



**INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS
UNIFORM EVALUATION SERVICES**

EVALUATION CRITERIA FOR STRUCTURAL STEEL APPROVED FABRICATOR INSPECTION PROGRAMS

**EC 020-2014
(Adopted - December 2014)**

1.0 PURPOSE

The purpose of these evaluation criteria is to describe the minimum requirements for IAPMO Uniform ES approval of a fabricator's structural steel fabricator inspection program in accordance with the 2015 and 2012 *International Building Code*® (IBC). By complying with these criteria, fabricators have established they have the necessary personnel, equipment, processes and procedures in place to consistently manufacture products that comply with required quality specifications.

2.0 SCOPE

2.1 2015 and 2012 IBC Section 1705.2.1 demands special inspection of structural steel construction in accordance with requirements in AISC 360. These criteria apply to fabricators of structural steel construction who fabricate under an alternative surveillance program to that described for special inspection as set forth in 2015 IBC Section 1704.2.5.1 and 2012 IBC Section 1704.2.5.2.

2.2. These criteria do not apply to the design or performance of finished products.

2.3 The building official has final authority for approving a fabricator's inspection program and is in no way constrained by these criteria.

2.4 Alternative Programs: With prior concurrence of IAPMO Uniform ES, alternative programs for approved fabricators of structural steel shall be permitted. These programs may refer to AISC 201, CSA W47.1, and IAS AC172. Alternative programs shall be oriented to requirements set forth in the IBC and corresponding reference standards.

3.0 REFERENCE STANDARDS

3.1 IAPMO Uniform ES evaluation criteria for evaluating structural steel fabricator inspection programs are based on and comply with the following references. Unless indicated otherwise, publications listed are current editions.

- *International Building Code*®,
- ANSI/AWS D1.1, Structural Welding Code- Steel
- AASHTO/AWS D1.5, Bridge Welding Code
- ANSI/AWS D1.8, Structural Welding Code – Seismic Supplement
- ANSI/AWS B5.1, Specification for Qualification of Welding Inspectors
- ANSI/AWS B5.17, Specification for the Qualification of Welding Fabricators
- ANSI/AWS A2.4, Standard Symbols for Welding, Brazing, and Nondestructive Examination
- ANSI/AWS A3.0, Standard Welding Terms and Definitions
- AWS QC1, Standard for AWS Certification of Welding Inspectors
- AISC QC014, AISC Audit Policies Issue #14, Dated 1-23-2009
- AISC 201, AISC Certification Program for Structural Steel Fabricators
- AISC 303, Code of Standard Practice for Steel Buildings and Bridges.
- ANSI/AISC 341, Seismic Provisions for Structural Steel Buildings
- ANSI/AISC 360, Specification for Structural Steel Buildings

- CSA W47.1, Certification of Companies for Fusion Welding of Steel
- CSA W178.2, Certification of Welding Inspectors
- IAS AC172, Accreditation Criteria for Fabricator Inspection Programs for Structural Steel
- SSPC, the Society for Protective Coatings
 - SSPC Painting Manual, Volume I, *Good Painting Practice*.
 - SSPC Painting Manual, Volume II, *Systems and Specifications*
- Research Council on Structural Connections (RCSC), *Specification for Structural Joints Using ASTM A 325 or A 490 Bolts*
- ISO 9606-1, *Qualification Testing of Welders – Fusion Welding – Part 1: Steels*
- EN-287-1, *Qualification Test of Welders – Fusion Welding – Part 1: Steels*

4.0 TERMINOLOGY

Definitions for the following terms as well as those provided in ISO/IEC Standards 2:2004 and 17000:2004 apply to these evaluation criteria.

- **Accredited Inspection Body:** An agency providing third-party inspection services for fabrication of steel and operating in accordance with ISO/IEC 17020. The verification of conformance to ISO/IEC 17020 shall be based on accreditation by an accreditation body recognized as conforming to ISO/IEC 17011.
- **Approved Fabricator:** A business establishment or individual approved by a building official under guidelines established in 1704 of the IBC or by an equivalent program that meets or exceeds compliance requirements for approved fabricator programs such as those used by IAPMO UNIFORM ES.
- **Contract Documents:** Work orders, drawings, specifications and other documents detailing a fabricator's deliverables for a project.
- **Corrective Action:** Actions taken to remedy a problem by removing or restricting its cause.
- **Nonconformance:** A member or component that is unusable as a result of its failure to conform to contracted criteria or specifications.
- **Procedure Qualification Record (PQR):** Where applicable, documentation provided in accordance with ANSI/AWS or AASHTO/AWS Standards.
- **Procedure:** A written description of any required activity describing who is responsible for it as well as when, where, why and how it is to be implemented.
- **Product:** The final result of a series of actions or processes.
- **Project:** Controlled activities that converge as part of a process designed to result in products that comply with customer expectations.
- **Quality Assurance (QA):** Monitoring and inspection tasks performed by the accredited inspection body to ensure that the material provided and work performed by the fabricator comply with the requirements of the approved construction documents and referenced standards.
- **Quality Assurance Plan (QAP):** A document describing how the accredited inspection body maintains detailed monitoring and inspection procedures to ensure conformance with the construction documents, referenced standards, and code requirements
- **Quality Control (QC):** Controls and inspections implemented by the fabricator, to ensure that the material provided and work performed comply with the requirements of the approved construction documents and referenced standards.
- **Quality Control Plan (QCP):** A document developed by the fabricator describing fabrication, erection, and inspection policies and procedures for use in ensuring that product quality complies with construction documents, referenced standards and code requirements.
- **Quality System Management (QSM):** A systematic approach that involves corporate management in the process of improving the quality of products and services.
- **Specification:** Detailed written requirements a product shall comply with.
- **Welding Procedure Specification (WPS):** Where applicable, performance requirements indicated in ANSI/AWS D1.1, AASHTO/AWS D1.5, and ANSI/AWS D1.8.

5.0 PREREQUISITES

5.1 General Requirements

5.1.1 The fabricator shall implement a comprehensive Quality Control (QC) System designed for ensuring product compliance with construction document requirements.

5.1.2 The fabricator shall provide IAPMO UNIFORM ES with QAP and QCP documentation developed in collaboration with an accredited inspection body detailing all processes, procedures and activities associated with their QA and QC program that includes the general requirements in this section, data indicated in 5.3 and written procedures described in Section 5.5.

5.1.3 The QAP and QCP documentation submitted to IAPMO UNIFORM ES by the fabricator shall be signed and dated by an internal representative of the fabricator's organization and accompanied by confirmation from the authorized representative of an accredited inspection body affirming that documentation is complete and the fabricator is ready for a fabrication facility assessment audit.

5.1.4 A joint fabrication facility assessment audit by IAPMO UNIFORM ES and the accredited inspection body is required before a fabricator's QC program can be accepted in order to determine the fabricator's compliance with their QA and QC documentation as well as IAPMO UNIFORM ES and code requirements.

5.1.5 After the fabricator's QA and QC program has been approved by IAPMO UNIFORM ES, the fabricator shall agree to submit to regular inspections by the accredited inspection body at intervals determined by IAPMO UNIFORM ES and the accredited inspection body based on the initial fabrication facility assessment audit.

5.2 Personnel Requirements

5.2.1 The fabricator shall designate a QC System Manager who has demonstrated the minimum competence, training and experience required to:

- Report directly to the organization's highest levels of management
- Maintain QC System documentation consistency with IAPMO UNIFORM ES evaluation criteria
- Oversee effective implementation of all QC System requirements
- Ensure that routine accredited inspection body assessments are performed and documented
- Ensure that any necessary corrective actions are performed and documented
- Perform and document yearly management reviews to assess Quality System performance that include an evaluation of customer complaints and their disposition
- Create QCPs that meet specific project requirements based on an understanding of and access to the appropriate documents
- Be qualified as a Quality Control Inspector QCI in accordance with requirements in AISC 360, a Certified Welding Inspector (CWI) based on provisions of AWS QC1 or their equivalent in the Canadian Standards Association (CSA) Standard W178.2 or be an ICC Special Inspector of Structural Steel. Alternatively, a full-time QCI shall be employed by the fabricator.
- Recognize the appropriate codes and specifications required for scope and quality of work requested
- Ensure that welders are qualified and certified for performing processes and procedures permitted and required for meeting product specifications
- Ensure that all welders remain current with requirements for ANSI/AWS D1.1 qualification
- Assume final responsibility for all welding performed by making sure it is visually inspected and satisfies contracted specifications
- Ensure that all raw materials received are inspected, correctly identified and comply with QC plan and required specifications
- Maintain documentation for final assemblies showing traceability back to raw materials, QC records and the responsible welder(s)
- Review and understand all Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs) before utilization in production

5.2.2 All welding personnel shall be tested and certified by qualified, third-party testing as complying with the applicable requirements described in ANSI/AWS D1.1 or AASHTO/AWS D1.5.

5.2.3 Acceptable third-party qualification includes certification as an AWS Certified Welding Inspector (CWI) under provisions of AWS QC1, qualification to CSA W178.2 requirements, or qualification in accordance with ISO 9606-1 or EN 287-1.

5.2.4 Welding tests may be administered by the CWI, but only when the test or test sample is submitted for review to an accredited testing laboratory.

5.2.5 An identifying number, letter and/or symbol shall be issued to all welders for use in linking them to their work.

5.3 Data Requirements

5.3.1 A QC System summary submitted to IAPMO UNIFORM ES for review shall, as a minimum, include the following information:

- The plant name, phone number, street address, and where it differs, mailing address
- Telephone number, email address and other contact information for the company's authorized IAPMO UNIFORM ES representative
- A facility floor plan (not necessarily to scale)
- A list of welding, burning, lifting, inspection and other major equipment used for production
- A list of typical products produced by the plant such as trusses, towers, signs and girders
- A copy of all production welding WPS's for the type of fabrication performed by the facility that includes both essential and nonessential variables as indicated in ANSI/AWS D1.1, AASHTO/AWS D1.5, and ANSI/AWS D1.8,
- Five years of required documentation for PQRs relating to AASHTO/AWS D1.5 for WPSs that have been qualified by testing
- Three years of PQR documentation for welding fracture-critical members indicating the submerged arc welding process
- A list of all welding employees and their qualifications, including process approvals, performance restrictions and assigned identification marks
- Proof of certification for all welders by an independent third-party CWI as described in Sections 5.2.2, 5.2.3 and 5.2.4
- Name and certification number for the CWI serving as the fabricator's welding QC Inspector
- A copy of all bolting procedures for snug-tightened, pre-tensioned, and slip-critical connections, which shall include pre-installation verification, installation, and inspection steps. Procedures shall comply with the RCSC
- Identification of individual(s) available to serve as Deputy QC Inspector(s) when the designated QC Inspector is unavailable
- An organizational chart displaying relationships between key QC personnel including the executive management, project and quality managers, IAPMO Uniform ES representatives, in-house QC and Deputy QC inspectors, production manager and welders
- Names, resumes and responsibilities of all employees essential to the quality of the fabricated products
- An approved vendor list that includes any testing laboratories retained for WPS verification
- A list of all testing and measuring equipment that shall be calibrated to conform to national standards. Equipment shall be sufficient to ensure quality compliance for the products fabricated at the facility.
- At completion of each fabrication, the approved fabricator shall submit a certificate of compliance to the building official stating that the materials supplied and work performed by the fabricator are in accordance with the construction documents and the code.

5.4 Contract Requirements

5.4.1 Contract review procedures shall include provisions to determine whether:

- The contract is appropriately written
- Sufficient resources area available to fulfill the contract's terms
- The product and/or service will meet the desired specifications
- A clause is included that provides for approving exceptions or change requests

5.4.2 Employees authorized to review contracts shall be knowledgeable about their requirements, have access to the necessary information and be approved by the QC System Manager.

5.5 Process Requirements

5.5.1 Procedures for controlling documents and data relating to the fabricator's QC functions and performance, specifying how to:

- Approve documents
- Ensure that only the most recent, approved documents are used
- Make documents available whenever and wherever needed to maintain QC System effectiveness
- Prepare detailed drawings and approve contract revisions and change orders
- Ensure that the shop drawings and other documentation are reviewed as required by Chapter N of AISC 360 by the Registered Design Professional (Engineer of Record) for the project.

5.5.2 Procedures for documenting the purchase/receipt of goods, indicating how to:

- Specify the type and grade of material on the purchasing agreement
- Confirm whether or not they satisfy the required specifications

5.5.3 Procedures for documenting subcontractor evaluations to include:

- A method of quantifying their ability to fulfill the terms of their contract
- An exclusionary clause for unaccredited facilities when accreditation by IAPMO UNIFORM ES or its equivalent is required

5.5.4 Procedures ensuring product traceability back to the original purchase order to include:

- Documentation for all raw materials, purchased materials and consumables used
- Identification of responsible QC and welding personnel
- A means of indicating traceability data on forms used for inspection

5.5.5 Procedures for communicating process controls to plant personnel to include:

- A description of how procedures are prioritized and communicated to appropriate personnel
- Procedures for cutting, sawing, fitting, welding, cambering, coating, etc.
- Bolting procedures in project documents that address fitting, snug-tight, prep-tensioning and surface fraying
- Forms used in procedure documentation such as cut lists and standard or detailed drawings

5.6 Test and Inspection Requirements

5.6.1 Test reports shall include information required by the relevant test standard, the UES Test Report Requirements in Procedure ES-025, and Appendix A. Additional documentation required includes:

- An accreditation certificate for the testing laboratory showing testing is consistent with ISO/IEC Standard 17025, issued by an accreditation body conforming to ISO/IEC 17011

5.6.2 QC Inspections performed by qualified personnel to ensure product conformance with construction documents shall encompass:

- Inspection tasks prior to, during, and after welding in accordance with Chapter N of AISC 360.
- Inspection tasks prior to, during, and after high-strength bolting in accordance with Chapter N of AISC 360.
- Shop cutting and finished surfaces.
- Shop heating for straightening, cambering and curving in accordance with Chapter M of AISC 360.
- Tolerances for shop fabrication in accordance with the AISC 303.
- For steel structures resisting seismic forces and required by the IBC to comply with AISC 341, inspection tasks prior to, during, and after welding in accordance with Chapter J of AISC 341.
- For steel structures resisting seismic forces and required by the IBC to comply with AISC 341, inspection tasks prior to, during, and after high-strength bolting in accordance with Chapter J of AISC 341.

5.6.3 Nondestructive testing (NDT) procedures for fabricators who provide this service shall be developed and documented for applicable projects in accordance with Chapter N of AISC 360 and shall be noted on the approved certificate. For steel structures resisting seismic forces and required by the IBC to comply with AISC 341, NDT procedures shall be developed and documented for applicable projects in accordance with Chapter J of AISC 341.

5.6.4 Maintenance schedules for measuring and testing equipment that include:

- Procedures for verifying calibration of testing equipment by a testing laboratory accredited by an accreditation body conforming to ISO/IEC 17011
- A method developed by the fabricator for verifying calibration of unique testing equipment when nationally recognized standards are unavailable

5.6.5 QA Inspections performed by the accredited inspection body shall occur at the intervals set forth in Section 5.1.5 and the QAP and shall encompass:

- Predetermined selection of inspection tasks set forth in AISC 360 or AISC 341, as applicable.
- Review of NDT reports.
- Review of documentation, test records, and inspection records.
- Submit an inspection report to IAPMO Uniform ES and the fabricator after complete the tasks

5.7 Control Requirements

5.7.1 Nonconforming product procedures that specify:

- Identification, documentation and disposition of product deficiencies
- Determining, documenting, and correcting nonconformities

5.7.2 Procedures for properly identifying and storing received materials and finished products, that mitigate against loss or damage

5.7.3 Audit procedures designed to determine the effectiveness of the QC System requiring:

- Specifying the method and frequency of internal audits
- Comparisons with previous audits.

5.7.4 Procedures for maintaining and retrieving QC records for at least two years, including:

- Internal audit, quality inspection and employee training documents
- Accredited inspection body reports
- Contract, vendor and subcontractor review documents
- Test reports from manufacturers and compliance certificates submitted by vendors

5.7.5 Training procedures that specify:

- Methods of maintaining the current level of competency for employees whose performance affects final product quality
- Minimum training required by detail, inspection, welding, fitting and painting personnel and project managers

5.8 Additional Requirements:

- All activities within the fabricator's organization shall be directed towards achieving the quality requirements of IAPMO UNIFORM ES and the accredited inspection body
- All personnel shall be fully apprised of and familiar with the requirements of the fabricator's QC program in their area of responsibility
- The fabricator's Quality System documentation shall be reviewed and updated at a minimum of once per year
- If for any reason the facility is closed for an extended period of time, the fabricator will inform the accredited inspection body and notify both IAPMO UNIFORM ES and the accredited inspection body at least 15 days in advance before resuming operations.
- The fabricator shall notify IAPMO UNIFORM ES in writing if for any reason it does not authorize necessary follow-up inspections by the accredited inspection body
- The fabricator will reply and investigate as soon as possible whenever IAPMO UNIFORM ES or a building official reports concerns about a completed product's noncompliance

- The fabricator will notify the accredited inspection body within 30 days if there is any change in management personnel including the executive management, Principal Engineer, General, Purchasing, Production or Quality Managers and others who potentially impact product quality.

5.9 Certificate of Recognition

Upon successful compliance to the requirements of this criteria, IAPMO UES shall issue a certificate of recognition containing the following items:

- Name of fabricator
- Location of fabricator
- Structural steel processes recognized
- Name of inspection body
- List of applicable standards used in the certification
- Date of issue and expiration date

Annex A**Test Report Content**

- 1.0** The services performed by the testing laboratory shall be documented by a retrievable report that accurately, clearly, objectively, and unambiguously presents measurements, observations, examinations, and test results in accordance with the reporting requirements of test method(s). Each test or inspection report also shall include the following unless the code, evaluation criteria, or the test standard requirements specify otherwise:
- 1.1** A title, for example, "Report of Welding Tests."
 - 1.2** The name, address, and contact information of the laboratory.
 - 1.3** A unique identification of the report (such as report number), the issue date, a sequential number for each page, and the total number of pages.
 - 1.4** The name and address of the client.
 - 1.5** Description of, condition of, and clear identification of the item tested.
 - 1.6** Quantity of tests conducted.
 - 1.7** Date test(s) were conducted.
 - 1.8** Identification of test standards or description of any non-standard methods used.
 - 1.9** Any deviations from, additions to, or exclusions from, the test standard and any other information relevant to the specific test, such as environmental conditions.
 - 1.10** Measurements, observations, examinations, and test results, supported by tables, graphs, sketches, and photographs, as appropriate, including a description of the failure mode or condition of item at conclusion of the tests.
 - 1.11** Conclusions or summary statements, including, when applicable, a statement indicating whether the product passed or failed the test.
 - 1.12** A statement that the results apply only to the items tested.
 - 1.13** A statement that the report shall not be reproduced, except in full, without the prior written approval of the laboratory.
 - 1.14** Name(s) of individual(s) performing the tests.
 - 1.15** A signature and title, or an equivalent identification, of the person(s) accepting responsibility for the content of the report on behalf of the laboratory.
 - 1.16** Identification of results obtained from tests subcontracted by the laboratory to others. The laboratory shall not represent the services of others as its own.
- 2.0** Each test report, where necessary for the proper interpretation or understanding of the report, shall include the following:
- 2.1** Project title and reference designation.
 - 2.2** Reference to relevant code, evaluation criteria, or other requirement(s).
 - 2.3** A statement indicating compliance with relevant code, evaluation criteria, or other requirement(s).
 - 2.4** Other reporting requirements of the evaluation agency, the client, or relevant authority.
- 3.0** Test reports presenting results shall include the following with respect to sampling:
- 3.1** Date of sampling or date sample received, as appropriate.
 - 3.2** Clear identification of the material sampled including manufacturer, brand name, lot number, source, or similar unique information, as applicable.
 - 3.3** Sampling location, where relevant, using an explicit description, diagram, sketch, or photograph, as applicable.
 - 3.4** Identification of sampling methods used, or sampling plan or procedure if a non-standard method was used.
 - 3.5** Deviations from, additions to, or exclusions from standard sampling methods or predetermined sampling plans or procedures.

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- 3.6** Details of environmental conditions present during the sampling such as rain or freezing weather that may have affected the testing of the sample or the interpretation of the test results.
- 3.7** If assemblies are tested (structural assemblies, etc.), identification of the assemblies, preferably with illustrations. The report shall identify the parties constructing the assemblies and shall also address witnessing and/or verifying the construction.
- 4.0** When interpretations of tests are included in the report, the basis for the interpretations shall be clearly explained. Interpretations commonly include determination of compliance or noncompliance of the results with requirements of the test method or evaluation criteria.
- 5.0** Material revisions or additions to a report after initial issue shall be made in a further document clearly indicating the revised information and clearly referencing the original report identification. Such revisions or additions shall meet the relevant requirements of Section 2.0.
- 6.0** Transmission of test reports by electronic means shall follow documented procedures to ensure that the requirements of this evaluation criteria are met and that confidentiality is preserved.