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# CRSI Standard for
# Standard Practice for Stainless Steel Reinforcing Bar Fabrication Facilities

***This Standard does not purport to address all the safety concerns, if any, associated with its use. It is the responsibility of the user of this Standard to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.***

## 1. Introduction

1.1. This standard describes standard practice for fabrication quality processes for stainless steel reinforcing bars.

## 2. Referenced Documents

2.1. *CRSI Manual of Standard Practice*

2.2. ASTM A955/A955M Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement

## 3. Definitions

3.1. FQI – Fabrication Quality Inspector

3.1.1. Personnel responsible for fabrication quality activities and documentation

3.2. FQM – Fabrication Quality Manual

3.3. PQS – Plant Quality Statement

3.3.1. A statement from a Company Senior Executive that outlines the plant's commitment to Quality

3.4. Production Shift - Consecutive run time, not to exceed 12 hours.

3.5. QM – Quality Manager

3.5.1. A manager responsible for all issues relating to quality within a plant

## 4. Fabrication Quality Manual (FQM) - All Plants shall develop and maintain a FQM and it shall:

4.1. Include a PQS from a Senior Company Executive that outlines the plant's commitment to quality.

4.2. Provide the Facility Name, street address and telephone number and the name of the contact person at the facility.

4.3. Provide an organization chart and a description of the duties and responsibilities assigned to key personnel in the quality program.

4.4. Describe the authority of the QM and FQI.

4.5. Include the signature of an authorized representative of the manufacturing organization

4.6. Outline procedures for allowing access to the FQM for all personnel involved in fabrication.

4.7. Describe the methods for assurance and documentation of the presence of the QM or the FQI during fabrication.

4.8. Describe requirements for annual updating.

4.9. Identify the measuring and testing equipment and procedures used to determine that the product and materials meet minimum requirements per specifications.

4.10. Identify the frequency and methods of measuring and testing equipment calibration and requirements for record keeping.
4.11. Define requirements for documentation, observation, and testing as part of a quality program as required in Sections 6 through 11 including:
  4.11.1. Documentation of FQI inspections.
  4.11.2. Minimum acceptable levels to ensure products comply with the purchaser's specifications.
  4.11.3. Corrective action procedures as necessary.
4.12. Any changes made to the FQM shall be highlighted or underlined and tracked by revision date.

**5. Training** – The FQM shall include key elements of a personnel training program, including as a minimum:
5.1. Training provided to the FQI and other plant personnel, with topics to include stainless inspection criteria fabrication and material handling.
5.2. Frequency of training, by job description, of all individuals within the plant.
5.3. QM evaluation of the FQI in the plant.
5.4. A description of the requirements for the QM (or designated representative) led meetings to review and evaluate the quality techniques of all the FQI once every six months and to assess compliance with the FQM.
5.5. Requirements for minutes of QM/FQI review and evaluation meetings.
5.6. Attendance Forms signed by the FQI.

**6. Stainless Inspection Criteria**
6.1. Stainless steel reinforcing bars shall be considered suspect if:
  6.1.1. Any area of carbon contamination exceeds 4 inches [100 mm] in maximum dimension.
  6.1.2. Two or more areas of carbon contamination exceeding 1 inch [25 mm] in maximum dimension in 40 feet [12 m] at the time of receipt inspection or in the fabricated piece after fabrication.
  6.1.3. Ten or more areas of carbon contamination exceeding ¼ inch [6 mm] in maximum dimension in 3 feet [1 m] of bar.
6.2. Suspect stainless steel reinforcing bars shall be quarantined by physically separating them from stainless steel reinforcing bars to be fabricated.
6.3. Investigation of suspect stainless steel reinforcing bars shall be conducted as follows:
  6.3.1. Cleaning of the carbon contamination shall be attempted with soap, water and a thorough rinse or austenitic wire brush as required. The FQI and other authorized personnel under their supervision shall know which materials can be used to repair damaged or contaminated stainless steel reinforcing bars.
    6.3.1.1. If the areas of carbon contamination are removed, the stainless steel reinforcing bars shall be accepted.
    6.3.1.2. If the stainless steel reinforcing bars are still suspect, they shall be rejected.
6.4. All investigation efforts shall be documented as applicable, including the date and time of inspection, the name and signature of the FQI making the inspection, the date of mill notification, and acceptance or disposition of the stainless steel reinforcing bars.
6.5. Inspection of stainless steel reinforcing bars for carbon contamination shall be made throughout the fabrication process at least once per production shift, at, the time of receipt, prior to fabrication, after fabrication, and prior to shipment.
6.6. The FQI shall document time and results of the examination.

**7. Receipt of Material**

7.1. Stainless steel reinforcing bars shall be identified with the size and grade of bar, mill manufacturer, date received, and heat number throughout the fabrication process. Inspection shall be made once per production shift.

7.2. All stainless steel reinforcing bars received shall be examined by FQI for carbon contamination, discoloration, and physical irregularities. This examination shall consist of the exterior of the bundle or coil as received.

7.2.1. All abnormalities shall be brought to the immediate attention of the QM.

7.3. The FQI shall document time and results of the examination.

**8. Handling and Storage**

8.1. Stainless steel reinforcing bars shall be handled and stored in a manner that minimizes the likelihood of damage caused from airborne carbon contamination.

8.2. All methods of handling fabricated stainless steel reinforcing bars shall be employed to insure that no carbon contamination is made with the stainless steel reinforcement.

8.3. Stainless steel reinforcing bars shall be lifted with specifically dedicated nylon strapping of sufficient strength. These nylon straps shall not to be used for handling any other materials.

8.4. Fork trucks used in the direct handling of coil or straight stainless steel reinforcing bundles shall have their forks covered with stainless steel or other non-carbon steel material.

8.5. Stainless steel reinforcing shall be tied with plastic strapping or an appropriate gauge of stainless steel tie wire within the weight limitations set forth in the current edition of *CRSI's Manual of Standard Practice*. Under no circumstances shall carbon steel strapping or carbon steel tie wire be used for bundling or tagging.

8.6. All racking for the purpose of storage of straight bars shall have any members that come in contact with the stainless steel protected and/or covered with wood, stainless steel, or a composite (plastic) material.

8.7. Stainless steel reinforcing bars shall not be stored directly on the ground. They shall either be kept elevated and stored on non-carbon steel dunnage or if stored on grade, shall have durable clean material between the stainless material and grade.

8.8. To meet the requirements of this standard, a facility for fabricating stainless steel reinforcing bars shall be either exclusive to the fabrication of stainless steel reinforcing bars or in a facility that provides a permanent fixed physical or engineered barrier that isolates the process from airborne carbon steel contamination.

8.9. Material that develops apparent suspect contamination at the fabrication facility shall be brought to the attention of the QM.

8.10. The FQI shall document time and results of the examination.

**9. Outdoor Storage**

9.1. If stainless steel reinforcing bars are stored outside they are not subject to potential airborne ferrous contamination.

9.2. Stainless steel reinforcing bars shall not be stored directly on the ground when stored outside. They shall be kept either elevated or stored on non-carbon steel dunnage or have some type of durable clean material between it and grade.

9.3. Inspection shall be made once per production shift.

9.4. The FQI shall document time and results of the examination.

**10. Bending & Shear Fabrication**

10.1. Sheared lengths of stainless steel reinforcing bars shall be checked to be within length tolerances set forth by the current edition of *CRSI's Manual of Standard Practice*. Inspection shall be performed at each change of coil, bundle, bar size, or fabricated dimension.

10.2. Dimensions of bent stainless steel reinforcing bars shall be checked for their specified dimensions and for tolerances set forth by the current edition of *CRSI's Manual of Standard Practice.* Inspection shall be performed at each change of coil or bar size.

10.3. Coiled bar deformation height shall be checked for ASTM A955/A955M conformity with a depth micrometer. Inspection shall be performed at the beginning of a coil, the middle of a coil during fabrication, at the end of the coil, or the last fabricated piece of that coil or production run. Measurements shall be recorded and maintained according to the mill manufacturer, coil number, heat number, and project designation. Deformations not complying with minimum ASTM A955/A955M specifications shall be brought to the immediate attention of the QM.

10.4. All fabrication equipment used in fabricating stainless steel reinforcing bars shall be dedicated machinery specifically to fabricate stainless steel reinforcing bars, and machinery shall insure that all pressure points, pinch points or friction points in contact with stainless steel reinforcement during fabrication is made from either carbon steel hardened to a minimum of 35 Rockwell C, stainless steel material, or composite (plastic) material.

10.5. Material deemed by an FQI to be out of tolerance after fabrication shall be either altered into correct tolerance or be identified with a "reject" tag and quarantined for disposition.

10.6. The FQI shall document time and results of the examination.

**11. Shipping**

11.1. Fabricated stainless steel reinforcing bars shall be tarped for shipping with a previously unused tarp or tarps that have not been exposed to carbon steel and are dedicated for the use of tarping stainless steel only. Alternatively, the bars shall be first covered with clean polyethylene sheeting to protect from contamination from the tarp.

11.2. Plastic shrink or stretch wrap shall be permitted to be used to cover individual bundles of fabricated stainless steel reinforcing bars, unless requested otherwise by the customer.

11.3. All bundles of fabricated stainless steel reinforcing bars shall have tags outlining recommended handling and storage at the jobsite.

11.4. The FQI shall document time and results of the examination.

**12. External Audits**

12.1. All documentation relating to external audits shall be retained in the plant's files.

12.2. Action taken related to conformance shall be documented and changes made to the PQM if required to maintain continuous conformance.

**13. Customer Complaints**

13.1. The QM or designated person shall address customer complaints and determine root causes.

13.2. Changes in procedures and/or training shall be documented in the PQM.

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