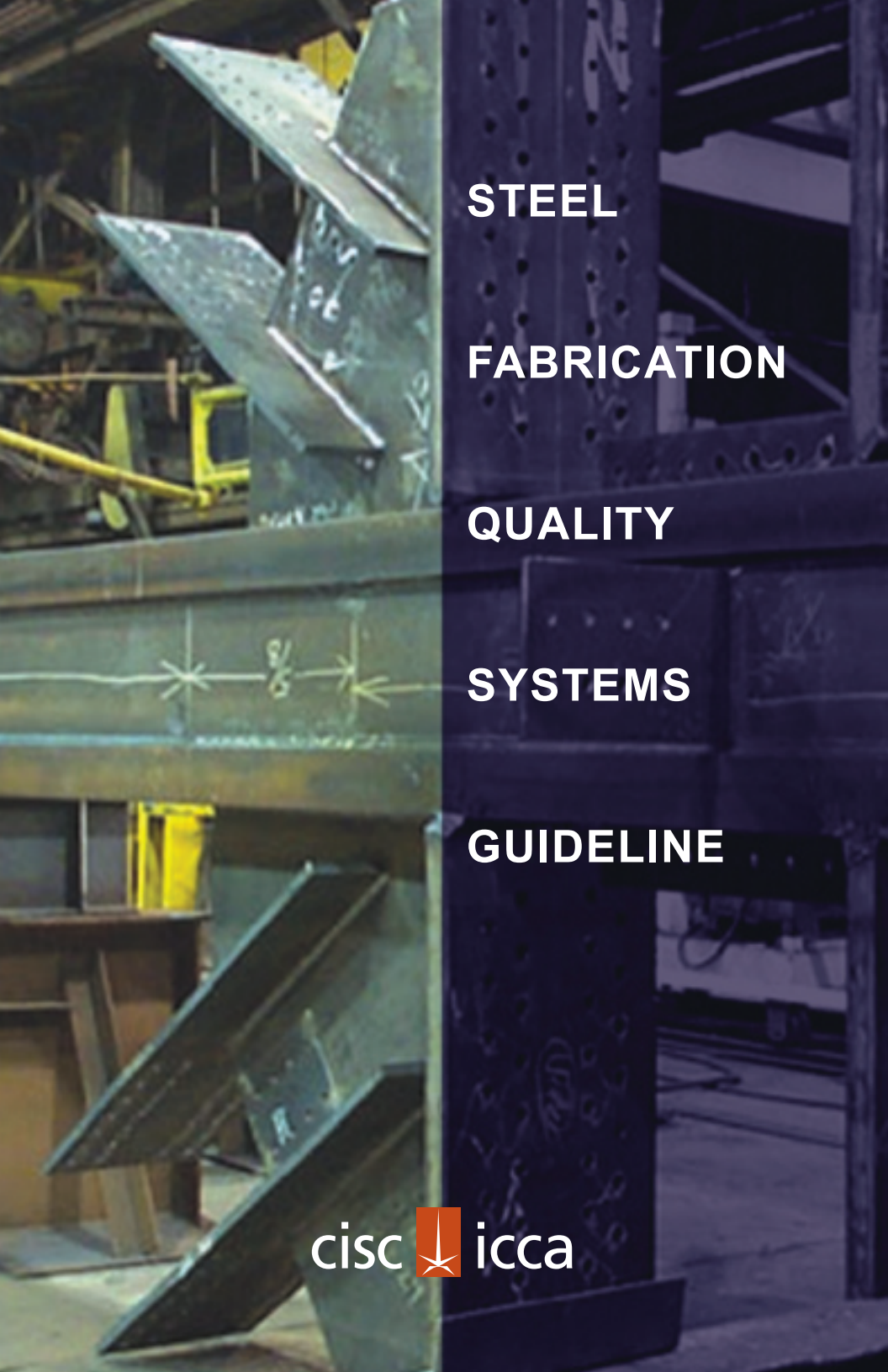

STEEL FABRICATION QUALITY SYSTEMS GUIDELINE

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PREFACE

The Canadian Institute of Steel Construction (CISC) is the national industry association representing the structural steel, open web steel joist, and steel plate fabricating industries in Canada. The CISC functions as a not-for-profit organization promoting the efficient and economic use of fabricated steel in construction.

The CISC has prepared this Guideline in recognition of the interest in meeting the quality requirements of its customers. It is designed to assist CISC Fabricators in developing a Quality System that will provide assurance that products will conform to contractual and regulatory requirements. This guideline addresses the special processes and specific requirements of the steel fabrication industry.

The Guideline is based on the belief that quality awareness is an integral part of all production processes. By promoting a "pride in workmanship" attitude in the employees, product quality will be maintained in the most economical manner.

The guideline has been prepared with reference to the following publications:

(a) CSA S16
(b) CSA W59
(c) CSA W47.1
(d) CISC Code of Standard Practice
(e) ISO 9001:2000
(f) ISO 9001:1994

Fabricators may choose to have their quality assurance program audited and registered by a CISC approved, accredited quality systems registration organization.

1. SCOPE AND AIMS OF MANUAL

The Quality Systems Manual, to be developed by the Fabricator, shall define the scope of application with respect to departments or systems included, and production location if more than one location is covered.

2. NORMATIVE REFERENCE

Reference to the following documents, when made in this guideline, refer to the most current published edition.

(a) CSA S16
(b) CSA W59
(c) CSA W47.1
(d) CISC Code of Standard Practice

3. TERMS AND DEFINITIONS

The following terms and definitions apply to this guideline or are commonly used in the industry. The fabricator may choose to include industry specific, or company specific terms and definitions in this section.

Corrective Action
An action taken to eliminate the cause of a detected nonconformity or other undesirable situation.

Defect
The non-fulfillment of a requirement that is recognized and corrected while in current process. For example, a misplaced cleat detected at the fit checking stage may be directed back to the fitting station for proper relocation may be considered a defect and not a non-conformity.

Document
Information and its supporting medium used to define and/or establish quality requirements.

Nonconformity
The non-fulfillment of a requirement.

Objective Evidence
Data supporting the existence or verity of something

Preventive Action
Action to eliminate the cause of a potential nonconformity or other undesirable potential situation.

Quality Assurance
Quality assurance means to establish measures to prevent problems and to demonstrate that such measures are taken and are effective, providing confidence that the quality requirements will be fulfilled.

Quality Control
Quality control encompasses activities aimed at determining whether results obtained through an activity conform to stated objectives for this activity. The results are measured and then compared with a pre-established objective for this activity.

Quality Management System
A system to establish the policy and objectives required to direct and control an organization with respect to quality and to achieve those objectives.

Quality Objective
An aim or goal related to improvement in the quality system.

Quality Policy
Overall intentions and direction of an organization related to quality as formally expressed by senior level management.

Record
A record is something stating results achieved or providing evidence of activities performed.

Root Cause
The initial and main reason why an event occurs. In corrective action, the removable factor leading to the elimination of future nonconformity

4. QUALITY SYSTEM REQUIREMENTS

4.1 General Requirements

The Fabricator shall develop a Quality System Manual that documents the processes necessary to provide assurance that finished products conform to customer requirements in accordance with the requirements of this guideline.

4.2 Work Procedures

The Quality System Manual shall be supported with applicable work procedures and sample documents.

4.3 Control of Documents

4.3.1 General

The Fabricator shall establish and maintain procedures for approval, issue, and maintenance of the documents and data required for the operation of the Quality System. Required documentation shall include, but may not be limited to, the following:

(a) Contract drawings, specifications, and amendments.
(b) Detail and erection drawings.
(c) Welding documentation as required by CSA W47.1.
(d) Purchase orders.

4.3.2 Erection diagrams and shop details

4.3.2.1
The Fabricator or his assigned representative shall prepare shop details and erection diagrams from Certified for Construction contract documents. Preparation, use, and approval of these documents shall conform to Section 5 of the CISC Code of Standard Practice, and Provincial and Territorial Engineering Association guidelines, where applicable.

4.3.2.2
Revisions to detail drawings/data shall be dealt with in the same manner as the originals, or as agreed upon with the Customer.

4.3.2.3
Current issues of appropriate documentation shall be available at all points of use. Provision must be made to ensure that obsolete drawings/data are removed from all points of use.

4.3.2.4
A shop drawing control system shall be maintained.

4.3.3
The Fabricator shall control the documentation required for procured and subcontracted items.

4.3.4
The Fabricator shall ensure that all required documentation is reviewed for adequacy prior to release.

4.3.5
The Fabricator shall define the retention period for documentation, including consideration for requirements of specific contracts and governing legislation.

4.4 Control of Quality Records

4.4.1

The Fabricator shall establish and maintain a system for the identification, collection, and storage of the records determined to demonstrate conformance to the requirements and effective operation of the Quality System. Required records shall include, but may not be limited to, the following:

(a) Contract drawings, specifications, and amendments,
(b) Mill test reports,
(c) Purchase orders,
(d) Applicable inspection and test records,
(e) Calibration records for measuring and inspection equipment,
(f) Shipping and receiving reports,
(g) Non-conformity, corrective action, and preventive action reports.

4.4.2

All records required by the contract specifications shall be available for review by the customer or his representative.

4.4.3

The Fabricator shall control the records required for procured and subcontracted items.

4.4.4

The fabricator shall define retention periods for records, including consideration for requirements of specific contracts and governing legislation.

5. MANAGEMENT RESPONSIBILITY

5.1 Management Commitment

Management is responsible for ensuring that:

(a) A documented statement is in place that describes the Fabricator's Quality Policy with respect to commitment and quality objectives,

(b) All employees are made fully aware of their authority and role in the Quality System as described in section 5.3.1,

(c) A Quality System that conforms to the requirements of this guideline is implemented,

(d) A senior level management representative is appointed to ensure that the requirements of the Quality System are maintained and reported,

(e) A quality system audit is carried out at a maximum interval of one year,

(f) The Quality System is reviewed at a senior management level at a maximum interval of one year, or more frequently, to ensure it's continuing suitability and effectiveness,

(g) Adequate resources are provided to carry out the Quality System including performance and verification of work.

5.2 Organization

5.2.1

The Fabricator shall define an organizational structure, which includes the following functions as applicable:

MANAGEMENT

QUALITY ASSURANCE

ENGINEERING

PRODUCTION

DRAFTING

PURCHASING

SALES / ESTIMATING

PROJECT MANAGEMENT

5.2.2

This chart represents a typical organizational structure. Departments may vary from company to company, and more than one function may be held by one person. Any of the functions noted may be subcontracted.

5.3 Responsibility and Authority

5.3.1

Each employee is responsible for the quality of his or her own work and carries an equally important share in the effectiveness of the quality assurance process.

5.3.1.1

All employees are responsible to ensure that the work performed by them conforms to a standard of workmanship required by the company in accordance with the applicable contract requirements.

5.3.2
Management is responsible for ensuring that responsibility and authority is defined for carrying out the following:

(a) ensuring that all product quality verifications are carried out on a continuous basis,

(b) dealing with non-conformities and ensuring that the specified dispositions are carried out on a continuing basis,

(c) communicating with the customer's appointed inspection representative(s),

(d) work is carried out in accordance with the applicable codes and standards;

(e) all welding is in accordance with the latest requirements of CSA Standards W47.1 and W59,

(f) non-conformities of a technical nature are dealt with in accordance with the applicable codes and standards,

(g) ensuring that all production personnel understand the contract requirements pertinent to their assignment,

(h) providing sufficient notice and making proper arrangements for required inspection,

(i) ensuring that all contract requirements, including revisions, are conveyed to the relevant departments and incorporated into the detail drawings and other fabrication data,

(j) purchasing all items in accordance with the contract requirements, including revisions, and for obtaining the required documentation.

6. RESOURCE MANAGEMENT

Except as stated in Section 6.1, the Fabricator shall identify the personnel and the corresponding level of education, training, skills, and experience required in order to ensure that work affecting product quality is carried out in the required manner.

6.1 Welding Personnel

Welders, welding operators, tack welders, welding supervisors, and welding engineers shall be qualified to the requirements of the latest issue of CSA standard W47.1.

7. PROCESS MANAGEMENT

7.1 QC Planning

The Fabricator shall determine the procedures, documentation, records and resources required to ensure that their product meets the customer requirements.

7.2 Contract Review

7.2.1

The Fabricator shall have a system in place to ensure that contract requirements are reviewed and incorporated into the work.

7.2.2

The Fabricator shall ensure that the necessary expertise, personnel, equipment, and plant resources are available to meet the contract requirements.

7.2.3

The Fabricator shall ensure that all additions and revisions to contract requirements are duly communicated to the necessary personnel, and incorporated into the work.

7.3 Purchasing

7.3.1

Purchase orders shall clearly describe the goods and services being ordered. The descriptions shall include the following information as applicable to the product being purchased:

(a) Quantity
(b) Unit of Measure
(c) Product Name
(d) Manufacturers Description
(e) Size and Length
(f) Material Specification
(g) Special Properties (e.g. Impact Category)
(h) Finish
(i) Inspection Instructions
(j) Special Packaging or Shipping Instructions
(k) Applicable standards
(l) Scope of work
(m) Attachments to the purchase order
(n) Tolerances

7.3.2

For subcontracted work, the Fabricator is responsible to ensure that the final product meets the customer requirements.

7.3.3

Specifications, drawings, process requirements, inspection instructions and other relevant technical data shall accompany the purchase order if applicable.

7.3.4

Purchase orders shall clearly specify the written documentation that shall be provided to verify conformance with purchase orders.

7.4 Receiving

7.4.1

Incoming materials shall be matched against receiving slips and purchase orders.

7.4.2

Nonconformities that are identified at the receiving stage shall be dealt with in accordance with Section 8.1, Control of Nonconformity.

7.4.3

Material shall not be used or processed until it has been inspected and approved for use.

7.5 Material Verification

7.5.1

The Fabricator shall be able to verify the material specification of all items in stock, and incorporated into the work.

7.5.2

Where individual pieces, lots, and batches are restocked, the identification system shall be maintained.

7.6 Control of Workmanship

7.6.1

All employees shall be made aware of their responsibilities under Section 5.3.1 of this Guideline as they apply to workmanship.

7.6.2

Workmanship and tolerances shall conform to the applicable clauses in the latest editions of CSA Standards S16, W59, and to the CISC Code of Standard Practice.

7.6.3
Fabricators performing welding shall be certified by the Canadian Welding Bureau in accordance with the requirements of CSA Standard W47.1.

7.6.4
The Fabricator shall ensure that manufacturing operations are carried out under controlled shop conditions. Controlled shop conditions shall include all conditions that affect product quality and the achievement of customer requirements.

7.6.5
All tools and equipment used shall be suitable to perform the work and shall be in proper working order.

7.7 Product Verification

The Fabricator shall verify conformance to the contract requirements.

7.7.1
The Fabricator shall define inspection points and inspection record requirements to verify conformance to the contract requirements, including the following:

(a) Examination of material for size, conformance to dimensional tolerances, and surface condition or defects,

(b) Examination of assemblies for overall dimensions, and location and orientation of holes and detail components,

(c) Verification that welding is carried out in accordance with the company's welding standards. This includes visual examination of completed weldments,

(d) Examination of surface preparation and finish.

7.7.2
Any additional inspection requirements noted in the contract documents shall be identified and implemented.

7.7.3
The Fabricator shall provide access to and cooperation with the Customers' designated representative for inspection of the work as required. Unless specific provisions are included in the contract documents, such inspections shall be scheduled so as not to impede the progress of production.

7.7.4
The Fabricator shall ensure that all verification has been performed in conformance with contract requirements and this Guideline.

7.7.5
All test records specified above are maintained in accordance with Section 4.4.

7.8 Customer Supplied Products

7.8.1
Upon receipt, the Fabricator shall examine all items for compliance with the customer-supplied documentation and to detect nonconformities.

7.8.2
The Fabricator shall promptly report to the customer, any item found to be damaged, incomplete, or otherwise unsuitable.

7.8.3
Unless otherwise specified, it is the responsibility of the customer to ensure that items supplied by the customer conform to the contract requirements.

7.9 Storage, Loading, and Shipping

7.9.1
The Fabricator shall maintain procedures to ensure that all items are properly prepared, handled, and/or packaged for storage and shipping to prevent damage to product.

7.9.2
The Fabricator shall ensure that items loaded correspond to the shipping bill.

7.9.3
The Fabricator shall maintain records of all items that have been shipped.

7.10 Control of Measuring and Inspection Equipment

7.10.1
The Fabricator shall maintain procedures to define the frequency and methods of checking, testing, and/or calibration of measuring and inspection equipment.

7.10.2
The Fabricator shall ensure that the equipment is suitable for the work and capable of measuring within the required tolerances.

7.10.3
The Fabricator shall ensure that new equipment, stored equipment, and repaired equipment are checked before use.

7.10.4
The Fabricator shall ensure that calibration status is controlled by physical marking, or other means.

7.10.5
The Fabricator shall ensure that calibration records for measuring and inspection equipment are maintained.

8. MEASUREMENT, ANALYSIS, AND IMPROVEMENT

8.1 Control of Nonconformity

8.1.1

The Fabricator shall establish a procedure to deal with nonconformities in order to ensure that only products that meet the contract requirements are released.

8.1.2

The Fabricator shall define the:

(a) Authority for disposition of nonconformities;
(b) Need for nonconformity reporting;
(c) Method of identifying nonconformities to prevent unintended use.

8.1.3

The Fabricator shall ensure that all nonconformities are dispositioned in one of the followings ways:

(a) In consultation with the customer, the item may be judged to be acceptable for its intended use 'as is'.

(b) The item may be reworked or repaired by an acceptable procedure that conforms to the contract requirements. In this instance, items must be re-inspected prior to release.

(c) The item may be rejected and/or returned to stock for re-use as allowable, or to the subcontractor/supplier as applicable.

(d) The item may be scrapped.

8.1.4

Records of the results and disposition of nonconformities shall be maintained in accordance with the requirements of Section 4.4.

8.2 Corrective Action

8.2.1

The Fabricator shall maintain a system for implementation of corrective action. Procedures for corrective action shall include directives for investigation of the cause, recommendations to prevent recurrence, and follow up.

8.2.2

The Fabricator shall determine the level of corrective actions required considering the magnitude of the problems and the associated risks.

8.3 Preventive Action

8.3.1

The Fabricator shall maintain a system for implementation of preventive action, and establish a procedure to deal with preventive action initiatives.

8.3.2

The Fabricator shall determine the level of preventive action required considering the magnitude of the problems and the associated risks.

8.4 Analysis of Data

8.4.1

In accordance with Section 7.7, the fabricator shall define inspection points and inspection record requirements to verify conformance to the contract requirements.

8.4.2

The Fabricator shall define critical inspection points and collect and analyze relevant data pertaining to those critical inspection points employing suitable and defined statistical techniques. This will be completed at suitable defined intervals.

8.4.3
The Fabricator shall establish improvement objectives, where necessary, in accordance with the analyzed data and other defined sources of data. Other sources of data may include, but are not limited to Nonconformance Reports, Corrective Actions at a minimum.