The AISC Quality Certification Program

CHARLES PESHEK, JR.

In recent years, the quality of construction methods and materials has become the subject of increasing concern to building officials, highway officials, and designers. One result of this concern has been the enactment of ever more demanding inspection requirements intended to ensure product quality. In many cases, however, these more demanding inspection requirements have not been based upon demonstrated unsatisfactory performance of structures in service. Rather, they have been based upon the capacity of sophisticated test equipment, or upon standards developed for nuclear construction rather than conventional construction. Adding to the problem, arbitrary interpretation of specifications by inspectors has too often been made without rational consideration of the type of construction involved. The result has been spiraling increases in the costs of fabrication of structural steel and of inspection, which must be paid by owners without necessarily assuring that the product quality required has been improved.

Product inspection, although it has a valid place in the construction process, is not the most logical or practical way to assure that structural steelwork will conform to the requirements of contract documents and satisfy the intended use. A better solution can be found in the exercise of good quality control and quality assurance by the fabricator *throughout the entire production process.*

Recognizing this fact, and seeking some valid, objective method whereby a fabricator's capability for assuring a quality product could be evaluated, a number of code authorities have, in recent years, instituted steps to establish fabricator registration programs. However, these independent efforts resulted in extremely inconsistent criteria. They were developed primarily by inspectors or inspection agencies who were experienced in testing, but were not familiar with the complexities of the many steps, procedures, techniques, and controls required to assure quality throughout the fabricating process. Neither were these inspection agencies qualified to determine the various levels of quality required to assure satisfactory performance in meeting the service requirements of the many different types of steel structures.

Recognizing the need for a comprehensive national standard for fabricator certification, and concerned by the trend toward costly inspection requirements that could not be justified by rational quality standards, the American Institute of Steel Construction has developed and implemented a voluntary Quality Certification Program, whereby any structural steel fabricating plant—whether a member of AISC or not—can have its capability for assuring quality production evaluated on a fair and impartial basis. This national program has been in operation for the past two and a half years.

Charles Peshek, Jr., is Quality Certification Administrator, American Institute of Steel Construction, New York, N.Y.

THE AISC PROGRAM

The AISC Quality Certification Program does not involve inspection and/or judgment of product quality on individual projects. Neither does it guarantee the quality of specific fabricated steel products. Rather, the purpose of the AISC Quality Certification Program is to confirm to the construction industry that a Certified structural steel fabricating plant *has the personnel, organization, experience, procedures, knowledge, equipment, capability, and commitment to produce fabricated steel of the required quality for a given category of structural steelwork.*

The AISC Quality Certification Program was developed by a group of highly qualified shop operation personnel from large, medium, and small structural steel fabricating plants throughout the United States. These individuals all had extensive experience and were fully aware of where and how problems can arise during the production process and of the steps and procedures that must be followed during fabrication to assure that the finished product meets the quality requirements of the contract.

The program was reviewed and strongly endorsed by an Independent Board of Review comprised of 17 prominent structural engineers from throughout the United States, who were not associated with the steel fabricating industry, but were well qualified in matters of quality requirements for reliable service of all types of steel structures.

CATEGORIES OF CERTIFICATION

A fabricator may apply for certification of a plant in one of the following four categories of structural steelwork:*

I: Conventional Steel Structures—Small Public Service and Institutional Buildings, (Schools, etc.), Shopping Centers, Light Manufacturing Plants, Miscellaneous and Ornamental Iron Work, Warehouses, Sign Structures, Low Rise, Truss Beam/Column Structures, Simple Rolled Beam Bridges.

II: Complex Steel Building Structures—Large Public Service and Institutional Buildings, Heavy Manufacturing Plants, Powerhouses (fossil, non-nuclear), Metal Producing/Rolling Facilities, Crane Bridge Girders, Bunkers and Bins, Stadia, Auditoriums, High Rise Buildings, Chemical Processing Plants, Petroleum Processing Plants.

III: Major Steel Bridges—All bridge structures other than simple rolled beam bridges.

MB: Metal Building Systems—Pre-engineered Metal Building Structures.

Certification in Category II automatically includes Category I. Certification in Category III automatically includes Categories I and II. Certification in Category MB is not transferable to any other Category.

INSPECTION-EVALUATION PROCEDURE

An outside, experienced, professional organization, ABS Worldwide Technical Services, Inc. (a subsidiary of American Bureau of Shipping) has been retained by AISC to perform the plant Inspection-Evaluation in accordance with a standard check list and rating procedure established by AISC for each certification category in the program. See Figs. 1–4 for sample checklist sheets for Category II. Upon completion of this Inspection-Evaluation, ABS Worldwide Technical Services (commonly known as ABSTECH) will recommend to AISC that a fabricator be approved or disapproved for certification. ABSTECH's Inspection-Evaluation is totally independent of the fabricator's and AISC's influence, and their evaluation is not subject to review by AISC.

At a time mutually agreed upon by the fabricator, AISC, and ABSTECH, the Inspection-Evaluation team visits the plant to investigate and rate the following basic plant functions directly and indirectly affecting quality assurance: General Management, Engineering and Drafting, Procurement, Shop Operations, and Quality Control. The Inspection-Evaluation team will perform the following:

1. Confirm data submitted with the Application for Certification.
2. Conduct interviews with key supervisory personnel and subordinate employees.
3. Observe and rate the organization in operation, including procedures used in functions affecting quality assurance.
4. Inspect and rate equipment and facilities.
5. At an "exit interview", review with plant management the completed check list observations and evaluation scoring, including discussions of deficiencies and omissions, if any.

The number of days required for Inspection-Evaluation varies according to the size and complexity of the plant, but will usually require from two to five days.

CERTIFICATION

Following recommendation for Certification by the Inspection-Evaluation team, AISC will issue a certificate identifying the fabricator, the plant, and the Category of Certification. The certificate is valid for a three year period, subject to annual review in the form of unannounced inspections early in the second and third year periods. The certificate is endorsed annually, provided there is successful completion of the unannounced second and third year inspection.

An annual self-audit, based on the standard check list, is required to be made by plant management during the 11th and 23rd months after initial Certification. This self-audit must be retained on file at the plant, and must be made available to the Inspection-Evaluation team during the unannounced second and third year inspections.

At the end of the third year, the cycle begins again with a complete prescheduled Inspection-Evaluation and the issuance of a new certificate. Failure to pass either the second or third year unannounced inspection is cause for revocation of Certification.

PRESENT STATUS OF THE PROGRAM

Since implementation of the AISC program, more than 50 plants have been certified in the various categories. The Certified plants are located in 23 different states. A considerable number of applications are in hand for future Inspection-Evaluation.

During the past three years a number of owners, architects and engineers have included the AISC Quality Certification Program as a part of the special provisions to their contract specifications for various projects.

A number of major steel bridges for which contracts have been awarded within the past year have required AISC Quality Certification in Category III or equal.

Two of the major Building Code bodies in the country have recognized that the AISC Quality Certification Program assures uniform minimum standards of quality in

* *See later discussion of Certification for Auxiliary and Support Structures for Nuclear Power Plants.*

CATEGORY: II

INSPECTION - EVALUATION CHECK LIST

Rating Procedure

Each item on the Inspection-Evaluation Check List will be rated from 0 to 4, or indicated "NA" on the following basis:

(0) Unsatisfactory: No effective compliance
(1) Poor: Less than minimum requirements
(2) Satisfactory: Complies with minimum requirements
(3) Good: Above minimum requirements
(4) Outstanding: Superior to others
(NA) Not Applicable: Certain items on the Inspection-Evaluation Check List may not be appropriate for the plant being certified, and should not be rated. These items will not be considered "rated items" in computing Summary Ratings.

NOTE: The Inspection-Evaluator may, at his discretion, mark an item on the Inspection-Evaluation Check List NA even though it may not be so noted, providing, a complete explanation is given for doing so. This may include items marked essential.

Minimum Ratings Required for Certification

1.	Overall Rating of Total Operation*	2.5
2.	Summary Ratings of Quality Assurance Functions (General Management, Engineering & Drafting, Procurement, Operations, Quality Control)*	2.0
3.	Ratings of Essential Items (indicated on check list by CAPITAL LETTERS)	2.0
4.	Rating of Items Other than Essential Items	NO MINIMUM

* The detailed methods for computing these Ratings are included with the Inspection-Evaluation Report sent to each applicant for Certification.

Fig. 1. Inspection-Evaluation check list—Cateogry II: sample page—Rating Procedure

structural steel fabrication. AISC has been named a Quality Assurance Agency by Southern Building Code Congress International, Inc. in their report number Q.A. 7801-78 and by Building Officials and Code Administrators International, Inc. in their report RR 77-61.

AISC has developed, and will soon implement, a Supplement to Categories I, II and III, to cover Certification of Auxiliary and Support Structures for Nuclear Power Plants. This supplement, applicable to nuclear plant structures designed under the AISC Specification, but not to pressure-retaining structures, will offer utility companies and designers of nuclear power plants a certification program that will eliminate the need for many of the more costly, conflicting programs now in use, many of which apply pressure-retaining quality requirements to conventional support structures.

CATEGORY: II	INSPECTION - EVALUATION CHECK LIST	Rating	Explanation

B. ENGINEERING AND DRAFTING (continued)

3. Procedures

a.	DOES THE DRAFTING DEPARTMENT MAINTAIN A CURRENT LOG OF DESIGN DRAWINGS AND SPECIFICATION RECEIPTS WITH LATEST REVISIONS AND DISPOSITIONS?	0 1 2 3 4	
b.	DETAIL DRAWINGS CHECKED BY QUALIFIED PERSONNEL.	0 1 2 3 4	
c.	DOES THE DRAFTING DEPARTMENT MAINTAIN A CURRENT LOG OF SHOP DETAIL DRAWINGS WITH LATEST APPROVAL, REVISIONS AND DISPOSITIONS?	0 1 2 3 4	
d.	ARE COPIES OF APPROVED SPECIAL PROCEDURES, IN ADDITION TO WELDING, FURNISHED TO QUALITY CONTROL AND PRODUCTION SUPERVISORS?	0 1 2 3 4	
e.	Current log of special process instructions with latest approval, revisions, dissemination and control.	0 1 2 3 4	
f.	Changes to drawings and documents reviewed and approved by those who originated the documents.	0 1 2 3 4	
g.	Provisions to assure that obsolete drawings and documents are destroyed or isolated from use.	0 1 2 3 4	
h.	Adequacy of established drafting standards and are there procedures to assure compliance both in house and on sublet work.	0 1 2 3 4	
i.	DRAFTING PROCEDURES TO ESTABLISH IDENTITY OF MAIN MATERIAL IN FINAL STRUCTURE SO THAT IT CAN BE TRACED TO MATERIAL REQUISITIONS AND MILL TEST REPORTS AND ARE PROCEDURES USED TO ASSURE COMPLIANCE BOTH IN HOUSE AND ON SUBLET-DRAFTING WORK?	0 1 2 3 4	

Plant_____ Inspector_____ Date_____

Fig. 2. Inspection-Evaluation check list—Category II: sample page—Engineering and Drafting

CATEGORY: II	INSPECTION - EVALUATION CHECK LIST	Rating	Explanation
D.	OPERATIONS (cont'd)		
3.	Procedures		
a.	Material Receipt and Storage		
i.	GRADE OF MATERIAL AND MARKING VERIFIED PRIOR TO FABRICATION.	0 1 2 3 4	
ii.	Raw material blocked and handled to prevent permanent distortion.	0 1 2 3 4	
iii.	ADEQUATE AND PROPER STORAGE FOR WELDING ELECTRODES, FLUX, BOLTS, RIVETS AND PAINT.	0 1 2 3 4	
b.	Fabrication		
i.	Adequacy of procedure for distributing drawings to the shop force.	0 1 2 3 4	
ii.	Adequacy of procedure for handling revisions and voided drawings.	0 1 2 3 4	
iii.	ADEQUACY OF PROCEDURE FOR INSTRUCTING THE SUPERVISORS AND WORKMEN ABOUT SPECIFICATIONS, INCLUDING WELDING PROCEDURES AND SPECIAL REQUIREMENTS.	0 1 2 3 4	
iv.	MATERIAL IDENTIFIED WHEN TRANSFERRED FROM STORAGE TO SHOP PRIOR TO PROCESSING.	0 1 2 3 4	
v.	IS THIS IDENTITY RETAINED DURING FABRICATION?	0 1 2 3 4	
vi.	Adequacy of system for assuring proper application of material cut from larger pieces.	0 1 2 3 4	
vii.	Grade identification retained on material returned to stock.	0 1 2 3 4	
viii.	Is material inspected for conformance to ASTM-A6 standard?	0 1 2 3 4	
ix.	WELDING ROD AND WELDING FLUXES ADEQUATELY IDENTIFIED WHEN STORED.	0 1 2 3 4	
x.	FLUX AND ROD OVENS ADEQUATE AND OPERATING PER AWS LATEST ADOPTION.	0 1 2 3 4	

Plant_____ Inspector_____ Date_____

Fig. 3. Inspection-Evaluation check list—Category II: sample page—Operations

CATEGORY: II	INSPECTION-EVALUATION CHECK LIST	Rating	Explanation
E.	QUALITY CONTROL (continued)		
3.	Procedures		
a.	CONTRACT SPECIFICATIONS AND SPECIAL PROVISIONS ON FILE.	0 1 2 3 4	
b.	DOES QUALITY CONTROL HAVE AUTHORITY TO STOP AND RESPONSIBILITY TO INFORM OPERATING SUPERVISION ON NONCONFORMING WORK?	0 1 2 3 4	
c.	Is a check made to ensure that approved welding procedures are disseminated and followed in the shop?	0 1 2 3 4	
d.	Required records maintained: Of Heat Numbers and material test reports for special requirements.	0 1 2 3 4	
e.	Required records maintained of N.D.T. Reports.	0 1 2 3 4	
f.	RECORD OF QUALIFIED WELDERS ON FILE.	0 1 2 3 4	
g.	An adequate in-process inspection procedure.	0 1 2 3 4	
h.	Adequate procedure for handling nonconforming material.	0 1 2 3 4	
i.	Adequate procedures for liason with outside inspectors.	0 1 2 3 4	
j.	Do all pieces receive a final inspection and is a record kept of this inspection?	0 1 2 3 4	
k.	Procedures for calibrating tapes, N. D. T. equipment, paint gauges and a record kept.	0 1 2 3 4	
ℓ.	Procedures for shop inspector qualifications.	0 1 2 3 4	
m.	Record kept of all inspections, such as by noted detail drawings.	0 1 2 3 4	
n.	Does an inspector check surface preparation prior to painting.	0 1 2 3 4	
o.	Does an inspector check painting?	0 1 2 3 4	
p.	A Quality Control procedure manual.	0 1 2 3 4	

Plant_____ Inspector_____ Date _____

Fig. 4. Inspection-Evaluation check list—Category II: sample page—Quality Control