



AMERICAN NATIONAL STANDARDS INSTITUTE/ STEEL DECK INSTITUTE

QA/QC - 2011 Standard for

Quality Control and Quality Assurance for Installation of Steel Deck



1. General

1.1 Scope:

- A. This Standard for Quality Control and Quality Assurance for Installation of Steel Deck, hereafter referred to as the Standard, shall govern the minimum requirements for quality control and quality assurance for material control and installation of cold formed steel deck and deck accessories used for floor and roof applications in buildings and other structures, where other structures are defined as structures designed, fabricated, and erected in a manner similar to buildings, with building-like vertical and lateral load resisting-elements.

User Note: This Standard does not apply to the manufacture of steel deck or accessories by the deck manufacturer, other than material control, nor to manufacture of mechanical fasteners or welding consumables. This Standard does not address quality control or quality assurance for concrete, concrete reinforcing steel, welded wire reinforcing, discontinuous fiber reinforcement for concrete, steel anchors, or placement of concrete.

User Note: Quality Control/Quality Assurance provisions for structural steel and steel anchors are found in Section N of AISC 360 and Section J of AISC 341.

- B. The Appendices shall be part of the Standard.
C. The User Notes and Commentary shall not be part of the Standard.

User Note: User Notes and Commentary are intended to provide practical guidance in the use and application of this Standard.

- D. Quality Control (QC) as specified in this Standard shall be provided by the installer. Quality Assurance (QA) as specified in this Standard shall be provided by others when required by the Authority Having Jurisdiction, the applicable building code, Owner, or Designer.

1.2 Definitions

- A. Authority Having Jurisdiction (AHJ): Organization, political subdivision, office or individual charged with the responsibility of administering and enforcing the provisions of the applicable building code.
B. Designer: The licensed professional responsible for the content of the drawings and specifications from which the steel deck is to be constructed.

User Note: The Designer is usually the structural engineer-of-record, however it may be the architect or other licensed professional acting within the scope of their license.

- C. Construction Documents: Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit, which have been approved in accordance with the requirements of the applicable building code.
- D. Design Documents: The design drawings and the specifications.
- E. Design Drawings. Graphic and pictorial documents prepared by the Designer, showing the design, location and dimensions of the steel deck and accessories. These documents generally include plans, sections, details, schedules, diagrams and notes.
- F. Installation Drawings: Field-installation drawings that are prepared to show the deck finish, size and type, and location and attachment of the deck and accessories.
- G. Inspect: When used in conjunction with quality control and quality assurance, it shall mean the systematic examination and review of the work for compliance with the appropriate documents, with appropriate subsequent documentation.
- H. Owner's Designated Representative for Construction: The owner or the entity that is responsible to the owner for the overall construction of the project, including its planning, quality, and completion.

User Note: The Owner's Designated Representative for Construction is usually the general contractor, the construction manager or similar authority at the job site.

- I. Quality Assurance (QA): Inspection as herein required of the materials, installation, fabrication, erection or placement of components and connections, performed by an agency, individual or firm other than the installer, requiring special expertise to confirm compliance with construction documents and referenced standards.
- J. Quality Assurance Inspector (QAI): Individual or agency designated to provide quality assurance inspection for the work being performed.
- K. Quality Control (QC): Controls and inspections implemented by the installer to confirm that the material provided and work performed meet the requirements of the construction documents, installation drawings, shop drawings, design documents and referenced standards.
- L. Quality Control Inspector (QCI). Individual or agency designated to perform quality control inspection tasks for the work being performed.
- M. Quality Control Program (QCP). A written practice describing the material controls and inspection procedures used by the installer to confirm conformance with the construction documents and referenced standards.
- N. Shop Drawings: Drawings, diagrams, or schedules depicting the steel deck and accessories produced for the specific project.
- O. Specifications: Written documents prepared by the Designer, containing the requirements for materials, standards and workmanship from which the steel deck is to be constructed.

- P. Terms not defined in this standard, AISI S100 or AISI/AISC shall have the ordinary accepted meaning for the context for which they are intended.

1.3 Reference Codes, Standards, and Documents:

- A. Codes and Standards: The following documents or portions thereof are referenced in this standard.
1. American Iron and Steel Institute (AISI)
 - a. AISI S100-07, North American Specification for the Design of Cold-Formed Steel Structural Members, with Supplement 2, dated 2010.
 - b. AISI/AISC, Standard Definitions for Use in the Design of Steel Structures, 2007 edition.
 2. American Welding Society (AWS)
 - a. AWS B5.1:2003, Specification for the Qualification of Welding Inspectors
 - b. AWS D1.1:2010, Structural Welding Code-Steel
 - c. AWS D1.3:2008, Structural Welding Code-Sheet Steel
 3. Steel Deck Institute (SDI)
 - a. SDI C-2011, Standard for Composite Steel Floor Deck-Slabs
 - b. SDI NC-2010, Standard for Noncomposite Steel Floor Deck
 - c. SDI RD-2010, Standard for Steel Roof Deck

User Note: The following standards and documents are referenced within the user notes:

1. American Institute of Steel Construction (AISC)
 - a. AISC 341-10, Seismic Provisions for Structural Steel Buildings
 - b. AISC 360-10, Specification for Structural Steel Buildings
2. American Iron and Steel Institute (AISI)
 - a. AISI S100-07, North American Specification for the Design of Cold-Formed Steel Structural Members, with Supplement 2, dated 2010.
3. American Welding Society (AWS)
 - a. AWS D1.1:2010, Structural Welding Code-Steel
4. Steel Deck Institute (SDI)
 - a. SDI-MOC, Manual of Construction with Steel Deck, 2nd Edition

2. Required Submittals

- 2.1** The following documents shall be submitted to the Designer and Owner's Designated Representative for Construction for approval prior to the installation of the steel deck:
- A. Installation drawings showing deck layout and all accessories, including installation details.
 - B. Catalogue data or independent evaluation reports on deck(s), including profile, thickness, physical properties and finish.

User Note: Deck profile, thickness, physical properties, and finish may be shown on the installation drawings instead of on submitted catalogue sheets.

- 2.2.** The following documents, as applicable, shall be made available in electronic or printed form to the Designer and the Owner's Designated Representative for Construction for review prior to installation of the steel deck, unless otherwise required by the Designer to be submitted.
- A. Manufacturer's installation instructions and product data sheets, catalogue data, or independent evaluation reports for mechanical fasteners.
 - B. Manufacturer's product data for welding consumables.
 - C. Manufacturer's product data sheets or catalog data for welding filler metals and fluxes to be used. The data sheets shall describe the product, limitations of use, recommended or typical welding parameters, and storage and exposure requirements, including baking, if applicable.
 - D. Mill certification of sheet steel used for deck.
 - E. Welding procedure specifications (WPS).
 - F. Procedure qualification records (PQR) for WPS that are not prequalified in accordance with AWS D1.1 or AWS D1.3, as applicable.
 - G. Welding personnel performance qualification records (WPQR)
 - H. Installer's written quality control program (QCP).
 - I. Installer's QC Inspector qualifications.

User Note: Documents related to mechanical fasteners are required only when mechanical fasteners are being installed. Documents related to welding are required only when welding of steel deck is being performed. At the time of initial submittals, the specific steel coil to be used is not known, therefore the mill certification should not be expected to be made available until after delivery of the deck to the job site. While it is possible to track a coil to a specific deck bundle, once bundles are broken, it is usually not possible to track a coil to a specific deck sheet with absolute certainty. Specific welders may not be known until deck installation begins, therefore WPQR's may not be made available until immediately before deck installation begins.

3. Inspection and Testing Personnel

3.1 Quality Control Inspector Qualifications

- A. Quality Control (QC) welding inspection personnel shall be qualified to the satisfaction of the installer's QCP, as applicable, and in accordance with one of the following:
 - 1. Associate Welding Inspector (AWI) or higher as defined in AWS B5.1; or
 - 2. Qualified by training or experience, or both, in deck installation, inspection, or testing and competent to perform inspection of the work.

User Note: Qualification by training or experience is permitted by AWS D1.1, Section 6.1.4.1(3)

- B. Quality Control (QC) mechanical fastener inspection personnel shall be qualified to the satisfaction of the installer's QCP on the basis of training and experience in installation of like or similar fasteners and shall be competent to perform inspection of the work.

3.2 Quality Assurance Inspector Qualifications

- A. The Quality Assurance Inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the AHJ and satisfy the Quality Assurance Inspector Qualifications contained in Section 3.2.B and 3.2.C.
- B. Quality Assurance (QA) welding inspection personnel shall be qualified in accordance with the quality assurance agency's written practice and with either of the following:
 1. Welding Inspector (WI) or higher as defined in AWS B5.1, except Associate Welding Inspectors (AWI) shall be permitted to be used under the direct supervision of WI's or higher who are on the premises and available when weld inspection is being conducted; or
 2. Qualified by training or experience, or both, in deck installation, inspection, or testing and competent to perform inspection of the work.

User Note: Qualification by training or experience is permitted by AWS D1.1, Section 6.1.4.1(3)

- C. Quality Assurance (QA) mechanical fastener inspection personnel shall be qualified in accordance with the quality assurance agency's written practice on the basis of training and experience in inspection of like or similar fasteners and shall be competent to perform inspection of the work.

4. Requirements for Inspection of Steel Deck Installation

4.1 Quality Control

- A. Quality control tasks shall be performed by the installer's Quality Control Inspector (QCI).
- B. For quality control inspection, the construction documents, installation drawings, shop drawings, design documents and the applicable referenced standards shall be utilized.

User Note: QC documentation is an internal record for the installer to record that the work has been performed and that the work is in accordance with the construction documents. Depending upon the installer's QCP, the method of documentation may vary.

4.2 Quality Assurance

- A. Quality assurance inspection of the deck shall be made at the project site. The Owner's Designated Representative for Construction shall schedule this work with the QAI and the installer to minimize interruptions to the work of the installer.
- B. The QAI shall review the materials test reports and certifications listed in Section 2.2 for compliance with the construction documents.

- C. Quality assurance tasks shall be performed by the QAI.
- D. Concurrent with the submittal of reports to the AHJ, Designer or Owner, the QAI shall submit to the Owner's Designated Representative for Construction and the installer lists of nonconforming items.

4.3 Where a task is to be performed by both QA and QC, it shall be permitted to coordinate inspection functions between the QCI and QAI so that the inspections are performed by only one party when approved in advance by the Owner, Designer, and AHJ. When QA tasks are performed only by the QCI, each inspection is to be documented in a report and the QAI shall periodically review the work of the QCI at an interval acceptable to the Owner, Designer, and the AHJ.

4.4 In the event that the requirements of the construction documents conflict with the installation drawings or shop drawings, the requirements of the construction documents shall govern.

User Note: It is not normally accepted practice for the Designer to change the requirements of the construction documents through the shop drawings or installation drawings without modifying the construction documents through a method acceptable to the AHJ.

5. Installer's Quality Control Program

5.1 The installer shall produce and maintain quality control procedures and perform inspection to confirm that their work is performed in accordance with this Standard, construction documents, installation drawings, shop drawings, design documents and the applicable referenced standards. All material control and installation procedures shall be monitored by the installer's Quality Control Inspector (QCI).

5.2 The installer's QCI shall inspect the following, as applicable:

- A. Field welding of deck in accordance with AWS D1.3, SDI C, SDI NC, and SDI RD.
- B. Installation of mechanical fasteners in accordance with SDI C, SDI NC, SDI RD, and manufacturer's instructions.
- C. Steel deck installation in accordance with the construction documents, installation drawings, shop drawings, design documents and applicable referenced standards.
- D. Scope of inspections shall comply with Appendix 1 and the requirements of the AHJ.

User Note: SDI-MOC is a useful guide to appropriate deck placement and installation practice.

6. Quality Assurance Tasks

6.1 The QAI shall perform the following verifications and inspections, as applicable. Acceptance shall be based on conformance with the construction documents.

- A. Verify deck materials are represented by appropriate mill certifications.
- B. Field welding of deck in accordance with AWS D1.3, SDI C, SDI NC, and SDI RD

- C. Installation of mechanical fasteners in accordance with SDI C, SDI NC, SDI RD, and manufacturer's instructions.
- D. Steel deck installation in accordance with the construction documents, installation drawings, shop drawings, design documents and applicable referenced standards.
- E. Scope of inspections shall comply with Appendix 1 and the requirements of the AHJ.

User Note: SDI-MOC is a useful guide to appropriate deck placement and installation practice.

7. Nonconforming material and workmanship:

- 7.1** Identification and rejection of materials and workmanship not in conformance with the construction documents shall be permitted at any time during progress of or following the completion of the work. However, this provision shall not relieve the Owner or the inspector of the obligation for timely, in-sequence inspections. Nonconforming material and workmanship shall be brought to the immediate attention of the Owner's Designated Representative for Construction and the deck installer. Nonconforming material or workmanship shall be brought into conformance, or made suitable for its intended purpose as determined by the Designer.

Appendix 1. Tables of Inspection or Execution Tasks

“Observe” shall mean to inspect these items on an intermittent basis. Operations need not be delayed pending these inspections. Frequency of observations shall be adequate to confirm that the work has been performed in accordance with the applicable documents. In the event that observations determine that the materials and/or workmanship are not in conformance with the applicable documents, additional inspections shall be performed to determine the extent of non-conformance.

“Perform” shall mean to perform these tasks prior to final acceptance for each item or element.

Within the listed tasks, “Document” shall mean the inspector shall prepare reports or other appropriate written documentation indicating that the work has or has not been performed in accordance with the construction documents.

User Note: The scope of inspections contained in Appendix 1 is considered to be adequate for most installations. At the option of the Designer or AHJ, the scope of inspections may be increased for specific structures or conditions.

Table 1.1. Inspection or Execution Tasks Prior to Deck Placement

	Task	QC	QA
A	Verify compliance of materials (deck and all deck accessories) with construction documents, including profiles, material properties, and base metal thickness	Perform	Perform
B	Document acceptance or rejection of deck and deck accessories	Perform	Perform

Table 1.2. Inspection or Execution Tasks After Deck Placement

	Task	QC	QA
A	Verify compliance of deck and all deck accessories installation with construction documents	Perform	Perform
B	Verify deck materials are represented by the mill certifications that comply with the construction documents	N/A	Perform
C	Document acceptance or rejection of installation of deck and deck accessories	Perform	Perform

Table 1.3. Inspection or Execution Tasks Prior to Welding

	Task	QC	QA
A	Welding procedure specifications (WPS) available	Observe	Observe
B	Manufacturer certifications for welding consumables available	Observe	Observe
C	Material identification (type/grade)	Observe	Observe
D	Check welding equipment	Observe	Observe

Table 1.4. Inspection or Execution Tasks During Welding

	Task	QC	QA
A	Use of qualified welders	Observe	Observe
B	Control and handling of welding consumables	Observe	Observe
C	Environmental conditions (wind speed, moisture, temperature)	Observe	Observe
D	WPS followed	Observe	Observe

Table 1.5. Inspection or Execution Tasks After Welding

	Task	QC	QA
A	Verify size and location of welds, including support, sidelap, and perimeter welds.	Perform	Perform
B	Welds meet visual acceptance criteria	Perform	Perform
C	Verify repair activities	Perform	Perform
D	Document acceptance or rejection of welds	Perform	Perform

Table 1.6. Inspection or Execution Tasks Prior to Mechanical Fastening

	Task	QC	QA
A	Manufacturer installation instructions available for mechanical fasteners	Observe	Observe
B	Proper tools available for fastener installation	Observe	Observe
C	Proper storage for mechanical fasteners	Observe	Observe

Table 1.7. Inspection or Execution Tasks During Mechanical Fastening

	Task	QC	QA
A	Fasteners are positioned as required	Observe	Observe
B	Fasteners are installed in accordance with manufacturer's instructions	Observe	Observe

Table 1.8. Inspection or Execution Tasks After Mechanical Fastening

	Task	QC	QA
A	Check spacing, type, and installation of support fasteners	Perform	Perform
B	Check spacing, type, and installation of sidelap fasteners	Perform	Perform
C	Check spacing, type, and installation of perimeter fasteners	Perform	Perform
D	Verify repair activities	Perform	Perform
E	Document acceptance or rejection of mechanical fasteners	Perform	Perform

Commentary

Field Determination of Base Metal Thickness

The following information is provided to assist field inspectors in checking base metal thickness:

1. Allowable minimum base metal thickness is 95% of the design thickness, per AISI S-100, Section A2.4. Lesser thicknesses are permitted at bends and corners. Design thickness is as specified by the manufacturer.
2. Primer paint thickness is usually on the order of 0.30 to 0.40 mils per side (0.0003 to 0.0004 inches)
3. Galvanizing thicknesses (measured as the total of both sides of the sheet) are typically as follows:
 - G40 0.50 mils (0.0005 inches)
 - G60 0.90 mils (0.0009 inches)
 - G90 1.40 mils (0.0014 inches)

Use of this Standard for Purposes of Other Than Special Inspection

This Standard has been prepared specifically for providing requirements for Special Inspections as required by Chapter 17 of the International Building Code or other governing building code. However, this Standard may also be used for setting forth requirements for quality control and quality assurance for cases where Special Inspections are not required by the Code. In this instance, if a Designer wishes to incorporate this standard into project specifications as a contractual requirement, the following modifications to this specification are recommended.

Table C-1. Modifications to SDI QA/QC-2011

Section 2.2.D:	Delete this section.
Section 3.2.A:	Change “AHJ” to “Designer”
Section 4.2.D:	Delete reference to “AHJ”
Section 4.3:	Delete references to “AHJ”
Section 5.2.D:	Delete “and the requirements of the AHJ.”
Section 6.1.A:	Delete this section.
Section 6.1.E:	Delete “and the requirements of the AHJ.”
Appendix 1:	Delete task 1.2.B

A Designer may incorporate this Standard into the project specifications in a manner similar to the following:

“Quality Control and Quality Assurance for steel deck installation shall be in accordance with SDI QA/QC-2011, “Standard for Quality Control and Quality Assurance for the Installation of Steel Deck”, as modified by Table C-1 contained in the Commentary to that Standard.”

Alternately, the Designer may list any applicable changes to this Standard individually within the project specification.