization.  The fabricator shall have enough AWS Certified Welding Inspectors (or other personnel as permitted by AWS D1.5 clause 6.1.3, “Inspection Personnel Qualification”) to monitor all shifts on which welding is performed.  The fabricator shall have a competent welding technician on staff. The welding technician shall have extensive knowledge and experience with or education in welding processes, procedures, and equipment and with the development, preparation, qualification and execution of welding procedure specifications. |  |  |  |
| **4.5.4.2** | **Buildings, Workspace, Equipment 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 bridge fabrication. The work areas and buildings (including housekeeping, ventilation and clean air supply, and electrical supply) shall be conducive to achieving consistent quality work. The fabricator shall have under their control the equipment and software necessary to perform fabrication or manufacturing and inspection consistent with the contract documents. |  |  |  |
| **4.7.8** | **Preparation of Fabrication and Erection Documents**  Fabrication and erection documents shall incorporate all contract requirements, specifications, codes and relevant standards to adequately procure materials, fabricate the structure or manufacture the component, and erect the structure. To ensure this, a documented procedure for preparation these documents shall be developed, which describes:   1. How project requirements are reviewed and incorporated 2. How the fabricator coordinates, proposes changes, and tracks information with the general contractor or owner (e.g., change orders and RFIs), and how the associated resolutions are tracked and controlled |  |  |  |
| **4.11.1** | **Traceability**  The *fabricator’s documented procedures* for identification of material and for  material traceability shall include provisions for maintaining heat and *MTR* identity material throughout the *fabrication* process. |  |  |  |
| **4.12.2** | **Bolt Installation**  The *documented procedure* for bolting shall meet the S4 supplementary requirement for rotational capacity testing as required by ASTM F3125/F3125M. |  |  |  |
|  | **CHAPTER 4.I**  **SUPPLEMENTAL REQUIREMENTS FOR FABRICATORS OF INTERMEDIATE BRIDGES** |  |  |  |
| **4.I** | The requirements in Chapter 4.I shall apply in addition to the requirements in Chapter 4,  except where noted. Eligible fabricators shall have either:   1. Supplied plate girder spans with field splices for highway or railroad bridges within the last five years, or 2. Established a documented training program for the purpose of communicating intermediate bridge work functions to the work forces, and demonstrated capability to fabricate intermediate bridges. Training shall include detailing, purchasing, and project management functions. |  |  |  |
| **4.I.5.4.2** | **Buildings, Workspace, Equipment and Associated Utilities**  Equipment shall include automatic, mechanized or semiautomatic welding equipment. |  |  |  |
| **4.I.7.1** | **Detailing Standards**  The detailing standards shall define the fabricator’s method for presenting information on shop assembly (blocking) drawings. |  |  |  |
| **4.I.7.6** | **Detailing Functions**  Detailing personnel shall have an understanding of bridge geometry, including, but not limited to, vertical and horizontal alignment, cross-slope, and roadway transitions. |  |  |  |
| **4.I.12.6** | **Laydown/Assembly**  The fabricator’s documented procedure for shop assembly of field connections shall include, at a minimum, the following items:   1. Provisions for control of assembled dimensions for both vertical and horizontal geometry 2. Provisions for control of accuracy of drilling and reaming of field connections 3. Documented procedures , including reference drawings, for match-marking shop-assembled pieces 4. Provisions for assuring the accuracy of numerically controlled equipment, if contract documents permit the use of such equipment in lieu of physical assembly |  |  |  |
|  | **CHAPTER 4.F**  **SUPPLEMENTAL REQUIREMENTS FOR FABRICATORS OF FRACTURE CRITICAL MEMBERS** |  |  |  |
| **4.F** | The requirements in Chapter 4.F shall apply in addition to the requirements in Chapter 4, except where noted. The fabricator shall have either:   1. Supplied fracture-critical members in accordance with AWS D1.5 within the last five years, or 2. Established a documented training program for the purpose of communicating fracture-critical work functions to the work forces, and demonstrated capability to fabricate fracture-critical members. |  |  |  |
| **4.F.5.7** | **Quality Manual**  The quality manual shall include or reference a written fracture control plan meeting the requirements of AWS D1.5. |  |  |  |
| **4.F.7.1** | **Detailing Standards**  The detailing standards for preparation of bills of material shall include whether the material is to be used for fracture-critical applications. The detailing standards for the fabricator’s shop and erection framing drawings shall define the manner of identifying fracture-critical welds. |  |  |  |
| **4.F.10.1** | **Purchasing Data**  The fabricator’s written purchasing documents shall identify material to be used for fracture-critical applications. |  |  |  |
| **4.F.11** | **Material Identification**  The fabricator’s documented procedures for identification of material and for material traceability shall include provisions for maintaining heat and MTR identity of fracture-critical material throughout the fabrication process. The *procedure* shall address how fracture-critical material is identified at receipt and throughout *fabrication* by unique mill piece or plate number. Further, the *procedure* shall also address how consumables purchased for fracture-critical welding are identified. |  |  |  |
| **4.F.12.1** | **Welding**  The fabricator’s documented procedure for welding shall include:   1. PQRs for fracture-critical WPSs 2. Fracture-critical provisions for welding procedure qualification, preheat, and storage of consumables |  |  |  |
| **4.F.13** | **Inspection and Testing**  The fabricator’s documented procedure shall include provisions for inspection of fracture-critical welds. |  |  |  |
| **4.F.15.2** | **Nonconforming Work**  The fabricator’s documented procedure shall include provisions for critical and noncritical repairs of fracture-critical welds in accordance with AWS D1.5. |  |  |  |
|  |  |  |  |  |