Code of Standard Practice
For Structural Stainless Steel Buildings

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Prepared by the American Institute of Steel Construction
under the direction of the AISC Committee
on Structural Stainless Steel

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PREFACE

As in any industry, trade practices have developed among those that are involved in the design, purchase, fabrication and erection of structural stainless steel. This Code provides a useful framework for a common understanding of the acceptable standards when contracting for structural stainless steel. As such, it is useful for owners, architects, engineers, general contractors, construction managers, fabricators, steel detailers, erectors and others associated with construction in structural stainless steel. Unless specific provisions to the contrary are contained in the contract documents, the existing trade practices contained herein are considered to be the standard custom and usage of the industry and are thereby incorporated into the relationships between the parties to a contract.

It is important to note the differences in design requirements between carbon or alloy steel and stainless steel when used as structural components in buildings. ANSI/AISC 360, 341, and 303 establish the design requirements for buildings and building-like structures in carbon or alloy steel, and AISC 370 and 313 set complementary commercial and technical requirements for structural stainless steel.

The Symbols and Glossary are an integral part of this Code. In many sections of this Code, a nonmandatory Commentary has been prepared to provide background and further explanation for the corresponding Code provisions. The user is encouraged to consult it.

This Code is written – and intended to be utilized in practice – as a unified document. Contract documents may supersede individual provisions of the Code as provided in Section 1.1, except when doing so would violate a requirement of the applicable building code.

This code has been developed to recognize the differences between structural stainless steel and structural steel. Unless otherwise noted, all references herein to “structural steel” shall also apply to structural stainless steel.

• The language throughout the entire Code has been generalized to address contracts that utilize drawings, models, or drawings and models in combination.
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GLOSSARY

The following abbreviations and terms are used in this Code. Where used, terms are italicized to alert the user that the term is defined in this Glossary.

AASHTO. American Association of State Highway and Transportation Officials.

Adjustable items. See Section 7.13.1.3.

AESSS. See architecturally exposed structural stainless steel.

AISC. American Institute of Steel Construction.

Allowance. A monetary amount included in a contract as a placeholder for work that is anticipated but not defined at the time the contract is executed.

Alloy steel. A steel, other than a stainless steel, that conforms to a specification that requires one or more of the following elements, by mass percent, to have a minimum content equal to or greater than: 0.30 for aluminum; 0.0008 for boron; 0.30 for chromium; 0.30 for cobalt; 0.40 for copper; 0.40 for lead; 1.65 for manganese; 0.08 for molybdenum; 0.30 for nickel; 0.06 for niobium (columbium); 0.60 for silicon; 0.05 for titanium; 0.30 for tungsten (wolfram); 0.10 for vanadium; 0.05 for zirconium; or 0.10 for any other alloying element, except sulphur, phosphorus, carbon, and nitrogen.

Anchor rod. A mechanical device that is either cast or drilled and chemically adhered, grouted or wedged into concrete and/or masonry for the purpose of the subsequent attachment of structural stainless steel.

ANSI. American National Standards Institute.

Approval documents. The structural stainless steel shop drawings, erection drawings, embedment drawings, and the fabrication and erection models. A combination of drawings and digital models also may be provided.

Architect. The entity that is professionally qualified and duly licensed to perform architectural services.

Architecturally exposed structural stainless steel. See Section 10.

ASME. American Society of Mechanical Engineers.

Bearing devices. Shop plates, loose base and bearing plates, and leveling devices, such as leveling plates, leveling nuts and washers, and leveling screws.

Bimetallic Interface. Any location where structural stainless steel has a direct electrical contact to a dissimilar metal.

Carbon steel. A steel that conforms to a specification that requires, by heat analysis in mass, a maximum of 2% carbon, 1.65% manganese, 0.60% silicon and 0.60% copper in addition to much smaller amounts of other elements.

CASE. Council of American Structural Engineers.

Clarification. An interpretation, of the design documents or specifications that have been released for construction, made in response to an RFI or a note on an approval document and providing an explanation that neither revises the information that has been released for construction nor alters the cost or schedule of performance of the work.

The Code, This Code. This document, the AISC Code of Standard Practice for Structural Stainless Steel Buildings as adopted by the American Institute of Steel Construction.

Column line. The grid line of column centers set in the field based on the dimensions shown on the structural design documents and using the building layout provided by the owner’s designated representative for construction. Column offsets are taken from the column line. The column line may be straight or curved as shown in the structural design documents.

Connection. An assembly of one or more joints that is used to transmit forces between two or more members and/or connection elements.

Contract documents. The documents that define the responsibilities of the parties that are involved in bidding, fabricating and erecting structural stainless steel. These documents normally include the design documents, the specifications and the contract.

Design documents. The design drawings or the design model. A combination of drawings and digital models also may be provided.

Design drawings. The graphic and pictorial portions of the contract documents showing the design, location and dimensions of the work. These documents generally include, but are not necessarily limited to, plans, elevations, sections, details, schedules, diagrams and notes.
Design model. A 3D digital model of the structure that conveys the structural stainless steel requirements given in Section 3.1 for the building.

Detailer. See steel detailer.

Embedment drawings. Drawings that show the location and placement of items that are installed to receive structural stainless steel.

EOR, engineer, engineer of record. See structural engineer of record.

Erection bracing drawings. Drawings that are prepared by the erector to illustrate the sequence of erection, any requirements for temporary supports and the requirements for raising, bolting and/or welding. These drawings are in addition to the erection drawings.

Erection documents. The erection drawings or the erection model. A combination of drawings and digital models also may be provided.

Erection drawings. Field-installation or member-placement drawings that are prepared by the fabricator to show the location and attachment of the individual structural stainless steel shipping pieces.

Erection model. A 3D digital model produced to convey the information necessary to erect the structural stainless steel. This may be the same digital model as the fabrication model, but it is not required to be.

Erector. The entity that is responsible for the erection of the structural stainless steel.

Established column line. The actual field line that is most representative of the erected column centers along a line of columns placed using the dimensions shown in the structural design drawings or design model and the lines and benchmarks established by the owner’s designated representative for construction, to be used in applying the erection tolerances given in this Code for column shipping pieces.

Fabrication documents. The shop drawings or the fabrication model. A combination of drawings and digital models also may be provided.

Fabrication model. A dimensionally accurate 3D digital model produced to convey the information necessary to fabricate the structural stainless steel. This may be the same digital model as the erection model, but it is not required to be.

Fabricator. The entity that is responsible for detailing (except in Section 4.5) and fabricating the structural stainless steel.
Hazardous materials. Components, compounds or devices that are either encountered during the performance of the contract work or incorporated into it containing substances that, notwithstanding the application of reasonable care, present a threat of harm to persons and/or the environment.

Inspector. The owner’s testing and inspection agency.

MBMA. Metal Building Manufacturers Association.

Mill material. Steel mill products that are ordered expressly for the requirements of a specific project.

Owner. The entity that is identified as such in the contract documents.

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. This is usually the general contractor, the construction manager or similar authority at the job site.

Owner’s designated representative for design. The owner or the entity that is responsible to the owner for the overall structural design of the project, including the structural stainless steel frame. This is usually the structural engineer of record.

Plans. See design drawings.

Released for construction. The term that describes the status of contract documents that are in such a condition that the fabricator and the erector can rely upon them for the performance of their work, including the ordering of material and the preparation of shop and erection drawings or fabrication and erection models.

Revision. An instruction or directive providing information that differs from information that has been released for construction. A revision may, but does not always, impact the cost or schedule of performance of the work.

RFI. A written request for information or clarification generated during the construction phase of the project.

SER. See structural engineer of record.

Shop drawings. Drawings of the individual structural stainless steel shipping pieces that are to be produced in the fabrication shop.

SJI. Steel Joist Institute.
Specifications. The portion of the contract documents that consists of the written requirements for materials, standards and workmanship.

SSPC. SSPC: The Society for Protective Coatings, which was formerly known as the Steel Structures Painting Council.

Stainless steel. A steel that conforms to a specification that requires, by mass percent, a minimum chromium content of 10.5 or more, and a maximum carbon content of less than 1.20.

Standard carbon or alloy steel structural shapes. Hot-rolled W-, S-, M- and HP-shapes, channels and angles listed in ASTM A6/A6M; structural tees split from the hot-rolled W-, S- and M- shapes listed in ASTM A6/A6M; hollow structural sections produced to ASTM A500/A500M, A501/A501M, A618/A618M, A847/A847M, A1065/A1065M, or A1085/A1085M; and, steel pipe produced to ASTM A53/A53M.

Standard stainless steel structural shapes. W-, S-, M-, HP-, and custom shapes, channels and angles; structural tees based on the hot-rolled W-, S- and M- shapes; hollow structural sections; and, box-sections and pipe produced by welding, including laser- and laser-hybrid, extrusion and hot rolling that generally resemble standard carbon or alloy steel structural shapes. Many standard stainless steel structural shapes are welded, including laser- and laser-hybrid, from two or three plates.

Steel detailer. The entity that produces the approval documents.

Strength Grade. Stainless steel designation for a specific set of minimal mechanical property requirements for one or more alloys.

Structural engineer of record. The licensed professional who is responsible for sealing the contract documents, which indicates that he or she has performed or supervised the analysis, design and document preparation for the structure and has knowledge of the load-carrying structural system.

Structural stainless steel. The elements of the stainless steel structural frame as given in Section 2.1.

Substantiating connection information. Information submitted by the fabricator, if requested by the owner’s designated representative for design in the contract documents, when Option 2 or Option 3 is designated for connections per Section 3.1.1.

Tier. The structural stainless steel framing defined by a column shipping piece.

UNS (Unified Numbering System) Number. Identification system for specific metals and alloys adopted by ASTM and in compliance with SAE standard J1086.
Weld show-through. In architecturally exposed structural stainless steel, visual indication of the presence of a weld or welds on the side of the member opposite the weld.
SECTION 1. GENERAL PROVISIONS

1.1. Scope

This Code sets forth criteria for the trade practices involved in stainless steel buildings, and other structures, where other structures are defined as those structures designed, fabricated and erected in a manner similar to buildings, with building-like vertical and lateral force-resisting elements. In the absence of specific instructions to the contrary in the contract documents, the trade practices that are defined in this Code shall govern the fabrication and erection of structural stainless steel and any bimetallic interfaces that may be integral to the structural stainless steel.

There are five stainless steel alloy families. Alloys from three of those families are included in this practice. All structural shapes manufactured from the austenitic and duplex stainless steel alloy families are included in this practice. The precipitation hardening stainless steel alloy family applications are limited to tension members, fittings, and fasteners.

Commentary:
The practices defined in this Code are the commonly accepted standards of custom and usage for structural stainless steel fabrication and erection, which generally represent the most efficient approach. This Code is not intended to define a professional standard of care for the owner’s designated representative for design; change the duties and responsibilities of the owner, contractor, architect, or structural engineer of record from those set forth in the contract documents; nor assign to the owner, architect or structural engineer of record any duty or authority to undertake responsibility inconsistent with the provisions of the contract documents.

This Code is not applicable to steel joists or metal building systems, which are addressed by SJI and MBMA, respectively.

1.2. Dates of Referenced Specifications, Codes and Standards

The following dated versions of documents are referenced in this Code:


1.3. Units

In this Code, the values stated in either U.S. customary units or metric units shall be used. Each system shall be used independently of the other.
Commentary:
In this Code, dimensions, weights and other measures are given in U.S. customary units with rounded or rationalized metric-unit equivalents in brackets. Because the values stated in each system are not exact equivalents, the selective combination of values from each of the two systems is not permitted.

1.4 Responsibility for Identifying Contract Documents

The owner’s designated representative for construction shall identify all contract documents. When the design drawings and a design model are both provided, the owner’s designated representative for design shall specify which document is the controlling contract document. The contract documents shall establish the procedures for communicating changes to the contract documents, permitted use of design and other digital models, and restrictions on the release of these digital models to other parties.

Commentary:
There can be many combinations of drawings and digital models used as part of the contract documents, and to transfer information between the many entities in the design and construction processes. The communication of design information to the fabricator through the design model is permitted in this Code. This Code does not designate which of these possible documents takes precedence because of the variation in current practice. The document hierarchy is left to the owner’s designated representative for design and communicated through the owner’s designated representative for construction. The owner’s designated representative for construction must provide guidance as to which information is to be considered to have precedence if conflicts exist.

1.5 Design Criteria

For structural stainless steel buildings and other structural stainless steel structures, in the absence of other design criteria, the provision in ANSI/AISC 370 shall govern the design of the structural stainless steel.

1.6 Responsibility for Design

1.6.1. When the owner’s designated representative for design provides the design, design documents and specifications, the fabricator and the erector are not responsible for the suitability, adequacy or building-code conformance of the design.

1.6.2. When the owner enters into a direct contract with the fabricator to both design and fabricate an entire, completed stainless steel structure, the fabricator shall be responsible for the suitability, adequacy, conformance with owner-established
performance criteria, and building-code conformance of the structural stainless steel design. The owner shall be responsible for the suitability, adequacy and building-code conformance of the non-structural stainless steel elements and shall establish the performance criteria for the structural stainless steel frame.

1.7. Patents and Copyrights

The entity or entities that are responsible for the specification and/or selection of proprietary structural designs shall secure all intellectual property rights necessary for the use of those designs.

1.8. Existing Structures

1.8.1. Demolition and shoring of any part of an existing structure are not within the scope of work that is provided by either the fabricator or the erecter. Such demolition and shoring shall be performed in a timely manner so as not to interfere with or delay the work of the fabricator or the erecter.

1.8.2. Protection of an existing structure and its contents and equipment, so as to prevent damage from normal erection processes, is not within the scope of work that is provided by either the fabricator or the erecter. Such protection shall be performed in a timely manner so as not to interfere with or delay the work of the fabricator or the erecter.

1.8.3. Surveying or field dimensioning of an existing structure is not within the scope of work that is provided by either the fabricator or the erecter. Such surveying or field dimensioning, which is necessary for the completion of the approval documents and fabrication, shall be performed and furnished to the fabricator in a timely manner so as not to interfere with or delay the work of the fabricator or the erecter.

1.8.4. Abatement or removal of hazardous materials is not within the scope of work that is provided by either the fabricator or the erecter. Such abatement or removal shall be performed in a timely manner so as not to interfere with or delay the work of the fabricator or the erecter.

1.9. Means, Methods and Safety of Erection

1.9.1. The erecter shall be responsible for the means, methods and safety of erection of the structural stainless steel frame.

1.9.2. The structural engineer of record shall be responsible for the structural adequacy of the design of the structure in the completed project. The structural engineer of
record shall not be responsible for the means, methods and safety of erection of the structural stainless steel frame. See also Sections 3.1.4 and 7.10.

1.10. Tolerances

Tolerances for materials, fabrication and erection shall be as stipulated in Sections 5, 6, 7 and 10. Tolerances absent from this Code or the contract documents shall not be considered zero by default.

Commentary:
Tolerances are not necessarily specified in this Code for every possible variation that could be encountered. For most projects, where a tolerance is not specified or covered in this Code, it is not needed to ensure that the fabricated and erected structural stainless steel complies with the requirements in Section 6 and 7. If a special design concept or system component requires a tolerance that is not specified in this Code, the necessary tolerance should be specified in the contract documents. If a tolerance is not shown and is deemed by the fabricator and/or erector to be important to the successful fabrication and erection of the structural stainless steel, it should be requested from the owner’s designated representative for design. The absence of a tolerance in this Code for a particular condition does not mean that the tolerance is zero; rather, it means that no tolerance has been established. In any case, the default tolerance is not zero.

1.11. Marking of Protected Zones in High-Seismic Applications

The fabricator shall permanently mark protected zones that are designated on the structural design documents in accordance with ANSI/AISC 341 Section A4.1. If these markings are obscured in the field, such as after the application of fire protection, the owner’s designated representative for construction shall re-mark the protected zones as they are designated on the structural design documents.
2.1. Definition of Structural Stainless Steel

Structural stainless steel shall consist of the elements of the structural frame, fabricated from stainless steel that are shown and sized in the structural design documents, essential to support the design loads and described as:

Anchor rods that will receive structural stainless steel.
Base plates, if part of the structural stainless steel frame.
Beams, including built-up beams, if made from standard stainless steel structural shapes and/or plates.
Bearing plates, if part of the structural stainless steel frame.
Bearings of steel for girders, or trusses.
Bracing, if permanent.
Canopy framing, if made from standard stainless steel structural shapes and/or plates.
Columns, including built-up columns, if made from standard stainless steel structural shapes and/or plates.
Connection materials for framing structural stainless steel to structural stainless steel.
Crane stops, if made from standard stainless steel structural shapes and/or plates.
Door frames, if made from standard stainless steel structural shapes and/or plates and if part of the structural stainless steel frame.
Edge angles and plates, if attached to the structural stainless steel frame or steel (open-web) joists.
Embedded structural stainless steel parts, other than bearing plates, that will receive structural stainless steel.
Expansion joints, if attached to the structural stainless steel frame.
Fasteners for connecting structural stainless steel items: permanent shop bolts, nuts and washers; shop bolts, nuts and washers for shipment; field bolts, nuts and washers for permanent connections; and, permanent pins.
Floor opening frames, if made from standard stainless steel structural shapes and/or plates and attached to the structural stainless steel frame or steel (open-web) joists.
Floor plates (checkered or plain), if attached to the structural stainless steel frame.
Girders, including built-up girders, if made from standard stainless steel structural shapes and/or plates.
Girts, if made from standard stainless steel structural shapes.
Grillage beams and girders.
Hangers, if made from standard stainless steel structural shapes, plates and/or rods and framing structural stainless steel to structural stainless steel.
Leveling nuts and washers.

Leveling plates.

Leveling screws.

Lintels, if attached to the structural stainless steel frame.

Marquee framing, if made from standard stainless steel structural shapes and/or plates.

Machinery supports, if made from standard stainless steel structural shapes and/or plates and attached to the structural steel frame.

Monorail elements, if made from standard stainless steel structural shapes and/or plates and attached to the structural steel frame.

Posts, if part of the structural steel frame.

Purlins, if made from standard stainless steel structural shapes.

Relieving angles, if attached to the structural stainless steel frame.

Roof-opening frames, if made from standard stainless steel structural shapes and/or plates and attached to the structural stainless steel frame or steel (open-web) joists.

Roof-screen support frames, if made from standard stainless steel structural shapes.

Sag rods, if part of the structural stainless steel frame and connecting structural stainless steel to structural stainless steel.

Shear stud connectors, if specified to be shop attached.

Shims, if permanent.

Struts, if permanent and part of the structural stainless steel frame.

Tie rods, if part of the structural stainless steel frame.

Trusses, if made from standard stainless steel structural shapes and/or built-up members.

Wall-opening frames, if made from standard stainless steel structural shapes and/or plates and attached to the structural stainless steel frame.

Wedges, if permanent.

Commentary:
The fabricator normally fabricates the items listed in Section 2.1. Such items must be shown, sized and described in the structural design documents. Bracing includes vertical bracing for resistance to wind and seismic load and structural stability, horizontal bracing for floor and roof systems, and permanent stability bracing for components of the structural stainless steel frame.

2.2. Other Steel, Iron or Metal Items

Structural stainless steel shall not include other steel, iron or metal items that are not generally described in Section 2.1, even where such items are shown in the structural design documents or are attached to the structural stainless steel frame. Other steel, iron or metal items include but are not limited to:
Base plates, if not part of the structural stainless steel frame.

Bearing plates, if not part of the structural stainless steel frame.

Bearings, if non-steel.

Cables for permanent bracing or suspension systems.

Castings.

Catwalks.

Chutes.

Cold-formed steel products.

Cold-rolled steel products, except those that are specifically covered in ANSI/AISC 370.

Cold formed stainless steel that is specifically covered in SEI/ASCE 8.

Corner guards.

Crane rails, splices, bolts and clamps.

Crane stops, if not made from standard stainless steel structural shapes or plates.

Door guards.

Embedded steel parts, other than bearing plates, that do not receive structural stainless steel or that are embedded in precast concrete.

Expansion joints, if not attached to the structural stainless steel frame.

Flagpole support steel.

Floor plates (checkered or plain), if not attached to the structural stainless steel frame.

Forgings.

Gage-metal products.

Grating.

Handrail and guards.

Hangers, if not made from standard stainless steel structural shapes, plates and/or rods or not framing structural stainless steel to structural stainless steel.

Hoppers.

Items that are required for the assembly or erection of materials that are furnished by trades other than the fabricator or erector.

Ladders.

Lintels, if not attached to the structural stainless steel frame.

Masonry anchors.

Ornamental metal framing.

Other miscellaneous metal not already listed.

Pressure vessels.

Reinforcing steel for concrete or masonry.

Relieving angles, if not attached to the structural stainless steel frame.

Roof screen support frames, if not made from standard stainless steel structural shapes.

Safety cages.

Shear stud connectors, if specified to be field installed.

Stacks.

Stairs.
Steel deck.
Steel (open-web) joists.
Steel joist girders.
Tanks.
Toe plates.
Trench or pit covers.

**Commentary:**
Section 2.2 includes many items that may be furnished by the fabricator if contracted to do so by specific notation and detail in the contract documents. When such items are contracted to be provided by the fabricator, coordination will normally be required between the fabricator and other material suppliers and trades. The provisions in this Code are not intended to apply to items in Section 2.2.
SECTION 3. DESIGN DOCUMENTS AND SPECIFICATIONS

3.1. Structural Design Documents and Specifications

Unless otherwise indicated in the contract documents, the structural design documents shall be based upon consideration of the design loads and forces to be resisted by the structural stainless steel frame in the completed project.

The structural design documents shall clearly show or note the work that is to be performed and shall give the following information with sufficient dimensions to accurately convey the quantity and complexity of the stainless structural stainless steel to be fabricated:

(a) The size, section, and location of all members.
(b) The required stainless steel alloy, designated by UNS number, strength grade if there are options, and surface finish requirements of the structural stainless steel shall be incorporated in the contract documents.
(c) Any paint, coatings, gaskets, bushings or other means necessary to mitigate galvanic corrosion at all bimetallic interfaces on the structural stainless steel.
(d) All geometry and working points necessary for layout.
(e) Floor elevations.
(f) Column centers and offsets.
(g) The camber requirements for members.
(h) Preset elevation requirements, if any, at free ends of cantilevered members relative to their fixed-end elevations.
(i) Joining requirements between elements of built-up members.
(j) When the requirements of ANSI/AISC 341 are applicable, the information required in ANSI/AISC 341 Section A4.
(k) The information required in Sections 3.1.1 through 3.1.6.
(l) The alloy's UNS number or ASTM standard designation, and strength grade, of all fasteners to join stainless steel structural elements to themselves and to join stainless steel structural elements to steel members.

The structural stainless steel specifications shall include any special requirements for the fabrication and erection of the structural stainless steel.

The structural stainless steel specifications shall indicate that the fasteners must be at least as corrosion resistant as the most corrosion resistant of the materials joined to prevent galvanic corrosion failures. Galvanized steel fasteners are not permitted.

The structural design documents, specifications and addenda shall be numbered and dated for the purposes of identification. 3D digital models shall contain a unique identifier.
Commentary:

Contract documents vary greatly in complexity and completeness. Nonetheless, the fabricator and the erector must be able to rely upon the accuracy and completeness of the contract documents. This allows the fabricator and the erector to provide the owner with bids that are adequate and complete. It also enables the preparation of the approval documents, the ordering of materials, and the timely fabrication and erection of shipping pieces.

In some cases, the owner can benefit when reasonable latitude is allowed in the contract documents for alternatives that can reduce cost without compromising quality. However, critical requirements that are necessary to protect the owner’s interest, that affect the integrity of the structure or that are necessary for the fabricator and the erector to proceed with their work must be included in the contract documents. Some examples of critical information may include, when applicable:

- Standard specifications and codes that govern structural stainless steel design and construction, including bolting and welding.
- Material specifications, including fasteners. (See both ANSI/AISC 370 and Design Guide 27 for discussion of the special care required when specifying fasteners for stainless steel structural elements.)
- Special material requirements to be reported on the material test reports.
- Welded-joint configuration.
- Weld-procedure qualification.
- Special requirements for work of other trades.
- Final disposition of backing and runoff tabs.
- Lateral bracing.
- Stability bracing.
- Connections or data for connection selection and/or completion.
- Restrictions on connection types.
- Column stiffeners (also known as continuity plates).
- Column web doubler plates.
- Bearing stiffeners on beams and girders.
- Web reinforcement.
- Openings for other trades.
- Surface preparation and shop painting requirements.
- Shop and field inspection requirements.
- Nondestructive testing requirements, including acceptance criteria.
- Special requirements on delivery.
- Special erection limitations.
- Identification of non-structural stainless steel elements that interact with the structural stainless steel frame to provide for the lateral stability of the structural stainless steel frame (see Section 3.1.4).
- Column differential shortening information (see Commentary to Section 7.13).

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It may be necessary to specify a relative elevation to which the free end of a cantilever must be erected (preset) prior to load application, with the fixed end stabilized before the member is released from the crane or temporary support and any other load is applied to it. This is needed so that the cantilevered member can be detailed and fabricated to allow for any required preset. This does not apply to a beam that is continuous over a support, which is controlled by camber, not preset.

When stainless steel is electrically bonded to a dissimilar metal (typically either carbon or alloy steel or aluminum) and there is an electrolyte present, there is the possibility of galvanic corrosion. Any processes or elements necessary to mitigate the chances of this corrosion must be part of the design documents and/or specifications. It is outside of the fabricator’s and erector’s scope to understand project environment and the risk of galvanic corrosion and the means to minimize said risk.

3.1.1. The owner’s designated representative for design shall indicate one of the following options for each connection:

1. Option 1: the complete connection design shall be shown in the structural design documents.
2. Option 2: in the structural design documents or specifications, the connection shall be designated to be selected or completed by an experienced steel detailer.
3. Option 3: in the structural design documents or specifications, the connection shall be designated to be designed by a licensed engineer working for the fabricator.

In all of the above options,

(a) The requirements of Section 3.1.2 shall apply.
(b) The approvals process in Section 4.4 shall be followed.

When Option 2 is specified, the experienced steel detailer shall utilize information provided in the structural design documents in the selection or completion of the connections. When such information is not provided in the structural design documents other sources such as Journal articles, text books, or other reference information as approved by the owner’s designated representative for design shall be used.
When Option 2 or 3 is specified, the owner’s designated representative for design shall provide the following connection design criteria in the structural design documents and specifications:

(a) Any restrictions on the types of connections that are permitted.
(b) Data concerning the loads, including shears, moments, axial forces and transfer forces, that are to be resisted by the individual members and their connections, sufficient to allow the selection, completion, or design of the connection details while preparing the approval documents.
(c) Whether the data required in (b) is given at the service-load level or the factored-load level.
(d) Whether LRFD or ASD is to be used in the selection, completion, or design of connection details.
(e) What substantiating connection information, if any, is to be provided with the approval documents to the owner’s designated representative for design.

When Option 3 is specified:

(a) The fabricator shall submit in a timely manner representative samples of the required substantiating connection information to the owner’s designated representatives for design and construction. The owner’s designated representative for design shall confirm in writing in a timely manner that these representative samples are consistent with the requirements in the contract documents, or shall advise what modifications are required to bring the representative samples into compliance with the requirements in the contract documents. This initial submittal and review is in addition to the requirements in Section 4.4.

(b) The licensed engineer in responsible charge of the connection design shall review and confirm in writing as part of the substantiating connection information, that the approval documents properly incorporate the connection designs. However, this review by the licensed engineer in responsible charge of the connection design does not replace the approval process of the approval documents by the owner’s designated representative for design in Section 4.4.

(c) The fabricator shall provide a means by which the substantiating connection information is referenced to the related connections on the approval documents for the purpose of review.

Commentary:
There are three options covered in this Section:

1) In Option 1, the owner’s designated representative for design shows the complete design of the connections in the structural design documents. The following information is included:

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(a) All weld types, sizes, lengths and strengths.
(b) All bolt alloys, sizes, locations, quantities and strength grades.
(c) All plate and angle sizes, thicknesses, dimensions, and alloys.
(d) All work point locations and related information.

The intent of this approach is that complete design information necessary for detailing the connection is shown in the structural design documents. Typical details are shown for each connection type, set of geometric parameters, and adjacent framing conditions. The steel detailer will then be able to transfer this information to the approval documents, applying it to the individual pieces being detailed.

(2) In Option 2, the owner’s designated representative for design allows an experienced steel detailer to select or complete the connections. This is commonly done by referring to loads embedded in the digital model, tables or schematic information in the structural design documents, or other reference information approved by the owner’s designated representative for design, such as journal papers and recognized software output. Tables and schematic information in the structural design documents should provide such information as weld types and sizes, plate thicknesses, and quantities of bolts. However, there may be some geometry and dimensional information that the steel detailer must develop. The steel detailer will then configure the connections based upon the design loads and other information given in the structural design documents and specifications.

The intent of this method is that the steel detailer will select the connection materials and configuration from the referenced tables or complete the specific connection configuration (e.g., dimensions, edge distances and bolt spacing) based upon the connection details that are shown in the structural design documents.

The steel detailer must be experienced and familiar with AISC requirements for connection configurations, the calculation of dimensions, and adaptation of typical connection details to similar situations. Notations of loadings in the structural design documents are only to facilitate selection of the connections from the referenced documents. It is not the intent that this method be used when the practice of engineering is required.

(3) Option 3 reflects a practice in some areas of the U.S. to have a licensed engineer working for or retained by the fabricator design the connections, and recognizes the information required by the fabricator to do this work. The owner’s designated representative for design, who has the knowledge of the structure as a whole, must review and approve the approval documents, and take such action on substantiating connection information as the owner’s
When, under Section 3.1.1, the owner’s designated representative for design designates that connections are to be designed by a licensed engineer employed or retained by the fabricator, this work is incidental to, and part of, the overall means and methods of fabricating and constructing the stainless steel frame. The licensed engineer performing the connection design is not providing a peer-review of the contract documents.

The owner’s designated representative for design reviews the approval documents during the approvals process as specified in Section 4.4 for conformance with the specified criteria and compatibility with the design of the primary structure.

One of these options should be indicated for each connection in a project. It is acceptable to group connection types and utilize a combination of these options for the various connection types involved in a project. Option 3 is not normally specified for connections that can be selected or completed as noted in Option 2 without practicing engineering.

If there are any restrictions as to the types of connections to be used, it is required that these limitations be set forth in the structural design documents and specifications. There are a variety of connections available for a given situation. Preference for a particular type will vary between fabricators and erectors. Stating these limitations, if any, in the structural design documents and specifications will help to avoid repeated changes to the approval documents due to the selection of a connection that is not acceptable to the owner’s designated representative for design, thereby avoiding additional cost and/or delay for revising the approval documents.

The structural design documents must indicate the method of design used as LRFD or ASD. In order to conform to the spirit of ANSI/AISC 370, the connections must be selected using the same method and the corresponding references.

Substantiating connection information, when required, can take many forms. When Option 2 is designated, the approval documents may suffice with no additional substantiating connection information required. When Option 3 is designated, the substantiating connection information may take the form of hand calculations and/or software output.

When substantiating connection information is required, it is recommended that representative samples of that information be agreed upon prior to preparation of the approval documents, in order to avoid additional cost and/or delay for the connection redesign and/or revising that might otherwise result.

The owner’s designated representative for design may require that the substantiating connection information be signed and sealed for Option 3. The signing and sealing of the cover letter transmitting the approval documents and substantiating connection information may suffice. This signing and
3.1.2. Permanent bracing, openings in structural stainless steel for other trades, and other special details, where required, shall be designed by the owner’s designated representative for design and shown in sufficient detail in the structural design documents issued for bidding so that the quantity, detailing and fabrication requirements for these items can be readily understood.

At locations away from connections, stiffeners, web doubler plates, bearing stiffeners, and other member reinforcement, where required, shall be designed by the owner’s designated representative for design and shown in sufficient detail in the structural design documents issued for bidding so that the quantity, detailing and fabrication requirements for these items can be readily understood.

At locations of connections, the following requirements shall apply to column stiffeners, web doubler plates, beam bearing stiffeners, and all other member reinforcement required to satisfy strength and equilibrium of forces through the connection:

1. When Option 1 or 2 in Section 3.1.1 is specified for a connection, these items shall be designed by the owner’s designated representative for design and shown in the structural design documents issued for bidding so that the quantity, detailing and fabrication requirements for member reinforcement at connections can be readily understood.

2. When Option 3 in Section 3.1.1 is specified for a connection, two subsidiary options are available to the owner’s designated representative for design; either:

   a. Option 3A: member reinforcement at connections shall be designed by the owner’s designated representative for design and shown in the structural design documents issued for bidding so that the quantity, detailing and fabrication requirements for member reinforcement at connections can be readily understood, or;

   b. Option 3B: the owner’s designated representative for design shall provide a bidding quantity of items required for member reinforcement at connections with corresponding project-specific details that show the conceptual configuration of reinforcement appropriate for the order of magnitude of forces to be transferred. These quantities and project-specific conceptual configurations will be relied upon for bidding.
purposes. If no quantities or conceptual configurations are shown, member reinforcement at connections will not be included in the bid. Subsequently, member reinforcement at connections, where required, shall be designed in its final configuration by the licensed engineer in responsible charge of the connection design.

When the actual quantity and/or details of any of the foregoing items differ from the bidding quantity and/or details, the contract price and schedule shall be adjusted equitably in accordance with Sections 9.4 and 9.5. Any limitations regarding type and connection of reinforcing shall be clearly provided.

**Commentary:**

Option 3A is most useful when the owner’s designated representative for design delegates connection design work but has selected member sizes to eliminate or minimize the need for member reinforcement at connections. Option 3A should not be used if the intent is to delegate the determination and design of member reinforcement at connections to the licensed engineer in responsible charge of the connection design.

Option 3B is necessary if the intent is to delegate the determination and design of member reinforcement at connections to the licensed engineer in responsible charge of the connection design. Because these requirements will not be known until connections are designed after award of the contract, bids prepared by multiple fabricators will not be comparable unless all bidders use the same assumptions in preparing their bids. The approach provided here allows for all bids to be comparable. The owner’s final cost for the actual member reinforcement requirements at connections will be determined through equitable contract price adjustment.

When no quantities and details are shown for column stiffeners, web doubler plates, beam bearing stiffeners, and/or other member reinforcement required to satisfy strength and equilibrium of forces through connections, the fabricator’s bid reflects no allowance for these items. Should it subsequently be determined that member reinforcement at connections is required, the provisions of Sections 9.4 and 9.5 then apply.

3.1.3. When leveling plates are to be furnished as part of the contract requirements, their locations and required thickness and sizes shall be specified in the contract documents.

3.1.4. When the *structural stainless steel* frame, in the completely erected and fully connected state, requires interaction with *non-structural stainless steel* elements (see Section 2) for strength and/or stability, those *non-structural stainless steel* elements shall be identified in the contract documents as required in Section 7.10.
Examples of non-structural stainless steel elements include diaphragms made of steel deck, diaphragms made of concrete on steel deck, and masonry and/or concrete shear walls.

3.1.5. When camber is required, the magnitude, direction and location of camber shall be specified in the structural design documents.

Commentary:
For cantilevers, the specified camber may be up or down, depending upon the framing and loading.

3.1.6. Specific members, or portions thereof, that are to be painted shall be identified in the contract documents. When shop painting is required, the painting requirements shall be specified in the contract documents, including the following information:

(a) The identification of specific members or portions thereof to be painted.
(b) The surface preparation that is required for these members.
(c) The paint specifications and manufacturer’s product identification, including color requirements, if any, that are required for these members.
(d) The minimum dry-film shop-coat thickness that is required for these members.

Commentary:
Other than the joining of dissimilar metals, stainless steel is generally not painted. At bimetallic interfaces, structural stainless steel joined by welding to dissimilar metals should be painted in the region abutting the other in order to prevent galvanic corrosion. Unless otherwise specified there should be a minimum of 2.5 in. (60mm) of painted stainless steel adjacent to the steel.

Coating systems for stainless steels must be carefully selected to provide sufficient durability to meet the requirements of the service environment and its associated operating conditions. The combination of surface preparation and formulation of the paint system are key factors in meeting these objectives. The passive film must be removed to obtain good coating adherence. Since the passive film completely reforms within 24 hours, mechanical or chemical removal shortly before primer application or the use of an appropriate etchant primer is critical. Micro-porosity, coating damage, deterioration or improper surface preparation can create the conditions necessary for highly localized crevice corrosion, which may cause more severe pitting corrosion than that experienced with un-coated surfaces.

3.2. Architectural, Electrical and Mechanical Design Documents and Specifications
All requirements for the quantities, sizes and locations of structural stainless steel shall be shown or noted in the structural design documents. The structural design documents are permitted to reference the architectural, electrical and/or mechanical design documents as a supplement to the structural design documents for the purposes of defining detail configurations and construction information.

When the referenced information is not available at the time of structural design, bidding, detailing or fabrication, subsequent revisions shall be the responsibility of the owner and shall be made in accordance with Sections 3.5 and 9.3.

3.3. Discrepancies

When discrepancies exist between the design documents and specifications, the design documents shall govern. When discrepancies exist between scale dimensions in the design documents and the figures written in them, the figures shall govern. When discrepancies exist between the structural design documents and the architectural, electrical or mechanical design documents, or the design documents for other trades, the structural design documents shall govern. When discrepancies exist between the design drawings and the design model, the governing document shall be as identified per Section 1.4.

When a discrepancy is discovered in the contract documents in the course of the fabricator’s work, the fabricator shall promptly notify the owner’s designated representative for construction so that the discrepancy can be resolved. Such resolution shall be timely so as not to delay the fabricator’s work. See Sections 3.5 and 9.3.

It is not the fabricator’s responsibility to discover discrepancies, including those that are associated with the coordination of the various design disciplines.

3.4. Legibility of Design Drawings

Design drawings shall be clearly legible and drawn to an identified scale that is appropriate to clearly convey the information.

Commentary:

Historically, the most commonly accepted scale for structural steel drawings has been 1/8 in. per ft (10 mm per 1 000 mm). There are, however, situations where a smaller or larger scale is appropriate. Ultimately, consideration must be given to the clarity of the drawing.

The scaling of the design drawings to determine dimensions is not an accepted practice for detailing the approval documents. However, it should be remembered when preparing design drawings that scaling may be the only method available when early-submission drawings are used to determine dimensions for estimating and bidding purposes.
3.5. Revisions to the Design Documents and Specifications

Revisions to the design documents and specifications shall be made either by issuing new design documents and specifications or by reissuing the existing design documents and specifications. In either case, all revisions, including revisions that are communicated through responses to RFIs or the annotation of the approval documents (see Section 4.4.2), shall be clearly and individually indicated in the contract documents. The contract documents shall be dated and identified by revision number. When the design documents are communicated using design drawings, each design drawing shall be identified by the same drawing number throughout the duration of the project, regardless of the revision. See also Section 9.3.

When revisions are communicated using design models, revisions shall be made evident in the revised design model submitted by identifying within the design model which items are changed. Alternatively, the changes shall be submitted with a written document describing in explicit detail the items that are changed. A historic tracking of changes must either be present in the revised design model or maintained in the written record of changes.

The party or entity that is contractually assigned responsibility for managing the design model shall maintain accurate accounting and tracking records of the most current design model, as well as previously superseded design models, and shall facilitate a tracking mechanism so that all contracted parties are aware of, and have access to, the most current design model.

Commentary:

Revisions to the design documents and specifications can be made by issuing sketches and supplemental information separate from the design documents and specifications. These sketches and supplemental information become amendments to the design documents and specifications and are considered new contract documents. All sketches and supplemental information must be uniquely identified with a number and date as the latest instructions until such time as they may be superseded by new information.

When revisions are made by revising and reissuing the existing structural design documents and/or specifications, a unique revision number and date must be added to those documents to identify that information as the latest instructions until such time as they may be superseded by new information. When the design documents are communicated using design drawings, the same unique drawing number must identify each design drawing throughout the duration of the project so that revisions can be properly tracked, thus avoiding confusion and miscommunication among the various entities involved in the project.

When revisions are communicated through the annotation of the approval documents or contractor submissions, such changes must be confirmed in writing by one of the aforementioned methods. This written confirmation is imperative to
When design models are used, a similar unique method of identifying each revision must be used. This method can vary in various digital modeling software, but the same level of notation of changes must be present in the revised design model as would be used on design drawings.

3.6 Fast-Track Project Delivery

When the fast-track project delivery system is selected, release of the structural design documents and specifications shall constitute a release for construction, regardless of the status of the architectural, electrical, mechanical and other interfacing designs and contract documents. Subsequent revisions, if any, shall be the responsibility of the owner and shall be made in accordance with Sections 3.5 and 9.3.

Commentary:
The fast-track project delivery system generally provides for a condensed schedule for the design and construction of a project. Under this delivery system, the owner elects to release for construction the structural design documents and specifications, which may be partially complete, at a time that may precede the completion of and coordination with architectural, mechanical, electrical and other design work and contract documents. The release of the structural design documents and specifications may also precede the release of the General Conditions and Division 1 Specifications.

Release of the structural design documents and specifications to the fabricator for ordering of material constitutes a release for construction. Accordingly, the fabricator and the erector may begin their work based upon those partially complete documents. As the architectural, mechanical, electrical and other design elements of the project are completed, revisions may be required in design and/or construction. Thus, when considering the fast-track project delivery system, the owner should balance the potential benefits to the project schedule with the project cost contingency that may be required to allow for these subsequent revisions.

3.7 Intellectual Property

Any copyright or other property or proprietary rights owned by the owner’s designated representative for design in any content included within the contract documents, whether created specifically for an individual project or otherwise made available for use on an individual project, shall remain the exclusive property of the owner’s designated representative for design.
SECTION 4. APPROVAL DOCUMENTS

4.1. Owner Responsibility

The owner shall furnish, in a timely manner and in accordance with the contract documents, the complete structural design documents and specifications that have been released for construction. Unless otherwise noted, design documents and specifications that are provided as part of the contract bid documents shall constitute authorization by the owner that the design documents and specifications are released for construction.

Commentary:
When the owner issues design documents and specifications that are released for construction, the fabricator and the erector rely on the fact that these are the owner’s requirements for the project. This release is required by the fabricator prior to the ordering of material and the preparation and completion of the approval documents.

To ensure the orderly flow of material procurement, detailing, fabrication and erection activities, on phased construction projects, it is essential that designs are not continuously revised after they have been released for construction. In essence, once a portion of a design is released for construction, the essential elements of that design should be “frozen” to ensure adherence to the contract price and construction schedule. Alternatively, all parties should reach a common understanding of the effects of future changes, if any, as they affect scheduled deliveries and added costs.

A pre-detailing conference, held after the structural stainless steel fabrication contract is awarded, can benefit the project. Typical attendees may include the owner’s designated representative for construction, the owner’s designated representative for design, the fabricator, the steel detailer, and the erector. Topics of the meeting should relate to the specifics of the project and might include:

- Contract document review and general project overview, including clarifications of scope of work, tolerances, layouts and sequences, and special considerations.
- Detailing and coordination needs, such as bolting, welding, and connection considerations, constructability considerations, OSHA requirements, coordination with other trades, and the advanced bill of materials.
- The project communication system, including distribution of contact information for relevant parties to the contract, identification of the primary and alternate contacts in the general contractor’s office, and the RFI system to be used on the project.
● The submittal schedule, including the method of submitting (electronic or hard copy); for hard copy, how many copies of documents are required; connection submittals; and identification of schedule-critical areas of the project, if any.

● If digital models will be used as part of the delivery method for the design documents, the parties should determine and convey the levels of development (LOD), the digital model types that will be furnished, the authorized uses of such digital models, the transmission of digital models to prevent the loss or alteration of data, interoperability, and methods of review and approval. The term levels of development refers to the level of completeness of elements within the digital model (see the BIMFORUM Level of Development Specification). The term “authorized uses” refers to the permitted uses of the digital model(s) and the digital data associated with the digital model(s). Such authorized uses may include the right to (1) store and view the digital model(s) for informational purposes only, (2) rely upon, store and view the digital model(s) to carry out the work on the project, (3) reproduce and distribute the digital model(s) for informational purposes only, (4) rely upon, reproduce and distribute the digital model(s) to carry out the work, (5) incorporate additional digital data into the digital model(s) without modifying the data received to carry out the work on the project, (6) modify the digital model(s) as required to carry out the work on the project, (7) produce the digital model(s) in an archival format for the owner to use as a reference for as-built construction data and/or for the operation of the project after completion, and/or (8) other authorized uses specified in the contract documents.

● Review of quality and inspection requirements, including the approvals process for corrective work.

Record of the meeting should be written and distributed to all parties. Subsequent meetings to discuss progress and issues that arise during construction also can be helpful, particularly when they are held on a regular schedule.

4.2. Fabricator Responsibility

4.2.1 Except as provided in Section 4.5, the fabricator shall produce the approval documents for the fabrication and erection of the structural stainless steel and is responsible for the following:

(a) The transfer of information from the contract documents into accurate and complete approval documents.

(b) The development of accurate, detailed dimensional information to provide for the fit-up of parts in the field.
Commentary:
The fabricator is permitted to use the services of independent steel detailers to produce approval documents and to perform other support services, such as producing advanced bills of material and bolt summaries.

As the fabricator develops the detailed dimensional information for production of the approval documents, there may be discrepancies, missing information or conflicts discovered in the contract documents. See Section 3.3.

4.2.2. Any copyright or other property or proprietary rights owned by the fabricator in any content included within the approval documents, whether created specifically for an individual project or otherwise made available for use on an individual project, shall remain the exclusive property of the fabricator.

4.2.3. When the approval documents are shop and erection drawings, each shop and erection drawing shall be identified by the same drawing number throughout the duration of the project and shall be identified by revision number and date, with each specific revision clearly identified. When the approval documents are fabrication and erection models, each submittal shall be uniquely identified.

When the fabricator submits a request to change connection details that are described in the contract documents, the fabricator shall notify the owner’s designated representatives for design and construction in writing in advance of the submission of the approval documents. The owner’s designated representative for design shall review and approve or reject the request in a timely manner.

When requested to do so by the owner’s designated representative for design, the fabricator shall provide to the owner’s designated representatives for design and construction its schedule for the submittal of approval documents so as to facilitate the timely flow of information between all parties.

Commentary:
When the fabricator intends to make a submission of alternative connection details to those shown in the contract documents, the fabricator must notify the owner’s designated representatives for design and construction in advance. This will allow the parties involved to plan for the increased effort that may be required to review the alternative connection details. In addition, the owner will be able to evaluate the potential for cost savings and/or schedule improvements against the additional design cost for review of the alternative connection details by the owner’s designated representative for design. This evaluation by the owner may result in the rejection of the alternative connection details or acceptance of the submission for review based upon cost savings, schedule improvements and/or job efficiencies.
The owner’s designated representative for design may request the fabricator’s schedule for the submittal of the approval documents. This process is intended to allow the parties to plan for the staffing demands of the submission schedule. The contract documents may address this issue in more detail. In the absence of the requirement to provide this schedule, none need be provided.

When the fabricator provides a schedule for the submission of the approval documents, it must be recognized that this schedule may be affected by revisions and the response time to requests for missing information or the resolution of discrepancies.

### 4.3. Use of Digital Files or Copies of the Design Documents

The fabricator shall neither use nor reproduce any part of the design documents as part of the approval documents without the written permission of the owner’s designated representative for design. When digital files or copies of the design documents are made available for the fabricator’s use as part of the approval documents, the fabricator shall accept this information under the following conditions:

(a) All information contained in the digital files or copies of the design documents shall be considered instruments of service of the owner’s designated representative for design and shall not be used for other projects, additions to the project or the completion of the project by others. Digital files or copies of the design documents shall remain the property of the owner’s designated representative for design and in no case shall the transfer of these copies of the design documents be considered a sale or unrestricted license.

(b) CAD files or copies of the design drawings shall not be considered to be contract documents. In the event of a conflict between the design drawings and the CAD files or copies thereof, the design drawings shall govern.

(c) When a design model is made available for use by the fabricator, the owner’s designated representative for construction shall designate whether the design model and/or other documents are to be considered the contract documents. See Section 1.4.

(d) Any party or entity that creates a copy of the design model does so at their own risk.

(e) The use of copies of the design documents shall not in any way obviate the fabricator’s responsibility for proper checking and coordination of dimensions, details, member sizes and fit-up, and quantities of materials as required to facilitate the preparation of approval documents that are complete and accurate as required in Section 4.2.

(f) If copies of design drawings are used by the fabricator, the fabricator shall remove information that is not required for the fabrication or erection of the structural stainless steel from the copies of the design drawings.

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Commentary:

Copies of the design documents often are readily available to the fabricator. As a result, the owner’s designated representative for design may have reduced control over the unauthorized use of the design documents. There are many copyright and other legal issues to be considered.

The owner’s designated representative for design may choose to make copies of the design documents available to the fabricator, and may charge a service or licensing fee for this convenience. In doing so, a carefully negotiated agreement should be established to set out the specific responsibilities of both parties in view of the liabilities involved for both parties. For sample contracts, see Consensus Docs 301 BIM Addendum, AIA Document E202 Building Information Modeling Protocol Exhibit, AIA Document E203 Building Information Modeling and Digital Data Exhibit, AIA Document G201 Project Digital Data Protocol Form, and AIA Document G202 Project Building Information Modeling Protocol Form.

Once the design model has been accessed and/or modified by any entity other than the owner’s designated representative for design, the resulting model is considered a copy of the design model and is no longer part of the contract documents.

The copies of the design documents are provided to the fabricator for convenience only. The information therein should be adapted for use only in reference to the placement of structural stainless steel members during erection. The fabricator should treat this information as if it were fully produced by the fabricator and undertake the same level of checking and quality assurance. When amendments or revisions are made to the contract documents, the fabricator must update this reference material.

Just like the transmission of the design documents created by the owner’s designated representative for design does not convey ownership rights in the design documents, the transmission of the approval documents created by the fabricator does not convey ownership rights in the approval documents.

4.4 Approval

Except as provided in Section 4.5, the approval documents shall be submitted to the owner’s designated representatives for design and construction for review and approval. The approval documents shall be returned to the fabricator within 14 calendar days.

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Final substantiating connection information, if any, shall also be submitted with the approval documents. The owner’s designated representative for design is the final authority in the event of a disagreement between parties regarding the design of connections to be incorporated into the overall structural stainless steel frame. The fabricator and licensed engineer in responsible charge of connection design are entitled to rely upon the connection design criteria provided in accordance with Section 3.1.1. Revisions to these criteria shall be addressed in accordance with Sections 9.3 and 9.4.

Approved approval documents shall be individually annotated by the owner’s designated representatives for design and construction as either approved or approved subject to corrections noted. When so required, the fabricator shall subsequently make the corrections noted and furnish corrected fabrication and erection documents to the owner’s designated representatives for design and construction.

Commentary:
As used in this Code, the 14-day allotment for the return of approval documents is intended to represent the fabricator’s portal-to-portal time. The intent in this Code is that, in the absence of information to the contrary in the contract documents, 14 days may be assumed for the purposes of bidding, contracting and scheduling. When additional time is desired, such as when substantiating connection information is part of the submittals, the modified allotment should be specified in the contract documents. A submittal schedule is commonly used to facilitate the approval process.

If the approval documents are approved subject to corrections noted, the owner’s designated representative for design may or may not require that it be resubmitted for record purposes following correction. If the approval documents are not approved, revisions must be made and the documents resubmitted until approval is achieved.

4.4.1. Approval, approval subject to corrections noted, and similar approvals of the approval documents shall constitute the following:

(a) Confirmation that the fabricator has correctly interpreted the contract documents in the preparation of those submittals.

(b) Confirmation that the owner’s designated representative for design has reviewed and approved the connection details shown in the approval documents and submitted in accordance with Section 3.1.1, if applicable.

(c) Release by the owner’s designated representatives for design and construction for the fabricator to begin fabrication using the approved submittals.
Such approval shall not relieve the fabricator of the responsibility for either the accuracy of the detailed dimensions in the approval documents or the general fit-up of parts that are to be assembled in the field. The fabricator shall determine the fabrication schedule that is necessary to meet the requirements of the contract.

Commentary:
When considering the current language in this Section, the Committee sought language that would parallel the practices of CASE. In CASE Document 962, CASE indicates that when the design of some element of the primary structural system is left to someone other than the structural engineer of record, “…such elements, including connections designed by others, should be reviewed by the structural engineer of record. He [or she] should review such designs and details, accept or reject them and be responsible for their effects on the primary structural system.” Historically, this Code has embraced this same concept.

From the inception of this Code, AISC and the industry in general have recognized that only the owner’s designated representative for design has all the information necessary to evaluate the total impact of connection details on the overall structural design of the project. This authority traditionally has been exercised during the approval process for the approval documents. The owner’s designated representative for design has thus retained responsibility for the adequacy and safety of the entire structure since at least the 1927 edition of this Code.

The fabricator, the erector, the owner, and the general public rely on the owner’s designated representative for construction to assume this responsibility. When no revisions or corrections to the approval drawings are required, the use of language other than “approved” in the required annotation of the approval documents does not alter that relationship.

4.4.2. Unless otherwise noted, any additions, deletions or revisions that are indicated in responses to RFIs or on the approved approval documents shall constitute authorization by the owner that the additions, deletions or revisions are released for construction. The fabricator and the erector shall promptly notify the owner’s designated representative for construction when any direction or notation in responses to RFIs or on the approval documents or other information will result in an additional cost and/or a delay. See Sections 3.5 and 9.3.

Commentary:
When the fabricator notifies the owner’s designated representative for construction that a direction or notation in responses to RFIs or on the approval documents will result in an additional cost or a delay, it is then normally the responsibility of the owner’s designated representative for construction to subsequently notify the owner’s designated representative for design.
4.5. Fabrication and/or Erection Documents Not Furnished by the Fabricator

When the fabrication and *erection documents* are not prepared by the *fabricator*, but are furnished by others, they shall be delivered to the *fabricator* in a timely manner, or as agreed upon in the *contract documents*. These fabrication and *erection documents* shall be prepared, insofar as is practical, in accordance with the shop fabrication and detailing standards of the *fabricator*. The *fabricator* shall not be responsible for the completeness, coordination, or accuracy of fabrication and *erection documents* so furnished, nor for the general fit-up of the members that are fabricated from them.

**Commentary:**
This delivery system of fabrication and *erection documents* is discouraged. The preparation of the fabrication and *erection documents* is very specific to the needs of the *fabricator* performing the work, and an integral part of the constructability and coordination assurance of the project. If the project team chooses to use this delivery method, the *contract documents* should be very clear as to the managing of this process, including, but not limited to, who and how the following will be handled:

- Standards, format and contents of the fabrication and *erection documents*, or representative documents that will be part of the *contract documents*, for the mill order and for fabrication, including field bolts.
- Provisions for proper risk management (errors and omissions or product liability, as applicable).
- Normal “pre-detailing” sequencing, OSHA erection aids, and other Sub Part R requirements incorporated.
- Schedule updates for documents, and impact to overall project schedule and contract, as these dates are impacted.
- Revision of fabrication and *erection documents* and control of in order to maintain the integrity of all parts of the fabrication and *erection documents*.
- Late released items.
- Shop question support, including those that arise on night shifts and weekends.
- Joist, deck and other commodity item question and coordination support.
- Field question support.

4.6. The RFI Process

When requests for information (*RFIs*) are issued, the process shall include the maintenance of a written record of inquiries and responses related to interpretation and implementation of the *contract documents*, including the *clarifications* and/or *revisions* to the *contract documents* that result, if any. *RFIs* shall not be used for the incremental release for construction of the design
documents. When RFIs involve discrepancies or revisions, see Sections 3.3, 3.5 and 4.4.2.

When a design model is used as the design documents, the changes and/or clarifications made in response to RFIs shall be incorporated into the design model.

Commentary:
The RFI process is most commonly used during the detailing process, but can also be used to forward inquiries by the erector or to inform the owner’s designated representative for design in the event of a fabricator or erector error and to develop corrective measures to resolve such errors.

The RFI process is intended to provide a written record of inquiries and associated responses but not to replace all verbal communication between the parties on the project. RFIs should be prepared and responded to in a timely fashion so as not to delay the work of the steel detailer, fabricator and erector. Discussion of the RFI issues and possible solutions between the fabricator, erector and owner’s designated representatives for design and construction often can facilitate timely and practical resolution. Unlike submittals in Section 4.4, RFI response time can vary depending on the urgency of the issue, the amount of work required by the owner’s designated representatives for design and construction to develop a complete response, and other circumstances, such as building official approval.

RFIs should be prepared in a standardized format, including RFI number and date, identity of the author, reference to a specific location(s) in the design documents or specification section, the needed response date, a description of a suggested solution (graphic depictions are recommended for more complex issues), and an indication of possible schedule and cost impacts. RFIs should be limited to one question each (unless multiple questions are interrelated to the same issue) to facilitate the resolution and minimize response time. Questions and proposed solutions presented in RFIs should be clear and complete. RFI responses should be equally clear and complete in the depictions of the solutions, and signed and dated by the responding party.

Unless otherwise noted, the fabricator and erector can assume that a response to an RFI constitutes a release for construction. However, if the response will result in an increase in cost or a delay in schedule, Section 4.4.2 requires that the fabricator and/or erector promptly inform the owner’s designated representatives for design and construction.

4.7 Erection Documents

The erection documents shall be provided to the erector in a timely manner so as to allow the erector to properly plan and perform the work.
Commentary:
For planning purposes, this may include release of preliminary *erection documents*, if requested by the *erector*. 

\[1698\]
\[1699\]
\[1700\]
SECTION 5. MATERIALS

5.1. Mill Materials

Unless otherwise noted in the contract documents, the fabricator is permitted to order the materials that are necessary for fabrication when the fabricator receives contract documents that have been released for construction.

Commentary:
The fabricator may purchase materials in stock lengths, exact lengths or multiples of exact lengths to suit the dimensions shown in the structural design documents. Such purchases will normally be job-specific in nature and may not be suitable for use on other projects or returned for full credit if subsequent design changes make these materials unsuitable for their originally intended use. The fabricator should be paid for these materials upon delivery from the mill, subject to appropriate additional payment or credit if subsequent unanticipated modification or reorder is required. Purchasing materials to exact lengths is not considered fabrication.

5.1.1. Unless otherwise specified by means of special testing requirements in the contract documents, mill testing shall be limited to those tests that are required for the material in the ASTM specifications indicated in the contract documents.

Materials ordered to special material requirements shall be marked by the supplier as specified in the ASTM standard to which the product is ordered prior to delivery to the fabricator’s shop or other point of use. Such material not so marked by the supplier, shall not be used until:

(a) Its identification is established by means of testing in accordance with the applicable ASTM specifications, and
(b) A fabricator’s identification mark, as described in Section 6.1.2 and 6.1.3, has been applied.

5.1.2. When mill material or built up material does not satisfy the tolerances of the ASTM standards for the product form for camber, profile, flatness or sweep, the fabricator shall be permitted to perform corrective procedures, including the use of controlled heating and/or mechanical straightening, subject to the limitations found in ANSI/AISC 370.

Commentary:
Dimensional tolerances for mill or built up stainless steel are set forth in the ASTM standards for each product. Normal variations in the cross-sectional geometry of standard stainless steel structural shapes must be recognized by the designer, the fabricator, the steel detailer, and the erector. Geometric perfection...
of the cross section is not necessary for either structural or architectural reasons, if the tolerances are recognized and provided for. The product or general requirements standards for each ASTM also stipulate tolerances for straightness that are adequate for typical construction. However, these characteristics may be controlled or corrected to closer tolerances during the fabrication process when the added cost is justified by the special requirements for an atypical project.

The fabricator should be in close communication with the mill in the case where out of tolerance material is discovered. The remediation methods may vary greatly depending upon the processes used to make the section.

5.1.3. When the surface of the structural stainless steel has variations that exceed the tolerances found in the ASTM or AWS standards for the product form are discovered or occur after the receipt of mill or built up material the fabricator shall, at the fabricator's option, be permitted to perform the corrective procedures prescribed in the applicable ASTM standard for that form for mill reconditioning of the surface of structural stainless steel shapes and plates. Should the applicable ASTM standard not include corrective procedures for mill reconditioning, the fabricator may propose remediation procedures to the owner's designated representative for design for review and approval.

5.1.4. When special tolerances that are more restrictive than those in the ASTM standards are required for mill materials, such special tolerances shall be specified in the contract documents. The fabricator shall, at the fabricator's option, be permitted to order material to ASTM standard tolerances and subsequently perform the corrective procedures described in Sections 5.1.2 and 5.1.3.

5.2. Stock Materials

5.2.1. Stock material that does not have mill certifications or material test reports from an independent lab shall not be used.

5.2.2. Stock materials that are purchased under no particular specification or under a specification that is less rigorous than the applicable ASTM specifications shall not be used without the approval of the owner's designated representative for design.

5.2.3. Mill certifications or material test reports from an independent certified lab shall be accepted as sufficient record of the quality of materials taken from stock by the fabricator. The fabricator shall review and retain the mill certifications or material test reports that cover such stock materials. However, the fabricator...
need not maintain records that identify individual pieces of stock material against individual material test reports, provided the fabricator purchases stock materials that meet the requirements for material grade and quality in the applicable ASTM specifications.
6.1. Identification of Material

6.1.1. The fabricator shall be able to demonstrate by written procedure and actual practice a method of material identification, visible up to the point of assembling members as follows:

(a) For all material, identification capability shall include shape designation, stainless steel alloy, and where appropriate, its strength grade, condition, or heat treatment. Representative mill certifications and material test reports shall be furnished by the fabricator if requested to do so by the owner’s designated representative for design, either in the contract documents or in separate written instructions given to the fabricator prior to ordering mill materials.

(b) For material ordered in accordance with an ASTM supplementary or other special material requirements in the contract documents, identification capability shall include stainless steel alloy, and where appropriate, its strength grade, condition, or heat treatment, and independent laboratory test reports (if required) or mill certification documenting compliance with supplementary requirements with heat number. The corresponding material test reports shall be furnished by the fabricator if requested to do so by the owner’s designated representative for design, either in the contract documents or in separate written instructions given to the fabricator prior to ordering mill materials.

6.1.2. During fabrication, up to the point of assembling members, each piece of material that is ordered to special material requirements shall carry a fabricator’s identification mark or an original supplier’s identification mark. The fabricator’s identification mark shall be in accordance with the fabricator’s established material identification system, which shall be on record and available prior to the start of fabrication for the information of the owner’s designated representative for construction, the building code authority and the inspector.

Commentary:
In many applications fabricator’s marks may adversely affect either the appearance or corrosion resistance of the structural stainless steel elements. The fabricator’s marks shall be of a size and location that does not cause unacceptable blemishing of the surface after erection.

6.1.3. Members that are made of material that is ordered to special material requirements shall not be given the same assembling or erection mark as members made of other material, even if they are of identical dimensions and detail.
6.2. Preparation of Material

6.2.1. Plasma or laser cutting of *structural stainless steel* by hand-guided or mechanically guided means is permitted.

6.2.2. Surfaces of cut edges that are specified as “finished”, with no further definition, in the *contract documents* shall have a roughness height value measured in accordance with ASME B46.1 that is equal to or less than 500 μin. (12.7 μm). The use of any fabricating technique that produces such a finish is permitted.

**Commentary:**
Most cutting processes, including friction sawing and cold sawing, and milling processes meet a surface roughness limitation of 500 μin. (12.7 μm) per ASME B46.1. Note that a 500 μin. (12.7 μm) is too rough to provide good corrosion resistance for uncoated *stainless steel* in an aggressive environment.

6.3. Fitting and Fastening

6.3.1. Projecting elements of *connection* materials need not be straightened in the connecting plane, subject to the limitations in ANSI/AISC 370.

6.3.2. Backing and runoff tabs shall be used in accordance with AWS D1.6/D1.6M as required to produce sound welds. The *fabricator* or erector need not remove backing or runoff tabs unless such removal is specified in the *contract documents*. When the removal of backing is specified in the *contract documents*, such removal shall meet the requirements in AWSD1.6/D1.6M. When the removal of runoff tabs is specified in the *contract documents*, hand plasma or laser cutting close to the edge of the finished member with no further finishing is permitted, unless other finishing is specified in the *contract documents*.

**Commentary:**
In most cases, the treatment of backing and runoff tabs is left to the discretion of the *owner’s designated representative for design*. In some cases, treatment beyond the basic cases described in this Section may be required. As one example, special treatment is required for backing and runoff tabs in beam-to-column moment *connections* when the requirements in ANSI/AISC 341 must be met. In all cases, the *owner’s designated representative for design* should specify the required treatments in the *contract documents*.

6.3.3. Unless otherwise noted in the *fabrication documents*, high-strength bolts for shop-attached *connection* material shall be installed in the shop in accordance with the requirements in ANSI/AISC 370.
6.4. Fabrication Tolerances

The tolerances on structural stainless steel fabrication shall be in accordance with the requirements in Section 6.4.1 through 6.4.6.

Commentary:
Fabrication tolerances are stipulated in several specifications and codes, each applicable to a specialized area of construction. Basic fabrication tolerances are stipulated in this Section. For architecturally exposed structural stainless steel, see Section 10. Other specifications and codes are also commonly incorporated by reference in the contract documents, such as ANSI/AISC 370 and, AWS D1.6/D1.6M.

6.4.1. For members that have both ends finished (see Section 6.2.2) for contact bearing, the variation in the overall length shall be equal to or less than 1/32 in. (1 mm). For other members that frame to other structural stainless steel elements, the variation in the detailed length shall be as follows:

(a) For members that are equal to or less than 30 ft (9 000 mm) in length, the variation shall be equal to or less than 1/16 in. (2 mm).
(b) For members that are greater than 30 ft (9 000 mm) in length, the variation shall be equal to or less than 1/8 in. (3 mm).

Commentary:
Care should be taken in the measurement of precision elements, including a consideration of thermal expansion.

6.4.2. For straight and curved structural members, whether of a single standard structural shape or built-up, the permitted variation in specified straightness or curvature shall be as listed below. In all cases, completed members shall be free of twists (except as allowed by ASTM standards), bends and open joints. Sharp kinks or sharp bends shall be cause for rejection.

(a) For straight structural members other than compression members, the variation in straightness shall be equal to or less than that specified for structural shapes in the applicable ASTM standards except when a smaller variation is specified in the contract documents. In the absence of applicable ASTM standards for structural stainless steel shapes, the straightness tolerance found in ASTM A484/A484M, Table 12 shall apply to structural stainless steel shapes.

For straight compression members, the variation in straightness shall be equal to or less than 1/1000 of the axial length between points that are to be laterally supported.
COMMENTARY:

Straightness, camber, and twist tolerances may need to be part of the ordering information in order to achieve the tolerances found in ASTM A484/A484M, Table 12.

(b) For curved structural members, the variation in the chord length shall be as defined in Section 6.4.1. Unless otherwise specified in the design documents, the maximum variation in curvature measured at the middle ordinate shall be plus or minus 1/8 in. (3 mm) times one-fifth the total arc length in ft (times two-thirds the total arc length in m) for members 10 ft (3 m) or greater in length. For members less than 10 ft (3 m) in length, the permissible variation in curvature measured at the middle ordinate shall be plus or minus 1/8 in. (3 mm). The middle ordinate is located between work points as shown in Figure C-6.1.

COMMENTARY:

Curved structural members, as referred to in this section, are defined as those members intended to maintain a specified curvature while in use. This section does not apply to members specified for camber. The location of the arc length is defined by the contract drawings and may be either at the member’s inside radius, the outside radius, or the radius between work points.

6.4.3. For beams that are detailed without specified camber, the member shall be fabricated so that, after erection, any incidental camber due to rolling or shop fabrication is upward. For trusses that are detailed without specified camber, the components shall be fabricated so that, after erection, any incidental camber in the truss due to rolling or shop fabrication is upward.

6.4.4. For beams that are specified in the contract documents with camber, beams received by the fabricator with 75% of the specified camber shall require no further cambering. Otherwise, the variation in camber shall be as follows:

(a) For beams that are equal to or less than 50 ft (15 000 mm) in length, the variation shall be equal to or less than minus zero / plus 1/2 in. (13 mm).
Fig. C-6.1. Illustration of the tolerance on curved structural steel member.

(b) For beams that are greater than 50 ft (15,000 mm) in length, the variation shall be equal to or less than minus zero/plus 1/2 in. plus 1/8 in. for each 10 ft or fraction thereof (13 mm plus 3 mm for each 3,000 mm or fraction thereof) in excess of 50 ft (15,000 mm) in length.

For the purpose of inspection, camber shall be measured in the fabricator's shop in the unstressed condition.

**Commentary:**

There is no known way to inspect beam camber after the beam is received in the field because of factors that include:

(a) The release of stresses in members over time and in varying applications.
(b) The effects of the dead weight of the member.
(c) The restraint caused by the end connections in the erected state.
(d) The effects of additional dead load that may ultimately be intended to be applied, if any.

Therefore, inspection of the fabricator's work on beam camber must be done in the fabrication shop in the unstressed condition.

6.4.5. For fabricated trusses that are specified in the contract documents with camber, the variation in camber at each specified camber point shall be equal to or less than plus or minus 1/800 of the distance to that point from the nearest point of support. For the purpose of inspection, camber shall be measured in the fabricator's shop in the unstressed condition. For fabricated trusses that are specified in the contract documents without indication of camber, the foregoing
requirements shall be applied at each panel point of the truss with a zero camber ordinate.

**Commentary:**

There is no known way to inspect truss camber after the truss is received in the field because of factors that include:

(a) The effects of the dead weight of the member.
(b) The restraint caused by the truss connections in the erected state.
(c) The effects of additional dead load that may ultimately be intended to be applied, if any.

Therefore, inspection of the fabricator’s work on truss camber must be done in the fabrication shop in the unstressed condition. See Figure C-6.2.

6.4.6. When permissible variations in the depths of beams and girders result in abrupt changes in depth at splices, such deviations shall be accounted for as follows:

(a) For splices with bolted joints, the variations in depth shall be taken up with filler plates.
(b) For splices with welded joints, the weld profile shall be adjusted to conform to the variations in depth, the required cross section of weld shall be provided and the slope of the weld surface shall meet the requirements in AWS D1.6/D1.6M or, if a laser or laser hybrid welded section is specified, ASTM A1069.
6.5. Shop Cleaning and Finishing (see also Section 3.1.6)

The finish required on structural stainless steel shall be specified in the contract documents. Structural stainless steel that has no special finish requirements shall be supplied with no coatings and it shall be cleaned of oil and grease with solvent cleaners, steel contamination, and of dirt and other foreign material by sweeping with a fiber brush or other suitable means in accordance with ASTM A967. For deeply embedded steel, removal shall be in compliance with ASTM A380.

Commentary:
There are a wide variety of finishes and surface treatments available. The type of surface finish may have implications on the long-term performance of the structural stainless steel elements, with smoother finishes providing better corrosion performance.

If the contract documents specify that the structural stainless steel is to have a finish other than as ordered from the mill, the fabricator shall perform such operations as required with clean media and appropriate tools that impart no foreign matter on the surface of the structural stainless steel. The work shall be performed in an area that is free of airborne steel and other contaminants.

Commentary:
The use of recycled blast media, recycled abrasives, and steel wire brushes may all leave stainless steel with steel embedded on its surface. This will stain under...
normal atmospheric conditions. Proper tooling and a shop environment that is
free of airborne steel are required to produce structural stainless steel that will
not stain under normal atmospheric conditions.

6.6. Marking and Shipping of Materials

6.6.1. Unless otherwise specified in the contract documents, erection marks shall be
applied to the structural stainless steel members by painting or other suitable
means in accordance to the guidelines in ANSI/AISC 370 Section M2.

6.6.2. Bolt assemblies and loose bolts, nuts and washers shall be shipped in separate
closed containers according to length and diameter, as applicable. Pins and other
small parts and packages of bolts, nuts and washers shall be shipped in boxes,
crates, kegs or barrels. A list and description of the material shall appear on the
outside of each closed container.

6.7. Delivery of Materials

6.7.1. Fabricated structural stainless steel shall be delivered in a sequence that will
permit efficient and economical fabrication and erection and that is consistent
with requirements in the contract documents. If the owner or owner’s designated
representative for construction wishes to prescribe or control the sequence of
delivery of materials, that entity shall specify the required sequence in the
contract documents. If the owner’s designated representative for construction
contracts separately for delivery and for erection, the owner’s designated
representative for construction shall coordinate planning between contractors.

6.7.2. Anchor rods, washers, nuts and other anchorage or grillage materials that are to
be built into concrete or masonry shall be shipped so that they will be available
when needed. The owner’s designated representative for construction shall allow
the fabricator sufficient time to fabricate and ship such materials before they are
needed.

6.7.3. If any shortage is claimed relative to the quantities of materials that are shown in
the shipping statements, the owner’s designated representative for construction
or the erector shall promptly notify the fabricator so that the claim can be
investigated.

Commentary:
The quantities of material that are shown in the shipping statement are
customarily accepted as correct by the owner’s designated representative for
construction, the fabricator and the erector.
6.7.4. Unless otherwise specified in the contract documents, and subject to the approved approval documents, the fabricator shall limit the number of field splices to that consistent with minimum project cost.

Commentary:
This Section recognizes that the size and weight of structural stainless steel assemblies may be limited by shop capabilities, the permissible weight and clearance dimensions of available transportation or job-site conditions.

6.7.5. If material arrives at its destination in damaged condition, the receiving entity shall promptly notify the fabricator and carrier prior to unloading the material, or promptly upon discovery prior to erection.
SECTION 7. ERECTION

7.1. Method of Erection

Fabricated stainless structural stainless steel shall be erected using methods and a sequence that will permit efficient and economical performance of erection, and that is consistent with the requirements in the contract documents. If the owner or owner’s designated representative for construction wishes to prescribe or control the method and/or sequence of erection, or specifies that certain members cannot be erected in their normal sequence, that entity shall specify the required method and sequence in the contract documents. If the owner’s designated representative for construction contracts separately for fabrication services and for erection services, the owner’s designated representative for construction shall coordinate planning between contractors.

Commentary:
Design modifications are sometimes requested by the erector to allow or facilitate the erection of the structural stainless steel frame. When this is the case, the erector should notify the fabricator prior to the preparation of the approval documents so that the fabricator may refer the erector’s request to the owner’s designated representatives for design and construction for resolution.

7.2. Job-Site Conditions

The owner’s designated representative for construction shall provide and maintain the following for the fabricator and the erector:

(a) Adequate access roads into and through the job site for the safe delivery and movement of the material to be erected and of derricks, cranes, trucks and other necessary equipment under their own power.

(b) A firm, properly graded, drained, convenient and adequate space at the job site for the operation of the erector’s equipment, free from overhead obstructions, such as power lines, telephone lines or similar conditions.

(c) Adequate storage space, when the structure does not occupy the full available job site, to enable the fabricator and the erector to operate at maximum practical speed. The storage space shall allow for the separation of structural stainless steel and carbon or alloy structural steel.

Otherwise, the owner’s designated representative for construction shall inform the fabricator and the erector of the actual job-site conditions and/or special delivery requirements prior to bidding.
7.3. **Foundations, Piers and Abutments**

The accurate location, strength and suitability of, and access to, all foundations, piers and abutments shall be the responsibility of the *owner's designated representative for construction*.

7.4. **Lines and Benchmarks**

The *owner's designated representative for construction* shall be responsible for the accurate location of lines and benchmarks at the job site and shall furnish the *erector* with a plan that contains all such information. The *owner's designated representative for construction* shall establish offset lines and reference elevations at each level for the *erector’s* use in the positioning of *adjustable items* (see Section 7.13.1.3), if any.

7.5. **Installation of Anchor Rods, Foundation Bolts, and Other Embedded Items**

7.5.1. Anchor rods, foundation bolts, and other embedded items shall be set by the *owner’s designated representative for construction* in accordance with *embedment drawings* that have been approved by the *owner’s designated representatives for design and construction*. The variation in location of these items from the dimensions shown in the approved *embedment drawings* shall be as follows:

(a) The vertical variation in location from the specified top of *anchor rod* location shall be equal to or less than plus or minus 1/2 in. (13 mm).

(b) The horizontal variation in location from the specified position of each *anchor rod* centerline at any location along its projection above the concrete shall be equal to or less than the dimensions given for the *anchor rod* diameters listed as follows:

<table>
<thead>
<tr>
<th>Anchor rod diameter, in. (mm)</th>
<th>Horizontal Variation, in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 and 7/8 (19 and 22)</td>
<td>1/4 (6)</td>
</tr>
<tr>
<td>1, 1-1/4, 1-1/2 (25, 31, 38)</td>
<td>3/8 (10)</td>
</tr>
<tr>
<td>1-3/4, 2, 2-1/2 (44, 50, 63)</td>
<td>1/2 (13)</td>
</tr>
</tbody>
</table>

**Commentary:**

The tolerances established in this Section have been selected for compatibility with the holes sizes that are recommended for base plates. This work was a collaboration of the ACI and the AISC to accommodate standard anchor rod placement. If special conditions require more restrictive tolerances, such as for smaller holes, the required tolerances should be stated in the *contract documents*. When the *anchor rods* are set in sleeves, the adjustment provided may be used to satisfy the required anchor-rod setting tolerances.
7.5.2. Unless otherwise specified in the contract documents, anchor rods shall be set with their longitudinal axis perpendicular to the theoretical bearing surface.

7.5.3. Embedded items and connection materials that are part of the work of other trades, but that will receive stainless structural stainless steel, shall be located and set by the owner’s designated representative for construction in accordance with an approved embedment drawing. The variation in location of these items shall be limited to a magnitude that is consistent with the tolerances that are specified in Section 7.13 for the erection of the structural stainless steel. Embedded items and connection materials that are part of work of other trades shall be marked in such a way as to indicate whether the embedded items are carbon, alloy or stainless steel.

7.5.4. All work that is performed by the owner’s designated representative for construction shall be completed so as not to delay or interfere with the work of the fabricator and the erector. The owner’s designated representative for construction shall conduct a survey of the as-built locations of anchor rods, foundation bolts and other embedded items, and shall verify that all items covered in Section 7.5 meet the corresponding tolerances. When corrective action is necessary, the owner’s designated representative for construction shall obtain the guidance and approval of the owner’s designated representative for design.

Commentary:
Few fabricators or erectors have the capability to provide this survey. Under standard practice, it is the responsibility of others.

7.6. Installation of Bearing Devices

All leveling plates, leveling nuts and washers, and loose base and bearing plates that can be handled without a derrick or crane are set to line and grade by the owner’s designated representative for construction. Loose base and bearing plates that require handling with a derrick or crane shall be set by the erector to lines and grades established by the owner’s designated representative for construction. The fabricator shall clearly scribe loose base and bearing plates with lines or other suitable marks to facilitate proper alignment.

Promptly after the setting of bearing devices, the owner’s designated representative for construction shall check them for line and grade. The variation in elevation relative to the established grade for all bearing devices shall be equal to or less than plus or minus 1/8 in. (3 mm). The final location of bearing devices shall be the responsibility of the owner’s designated representative for construction.
Commentary:
The 1/8 in. (3 mm) tolerance on elevation of bearing devices relative to established grades is provided to permit some variation in setting bearing devices, and to account for the accuracy that is attainable with standard surveying instruments. The use of leveling plates larger than 22 in. by 22 in. (550 mm by 550 mm) is discouraged and grouting is recommended with larger sizes. For the purposes of erection stability, the use of leveling nuts and washers is discouraged when base plates have less than four anchor rods.

7.7. Grouting

Grouting shall be the responsibility of the owner's designated representative for construction. Leveling plates and loose base and bearing plates shall be promptly grouted after they are set and checked for line and grade. Columns with attached base plates, beams with attached bearing plates and other similar members with attached bearing devices that are temporarily supported on leveling nuts and washers, shims or other similar leveling devices, shall be promptly grouted after the structural stainless steel frame or portion thereof has been plumbed.

Commentary:
In the majority of structures the vertical load from the column bases is transmitted to the foundations through structural grout. In general, there are three methods by which support is provided for column bases during erection:

(a) Pre-grouted leveling plates or loose base plates.
(b) Shims.
(c) Leveling nuts and washers on the anchor rods beneath the column base.

Standard practice provides that loose base plates and leveling plates are to be grouted as they are set. Bearing devices that are set on shims or leveling nuts are grouted after plumbing, which means that the weight of the erected structural stainless steel frame is supported on the shims or washers, nuts and anchor rods. The erector must take care to ensure that the load that is transmitted in this temporary condition does not exceed the strength of the shims or washers, nuts and anchor rods. These considerations are presented in greater detail in AISC Design Guide 1, Base Plate and Anchor Rod Design, and AISC Design Guide 10, Erection Bracing of Low-Rise Structural Steel Frames.

7.8. Field Connection Material

7.8.1. The fabricator shall provide field connection details that are consistent with the requirements in the contract documents and that will, in the fabricator's opinion, result in economical fabrication and erection.
7.8.2. When the fabricator is responsible for erecting the structural stainless steel, the fabricator shall furnish all materials that are required for both temporary and permanent connection of the component parts of the structural stainless steel frame.

7.8.3. When the erection of the structural stainless steel is not performed by the fabricator, the fabricator shall furnish the following field connection material:

(a) Bolts, nuts and washers in sufficient quantity for all structural stainless steel-to-structural stainless steel field connections that are to be permanently bolted. The fabricator shall include an extra 2% plus 3 bolts, subject to a minimum of 5 extra bolts, of each grade, type, diameter, length, and production lot number. Bolt material, alloy grade, and type shall be as specified in the contract documents.

(b) Shims that are shown as necessary for make-up of permanent structural stainless steel-to-structural stainless steel field connections.

(c) Backing and run-off tabs that are required for field welding.

7.8.4. The erector shall furnish all welding electrodes, fit-up bolts and drift pins used for the erection of the structural stainless steel. Non-steel backing, if used, shall be furnished by the erector.

7.8.5 The supplier of temporary supports, backing, and other erection aids shall take all care necessary to provide materials that are compatible with the structural stainless steel and its intended long term surface finish. Galvanized bolts shall not be supplied without the approval of the owner’s designated representative for construction.

**Commentary:**

For temporary bracing and supports, bolts used to join structural stainless steel to itself and to carbon or alloy steel should be of material and grade that is either equal in corrosion resistance or better than the neighboring materials. Galvanized bolts are generally not appropriate even for short term use.

The use of carbon or alloy steel temporary bracing and assembly fixtures can leave the surface of structural stainless steel contaminated. Where finished structural stainless steel is specified, the fabricator and erector need to protect against contamination and damage. If contamination occurs the corrosion resistance of the structural stainless steel should be restored using ASTM A967 or ASTM A380 depending on the severity of the damage.

See the Commentary for Section 2.2.
7.9. **Loose Material**

Unless otherwise specified in the contract documents, loose structural stainless steel items that are not connected to the structural stainless steel frame shall be set by the owner’s designated representative for construction without assistance from the erector.

7.10. **Temporary Support of Structural Stainless Steel Frames**

7.10.1. The owner’s designated representative for design shall identify the following in the contract documents:

(a) The lateral force-resisting system and connecting diaphragm elements that provide for lateral strength and stability in the completed structure.

(b) Any special erection conditions or other considerations that are required by the design concept, such as the use of shores, jacks or loads that must be adjusted as erection progresses to set or maintain camber, position within specified tolerances or prestress.

**Commentary:**

The intent of Section 7.10.1 of the Code is to alert the owner’s designated representative for construction and the erector of the means for lateral force resistance in the completed structure so that appropriate planning can occur for construction of the building. Examples of a description of the lateral force-resisting system as required in Section 7.10.1(a) are shown in the following.

Example 1 is an all-steel building with a composite metal deck and concrete floor system. All lateral force resistance is provided by welded moment frames in each orthogonal building direction. One suitable description of this lateral force-resisting system is:

All lateral force resistance and stability of the building in the completed structure is provided by moment frames with welded beam to column connections framed in each orthogonal direction (see plan sheets for locations). The composite metal deck and concrete floors serve as horizontal diaphragms that distribute the lateral wind and seismic forces horizontally to the vertical moment frames. The vertical moment frames carry the applied lateral loads to the building foundation.

Example 2 is a steel-framed building with a composite metal deck and concrete floor system. All beam-to-column connections are simple connections and all lateral force resistance is provided by reinforced concrete shear walls in the building core and in the stairwells. One suitable description of this lateral force-resisting system is:
All lateral force resistance and stability of the building in the completed structure is provided exclusively by cast-in-place reinforced concrete shear walls in the building core and stairwells (see plan sheets for locations). These walls provide all lateral force resistance in each orthogonal building direction. The composite metal deck and concrete floors serve as horizontal diaphragms that distribute the lateral wind and seismic forces horizontally to the concrete shear walls. The concrete shear walls carry the applied lateral loads to the building foundation.

See also Commentary Section 7.10.3.

Section 7.10.1(b) is intended to apply to special requirements inherent in the design concept that could not otherwise be known by the erector. Such conditions might include designs that require the use of shores or jacks to impart a load or to obtain a specific elevation or position in a subsequent step of the erection process in a sequentially erected structure or member. These requirements would not be apparent to an erector, and must be identified so the erector can properly bid, plan and perform the erection.

The erector is responsible for installation of all members (including cantilevered members) to the specified plumbness, elevation and alignment within the erection tolerances specified in this Code. The erector must provide all temporary supports and devices to maintain elevation or position within these tolerances. These works are part of the means and methods of the erector and the owner’s designated representative for design need not specify these methods or related equipment.

See also the preset requirements for cantilevered members in Section 3.1.

7.10.2. The owner’s designated representative for construction shall indicate to the erector prior to bidding, the installation schedule for non-structural stainless steel elements of the lateral force-resisting system and connecting diaphragm elements identified by the owner’s designated representative for design in the contract documents.

Commentary:

See Commentary Section 7.10.3.
are unpredictable, such as loads due to hurricane, tornado, earthquake, explosion or collision. Temporary supports that are required during or after the erection of the structural stainless steel frame for the support of loads caused by non-structural stainless steel elements, including cladding, interior partitions and other such elements that will induce or transmit loads to the structural stainless steel frame during or after erection, shall be the responsibility of others.

Commentary:
Many structural stainless steel frames have lateral force-resisting systems that are activated during the erection process. Such lateral force-resisting systems may consist of welded moment frames, braced frames or, in some instances, columns that cantilever from fixed-base foundations. Such frames are normally braced with temporary guys that, together with the steel deck floor and roof diaphragms or other diaphragm bracing that may be included as part of the design, provide stability during the erection process. The guy cables are also commonly used to plumb the structural stainless steel frame. The erector normally furnishes and installs the required temporary supports and bracing to secure the bare structural stainless steel frame, or portion thereof, during the erection process. When erection bracing drawings are required in the contract documents, those drawings show this information.

If the owner’s designated representative for construction determines that steel decking is not installed by the erector, temporary diaphragm bracing may be required if a horizontal diaphragm is not available to distribute loads to the vertical and lateral force-resisting system. If the steel deck will not be available as a diaphragm during structural stainless steel erection, the owner’s designated representative for construction must communicate this condition to the erector prior to bidding. If such diaphragm bracing is required, it must be furnished and installed by the erector.

Sometimes structural systems that are employed by the owner’s designated representative for design rely upon other elements besides the structural stainless steel frame for lateral force resistance. For instance, concrete or masonry shear walls or precast spandrels may be used to provide resistance to vertical and lateral forces in the completed structure. Because these situations may not be obvious to the contractor or the erector, it is required in this Code that the owner’s designated representative for design must identify such situations in the contract documents. Similarly, if a structure is designed so that special erection techniques are required, such as jacking to impose certain loads or position during erection, it is required in this Code that such requirements be specifically identified in the contract documents.

In some instances, the owner’s designated representative for design may elect to show erection bracing in the structural design documents. When this is the case, the owner’s designated representative for design should then confirm that
the bracing requirements were understood by review and approval of the erection documents during the submittal process.

Sometimes during construction of a building, collateral building elements, such as exterior cladding, may be required to be installed on the bare structural stainless steel frame prior to completion of the lateral force-resisting system. These elements may increase the potential for lateral loads on the temporary supports. Such temporary supports may also be required to be left in place after the structural stainless steel frame has been erected. Special provisions should be made by the owner’s designated representative for construction for these conditions.

7.10.4. All temporary supports that are required for the erection operation and furnished and installed by the erector shall remain the property of the erector and shall not be modified, moved or removed without the consent of the erector. Temporary supports provided by the erector shall remain in place until the portion of the structural stainless steel frame that they brace is complete and the lateral force-resisting system and connecting diaphragm elements identified by the owner’s designated representative for design in accordance with Section 7.10.1 are installed. Temporary supports that are required to be left in place after the completion of structural stainless steel erection shall be removed when no longer needed by the owner’s designated representative for construction and returned to the erector in good condition.

7.11. Safety Protection

7.11.1. The erector shall provide floor coverings, handrails, walkways and other safety protection for the erector’s personnel as required by law and the applicable safety regulations. Unless otherwise specified in the contract documents, the erector is permitted to remove such safety protection from areas where the erection operations are completed.

7.11.2. When safety protection provided by the erector is left in an area for the use of other trades after the structural stainless steel erection activity is completed, the owner’s designated representative for construction shall:

(a) Accept responsibility for and maintain this protection.
(b) Indemnify the fabricator and the erector from damages that may be incurred from the use of this protection by other trades.
(c) Ensure that this protection is adequate for use by other affected trades.
(d) Ensure that this protection complies with applicable safety regulations when being used by other trades.
(e) Remove this protection when it is no longer required and return it to the erector in the same condition as it was received.
7.11.3. Safety protection for other trades that are not under the direct employment of the erecter shall be the responsibility of the owner’s designated representative for construction.

7.11.4. When permanent steel decking is used for protective flooring and is installed by the owner’s designated representative for construction, all such work shall be scheduled and performed in a timely manner so as not to interfere with or delay the work of the fabricator or the erecter. The sequence of installation that is used shall meet all safety regulations.

7.11.5. Unless the interaction and safety of activities of others, such as construction by others or the storage of materials that belong to others, are coordinated with the work of the erecter by the owner’s designated representative for construction, such activities shall not be permitted until the erection of the structural stainless steel frame or portion thereof is completed by the erecter and accepted by the owner’s designated representative for construction.

7.12. Structural Stainless Steel Frame Tolerances

The accumulation of the mill tolerances and fabrication tolerances shall not cause the erection tolerances to be exceeded.

Commentary:
It is recognized in the current provision in this Section that accumulations of mill tolerances and fabrication tolerances generally occur between the locations at which erection tolerances are applied, and not at the same locations.

7.13. Erection Tolerances

Erection tolerances shall be defined relative to member working points and working lines, which shall be defined as follows:

(a) For members other than horizontal members, the member work point shall be the actual center of the member at each end of the shipping piece.
(b) For horizontal members, the working point shall be the actual centerline of the top flange or top surface at each end.
(c) The member working line shall be the straight line that connects the member working points.

The substitution of other working points is permitted for ease of reference, provided they are based upon the preceding definitions.

The tolerances on structural stainless steel erection shall be in accordance with the requirements in Sections 7.13.1 through 7.13.3.
Commentary:
Thermal expansion and contraction may be a consideration in design and construction (see Figures C-7.1 and C-7.2). The coefficient of thermal expansion for stainless steel is different from carbon or alloy steel and varies by stainless steel family. (Values for the coefficient of thermal expansion of stainless steel can be found in ANSI/AISC 370.) Differential temperature effects should also be taken into account in plumbing surveys when tall structural stainless steel members are subjected to sun exposure on one side.

The alignment of lintels, spandrels, wall supports and similar members that are used to connect other building construction units to the structural stainless steel frame should have an adjustment of sufficient magnitude to allow for the accumulation of mill tolerances and fabrication tolerances, as well as the erection tolerances. See Figure C-7.3.
Fig. C-7.1. Effects of differential column shortening.
7.13.1. The tolerances on position and alignment of member working points and working lines shall be as described in Sections 7.13.1.1 through 7.13.1.3.

7.13.1.1. For an individual column shipping piece, the angular variation of the working line from a plumb line shall be equal to or less than 1/500 of the distance between working points, subject to the following additional limitations:

(a) For an individual column shipping piece that is adjacent to an elevator shaft, the displacement of member working points shall be equal to or less than 1 in. (25 mm) from the established column line in the first 20 stories. Above this level, an increase in the displacement of 1/32 in. (1 mm) is permitted for each additional story up to a maximum displacement of 2 in. (50 mm) from the established column line.

(b) For an exterior individual column shipping piece, the displacement of member working points from the established column line in the first 20 stories shall be equal to or less than 1 in. (25 mm) toward and 2 in. (50 mm) away from the building exterior. Above this level, an increase in the displacement of 1/16 in. (2 mm) is permitted for each additional story up to a maximum displacement of 2 in. (50 mm) toward and 3 in. (75 mm) away from the building exterior.

Commentary:
The limitations that are described in this Section and illustrated in Figures C-7.4 and C-7.5 make it possible to maintain built-in-place or prefabricated facades in a true vertical plane up to the 20th story, if connections that provide for 3 in. (75 mm) of adjustment are used. Above the 20th story, the facade may be maintained within 1/16 in. (2 mm) per story with a maximum total deviation of 1 in. (25 mm) from a true vertical plane, if connections that provide for 3 in. (75 mm) of adjustment are used. Connections that permit adjustments of plus 2 in. (50 mm) to minus 3 in. (75 mm) – a total of 5 in. (125 mm) – will be necessary in cases where it is desired to construct the facade to a true vertical plane above the 20th story.
When plumbing columns, apply a temperature adjustment at a rate of 13/64 in. per 100 ft for each change of 15°F [3 mm per 10 000 mm for each change of 15°C] between the temperature at the time of erection and the working temperature.

![Diagram](image)

*Fig. C-7.2. Tolerances in plan location of column.*
Fig. C-7.3. Clearance required to accommodate fascia.

(c) For an exterior individual column shipping piece, the member working points at any splice level for multi-tier buildings and at the tops of columns for single-tier buildings shall fall within a horizontal envelope, parallel to the exterior established column line, that is equal to or less than 1-1/2 in. (38 mm) wide for buildings up to 300 ft (90 000 mm) in length. An increase in the width of this horizontal envelope of 1/2 in. (13 mm) is permitted for each additional 100 ft (30 000 mm) in length up to a maximum width of 3 in. (75 mm).

Commentary:
This Section limits the position of exterior column working points at any given splice elevation to a narrow horizontal envelope parallel to the exterior established column line (see Figure C-7.6). This envelope is limited to a width of 1-1/2 in. (38 mm), normal to the exterior established column line, in up to 300 ft (90 000 mm) of building length. The horizontal location of this envelope is not necessarily directly above or below the corresponding envelope at the adjacent splice elevations, but should be within the limitation.
of the 1 in 500 plumbness tolerance specified for the controlling columns (see Figure C-7.5).

(d) For an exterior column shipping piece, the displacement of member working points from the *established column line* that is nominally parallel to the building exterior shall be equal to or less than 2 in. (50 mm) in the first 20 stories. Above this level, an increase in the displacement of 1/16 in. (2 mm) is permitted for each additional story up to a maximum displacement of 3 in. (75 mm) in the direction nominally parallel to the building exterior.

7.13.1.2. For members other than column shipping pieces, the following limitations shall apply:

(a) For a member that consists of an individual, straight shipping piece without field splices, other than a cantilevered member, the variation in alignment shall be acceptable if it is caused solely by variations in column alignment and/or primary supporting member alignment that are within the permissible variations for the fabrication and erection of such members.

(b) For a member that consists of an individual, straight shipping piece that connects to a column, the variation in the distance from the member working point to the upper finished splice line of the column shall be equal to or less than plus 3/16 in. (5 mm) and minus 5/16 in. (8 mm).

(c) For a member that consists of an individual shipping piece that does not connect to a column, the variation in elevation shall be acceptable if it is caused solely by the variations in the elevations of the supporting members within the permissible variations for the fabrication and erection of those members.
Fig. C-7.4. Clearance required to accommodate accumulated column clearance.
Fig. C-7.5. Exterior column plumbness tolerance normal to building exterior.

Note: The plumb line through the base working point for an individual column is not necessarily the precise plan location because Sec. 7.13.1.1 deals only with plumbness tolerances and does not include inaccuracies in location of the Established Column Line, foundations and anchor rods beyond the Erector's control.
Fig. C-7.6. Tolerance in plan at any splice elevation of exterior columns.
(d) For a member that consists of an individual, straight shipping piece and that is a segment of a field assembled unit containing field splices between points of support, the plumbness, elevation and alignment shall be acceptable if the angular variation, vertically and horizontally, of the working line from a straight line between points of support is equal to or less than 1/500 of the distance between working points.

**Commentary:**

The angular misalignment of the working line of all fabricated shipping pieces relative to the line between support points of the member as a whole in erected position must not exceed 1 in 500. Note that the tolerance is not stated in terms of a linear displacement at any point and is not to be taken as the overall length between supports divided by 500. Typical examples are shown in Figure C-7.7. Numerous conditions within tolerance for these and other cases are possible. The condition described in (d) applies to both plan and elevation tolerances.

![Fig. C-7.7. Alignment tolerances for members with field splices.](image-url)
(e) For a cantilevered member that consists of an individual, straight shipping piece, the plumbness, elevation and alignment shall be acceptable if the angular variation of the working line from a straight line that is extended in the plan direction from the working point at its supported end is equal to or less than 1/500 of the distance from the working point at the free end.

**Commentary:**
This tolerance is evaluated after the fixed end condition is sufficient to stabilize the cantilever and before the temporary support is removed. The preset specified in the *contract documents* should be calculated accordingly. The temporary support cannot be used to induce artificial deflection into the cantilever to meet this tolerance after the fixed end is restrained.

(f) For a member of irregular shape, the plumbness, elevation and alignment shall be acceptable if the fabricated member is within its tolerances and the members that support it are within the tolerances specified in this Code.

(g) For a member that is fully assembled in the field in an unstressed condition, the same tolerances shall apply as if fully assembled in the shop.

(h) For a member that is field-assembled, element-by-element, in place, temporary support shall be used or an alternative erection plan shall be submitted to the *owner's designated representatives for design and construction*. The tolerance in Section 7.13.1.2(d) shall be met in the supported condition with working points taken at the point(s) of temporary support.

**Commentary:**
Trusses fabricated and erected as a unit or as an assembly of truss segments normally have excellent controls on vertical position regardless of fabrication and erection techniques. However, a truss fabricated and erected by assembling individual components in place in the field is potentially more sensitive to deflections of the individual truss components and the partially completed work during erection, particularly the chord members. In such a case, the erection process should follow an erection plan that addresses this issue.

7.13.1.3. For members that are identified as *adjustable items* by the *owner's designated representative for design* in the *contract documents*, the *fabricator* shall provide adjustable connections for these members to the supporting *structural stainless steel* frame. Otherwise, the *fabricator* is permitted to provide nonadjustable connections. When *adjustable items* are specified, the *owner's designated representative for design* shall indicate the total adjustability that is required for the proper alignment of these supports for other trades. The variation in the position and alignment of *adjustable items* shall be as follows:
(a) The variation in the vertical distance from the upper finished splice line of the nearest column to the support location specified in the structural design documents shall be equal to or less than plus or minus 3/8 in. (10 mm).

(b) The variation in the horizontal distance from the established finish line at the particular floor shall be equal to or less than plus or minus 3/8 in. (10 mm).

(c) The variation in vertical and horizontal alignment at the abutting ends of adjustable items shall be equal to or less than plus or minus 3/16 in. (5 mm).

Commentary:
When the alignment of lintels, wall supports, curb angles, mullions and similar supporting members for the use of other trades is required to be closer than that permitted by the foregoing tolerances for structural stainless steel, the owner's designated representative for design must identify such items in the contract documents as adjustable items.

7.13.2. In the design of stainless steel structures, the owner's designated representative for design shall provide for the necessary clearances and adjustments for material furnished by other trades to accommodate the mill tolerances, fabrication tolerances and erection tolerances in this Code for the structural stainless steel frame.

Commentary:
In spite of all efforts to minimize inaccuracies, deviations will still exist; therefore, in addition, the designs of prefabricated wall panels, partition panels, fenestrations, floor-to-ceiling door frames, and similar elements must provide for clearance and details for adjustment as described in Section 7.13.2. Designs must provide for adjustment in the vertical dimension of prefabricated facade panels that are supported by the structural stainless steel frame because the accumulation of shortening of loaded steel columns will result in the unstressed facade supported at each floor level being higher than the structural stainless steel framing to which it must be attached. Observations in the field have shown that where a heavy facade is erected to a greater height on one side of a multistory building than on the other, the structural stainless steel framing will be pulled out of alignment. Facades should be erected at a relatively uniform rate around the perimeter of the structure.

7.13.3. Prior to placing or applying any other materials, the owner's designated representative for construction shall determine that the location of the structural stainless steel is acceptable for plumbness, elevation and alignment. The erector shall be given either timely notice of acceptance by the owner's designated representative for construction or a listing of specific items that are to be corrected in order to obtain acceptance. Such notice shall be rendered promptly upon completion of any part of the work and prior to the start of work by other
trades that may be supported, attached or applied to the structural stainless steel frame.

7.14. Correction of Errors

The correction of minor misfits by moderate amounts of reaming, grinding, welding or cutting, and the drawing of elements into line with drift pins, shall be considered to be normal erection operations. Errors that cannot be corrected using the foregoing means, or that require major changes in member or connection configuration, shall be promptly reported to the owner's designated representatives for design and construction and the fabricator by the erector, to enable the responsible entity to either correct the error or approve the most efficient and economical method of correction to be used by others.

Commentary:
As used in this Section, the term “moderate” refers to the amount of reaming, grinding, welding or cutting that must be done on the project as a whole, not the amount that is required at an individual location. It is not intended to address limitations on the amount of material that is removed by reaming at an individual bolt hole, for example, which is limited by the bolt-hole size and tolerance requirements in ANSI/AISC 370.

7.15. Cuts, Alterations and Holes for Other Trades

Neither the fabricator nor the erector shall cut, drill or otherwise alter their work, nor the work of other trades, to accommodate other trades, unless such work is clearly specified in the contract documents. When such work is so specified, the owner's designated representatives for design and construction shall furnish complete information as to materials, size, location and number of alterations in a timely manner so as not to delay the preparation of the approval documents.

7.16. Handling and Storage

The erector shall take reasonable care in the proper handling and storage of the structural stainless steel during erection operations to avoid the accumulation of excess dirt, cross contamination between stainless steel to carbon or alloy steel, and foreign matter. The erector shall not be responsible for the removal from the structural stainless steel of dust, dirt or other foreign matter that may accumulate during erection as the result of job-site conditions or exposure to the elements. The erector shall be responsible for any reconditioning necessary that is a result of handling or storage at site.
Commentary:
During storage, loading, transport, unloading and erection, blemish marks caused by slings, chains, blocking, tie-downs, cross contamination etc., occur in varying degrees. Abrasions caused by handling or cartage after finishing are to be expected. It must be recognized that any shop-applied finished surface, no matter how carefully protected, may require reconditioning in the field. Reconditioning these blemished areas in accordance with project specification requirements is the responsibility of the contractor performing the field reconditioning.

The erector is responsible for the proper storage and handling of fabricated structural stainless steel at the job site during erection. Finished and shop-painted structural stainless steel that is stored in the field pending erection should be kept free of the ground and positioned so as to minimize the potential for water retention. The owner or owner's designated representative for construction is responsible for providing suitable job-site conditions and proper access so that the fabricator and the erector may perform their work. Job-site conditions are frequently muddy, sandy, dusty or a combination thereof during the erection period. Under such conditions, it may be impossible to store and handle the structural stainless steel in such a way as to completely avoid any accumulation of mud, dirt or sand on the surface of the structural stainless steel, even though the fabricator and the erector manages to proceed with their work.

Repairs of damage to finished surfaces and/or removal of foreign materials due to adverse job-site conditions are outside the scope of responsibility of the fabricator and the erector when reasonable attempts at proper handling and storage have been made.

7.17. Field Finishing

Neither the fabricator nor the erector is responsible to finish field bolt heads and nuts or field welds, nor to touch up abrasions of shop applied surface finish, nor to perform any other field finishing.

7.18. Final Cleaning Up

Upon the completion of erection and before final acceptance, the erector shall remove all of the erector’s falsework, rubbish and temporary buildings.
SECTION 8. QUALITY CONTROL

8.1. General

8.1.1. The fabricator shall maintain a quality control program to ensure that the work is performed in accordance with the requirements in this Code, ANSI/AISC 370 and the contract documents.

8.1.2. The erector shall maintain a quality control program to ensure that the work is performed in accordance with the requirements in this Code, ANSI/AISC 370 and the contract documents. The erector shall be capable of performing the erection of the structural stainless steel, and shall provide the equipment, personnel and management for the scope, magnitude and required quality of each project.

8.1.3. When the owner requires more extensive quality control procedures, or independent inspection by qualified personnel this shall be clearly stated in the contract documents, including a definition of the scope of such inspection.

8.2. Inspection of Mill Material

Material test reports shall constitute sufficient evidence that the mill product satisfies material order requirements. The fabricator shall make a visual inspection of material that is received from the mill, but need not perform any material tests unless the owner’s designated representative for design specifies in the contract documents that additional testing is to be performed at the owner’s expense.

8.3. Nondestructive Testing

When nondestructive testing is required, the process, extent, technique and standards of acceptance shall be clearly specified in the contract documents.

8.4. Independent Inspection

When inspection by personnel other than those of the fabricator and/or erector is specified in the contract documents, the requirements in Sections 8.4.1 through 8.4.6 shall be met.

8.4.1. The fabricator and the erector shall provide the inspector with access to all places where the work is being performed. A minimum of 24 hours notification shall be given prior to the commencement of work.

8.4.2. Inspection of shop work by the inspector shall be performed in the fabricator’s shop to the fullest extent possible. Such inspections shall be timely, in-sequence
and performed in such a manner as will not disrupt fabrication operations and will permit the repair of nonconforming work prior to any required painting while the material is still in-process in the fabrication shop.

8.4.3. Inspection of field work shall be promptly completed without delaying the progress or correction of the work.

8.4.4. Rejection of material or workmanship that is not in conformance with the contract documents shall be permitted at any time during the progress of the work. However, this provision shall not relieve the owner or the inspector of the obligation for timely, in-sequence inspections.

8.4.5. The fabricator, erector, and owner's designated representatives for design and construction shall be informed of deficiencies that are noted by the inspector promptly after the inspection. Copies of all reports prepared by the inspector shall be promptly given to the fabricator, erector, and owner's designated representatives for design and construction. The necessary corrective work shall be performed in a timely manner.

8.4.6. The inspector shall not suggest, direct or approve the fabricator or erector to deviate from the contract documents or the approved approval documents, or approve such deviation, without the written approval of the owner's designated representatives for design and construction.
SECTION 9. CONTRACTS

9.1. Types of Contracts

9.1.1. For contracts that stipulate a lump sum price, the work that is required to be performed by the fabricator and the erector shall be completely defined in the contract documents.

9.1.2. For contracts that stipulate a price per pound (price per kilogram), the scope of work that is required to be performed by the fabricator and the erector, the type of materials, the character of fabrication and the conditions of erection shall be based upon the contract documents, which shall be representative of the work to be performed.

9.1.3. For contracts that stipulate a price per item, the work that is required to be performed by the fabricator and the erector shall be based upon the quantity and the character of the items that are described in the contract documents.

9.1.4. For contracts that stipulate unit prices for various categories of structural stainless steel, the scope of work that is required to be performed by the fabricator and the erector shall be based upon the quantity, character and complexity of the items in each category as described in the contract documents, and shall also be representative of the work to be performed in each category.

9.1.5. When an allowance for work is called for in the contract documents and the associated work is subsequently defined as to the quantity, complexity and timing of that work after the contract is executed, the contract price for this work shall be adjusted by change order.

Commentary:

Allowances, if used, are not a true definition of the cost of work to be performed. By nature, an allowance is only an estimate and placeholder in the bid. Once the actual work is defined, the actual cost can be provided. It must be recognized that the actual cost can be higher or lower than the allowance. See Section 9.4. Allowances required by the contract documents or proposed by the bidder should be as thoroughly defined as practicable as to the distinct nature of the work covered by the allowance, including whether the allowance is to include materials only, fabrication costs and/or erection costs.

9.2. Calculation of Weights

Unless otherwise specified in the contract, for contracts stipulating a price per pound (price per kilogram) for fabricated structural stainless steel that is delivered and/or erected, the quantities of materials for payment shall be
determined by the calculation of the gross weight of materials as shown in the fabrication documents.

**Commentary:**
The standard procedure for calculation of weights that is described in this Code meets the need for a universally acceptable system for defining “pay weights” in contracts based upon the weight of delivered and/or erected materials. These procedures permits the owner to easily and accurately evaluate price-per-pound proposals from potential suppliers and enables all parties to a contract to have a clear and common understanding of the basis for payment.

The procedure in this Code affords a simple, readily understood method of calculation that will produce pay weights that are consistent throughout the industry and that may be easily verified by the owner. While this procedure does not produce actual weights, it can be used by purchasers and suppliers to define a widely accepted basis for bidding and contracting for structural stainless steel. However, any other system can be used as the basis for a contractual agreement. When other systems are used, both the supplier and the purchaser should clearly understand how the alternative procedure is handled.

9.2.1. The weights shall be calculated based on the densities for the alloy family as shown in ANSI/AISC 370.

9.2.2. The weights of standard stainless steel structural shapes, plates and bars shall be calculated on the basis of fabrication documents that show the actual quantities and dimensions of material to be fabricated, as follows:

(a) The weights of all standard stainless steel structural shapes shall be calculated using the nominal weight per ft (mass per m) and the detailed overall length.

(b) The weights of plates and bars shall be calculated using the detailed overall rectangular dimensions.

(c) When parts can be economically cut in multiples from material of larger dimensions, the weight shall be calculated on the basis of the theoretical rectangular dimensions of the material from which the parts are cut.

(d) When parts are cut from standard stainless steel structural shapes, leaving a nonstandard section that is not useable on the same contract, the weight shall be calculated using the nominal weight per ft (mass per m) and the overall length of the standard stainless steel structural shapes from which the parts are cut.

(e) Deductions shall not be made for material that is removed for cuts, copes, clips, blocks, drilling, punching, boring, slot milling, planing or weld joint preparation.
9.2.3. The weights of items such as anchor rods, clevises, turnbuckles, sleeve nuts, recessed-pin nuts, cotter pins and similar components shall be taken from the manufacturer’s catalog and the manufacturer’s shipping weight shall be used.

9.2.4. The weights of shop or field weld metal and protective coatings shall not be included in the calculated weight for the purposes of payment.

9.3. Revisions to the Contract Documents

Revisions to the contract documents shall be confirmed by change order or extra work order. Unless otherwise noted, the issuance of a revision to the contract documents shall constitute authorization by the owner that the revision is released for construction. The contract price and schedule shall be adjusted in accordance with Sections 9.4 and 9.5.

9.4. Contract Price Adjustment

9.4.1. When the scope of work and responsibilities of the fabricator and the erector are changed from those previously established in the contract documents, an appropriate modification of the contract price shall be made. In computing the contract price adjustment, the fabricator and the erector shall consider the quantity of work that is added or deleted, the modifications in the character of the work, and the timeliness of the change with respect to the status of material ordering, detailing, fabrication and erection operations.

Commentary:
The fabrication and erection of structural stainless steel is a dynamic process. Typically, material is being acquired at the same time that the approval documents are being prepared. Additionally, the fabrication shop will normally fabricate pieces in the order that the structural stainless steel is being shipped and erected. Items that are revised or placed on hold generally upset these relationships and can be very disruptive to the digital modeling/detailing, fabricating and erecting processes. The provisions in Sections 3.5, 4.4.2 and 9.3 are intended to minimize these disruptions so as to allow work to continue. Accordingly, it is required in this Code that the reviewer of requests for contract price adjustments recognize this and allow compensation to the fabricator and the erector for these inefficiencies and for the materials that are purchased and the detailing, fabrication and erection that has been performed, when affected by the change.

9.4.2. Requests for contract price adjustments shall be presented by the fabricator and/or the erector in a timely manner and shall be accompanied by a description of the change that is sufficient to permit evaluation and timely approval by the owner.
9.4.3. Price-per-pound (price per kilogram) and price-per-item contracts shall provide for additions or deletions to the quantity of work that are made prior to the time the work is released for construction. When changes are made to the character of the work at any time, or when additions and/or deletions are made to the quantity of the work after it is released for detailing, fabrication or erection, the contract price shall be equitably adjusted.

9.5. Scheduling

9.5.1. The contract schedule shall state when the design documents will be released for construction, if the design documents are not available at the time of bidding, and when the job site, foundations, piers and abutments will be ready, free from obstructions and accessible to the erector, so that erection can start at the designated time and continue without interference or delay caused by the owner's designated representative for construction or other trades.

9.5.2. The fabricator and the erector shall advise the owner's designated representatives for design and construction, in a timely manner, of the effect any revision has on the contract schedule.

9.5.3. If the fabrication or erection is significantly delayed due to revisions to the requirements of the contract, or for other reasons that are the responsibility of others, the fabricator and/or erector shall be compensated for the additional costs incurred.

9.6. Terms of Payment

The fabricator shall be paid for mill materials and fabricated product that is stored off the job site. Other terms of payment for the contract shall be outlined in the contract documents.

Commentary:
These terms include such items as progress payments for material, fabrication, erection, retainage, performance and payment bonds, and final payment. If a performance or payment bond, paid for by the owner, is required by contract, no retainage shall be required.
SECTION 10. ARCHITETURALLY EXPOSED STRUCTURAL STAINLESS STEEL

10.1. General Requirements

When members are specifically designated as architecturally exposed structural stainless steel or AESSS in the contract documents, the requirements in Sections 1 through 9 shall apply as modified in Section 10. Surfaces exposed to view of AESSS members and components shall be fabricated and erected with the care and dimensional tolerances that are stipulated in Sections 10.2 through 10.6.

Commentary:
The designation of stainless steel as AESSS adds cost, and that cost is higher as the level of the AESSS designation increases.

10.1.1. The following categories shall be used when referring to AESSS:

AESSS 1: Basic elements.
AESSS 2: Feature elements viewed at a distance greater than 20 ft (6 m).
AESSS 3: Feature elements viewed at a distance less than 20 ft (6 m).
AESSS 4: Showcase elements with special surface and edge treatment beyond fabrication.
AESSS C: Custom elements with characteristics described in the contract documents.

Commentary:
The categories are listed in the AESSS matrix shown in Table 10.1. Each category describes characteristics with successively more detailed—and costly—requirements.

• Basic elements in AESSS 1 are those that have workmanship requirements that exceed what would be done in non-AESSS construction.
• Feature elements in AESSS 2 and 3 exceed the basic requirements, but the intent is to allow the viewer to see the art of metalworking. AESSS 2 is achieved primarily through geometry without finish work, and treats things that can be seen at a larger viewing distance, like enhanced treatment of bolts, welds, connection and fabrication details, and tolerances for gaps, copes and similar details. AESSS 3 is achieved through geometry and basic finish work, and treats things that can be seen at a closer viewing distance or are subject to touch by the viewer, with welds that are generally smooth but visible. AESSS 3 involves the use of a mock-up and acceptance is based upon the approved conditions of the mock-up.
• Showcase elements in AESSS 4 are those for which the designer intends that the form is the only feature showing in an element. All welds are ground and...
blended, edges are ground square and true. All surfaces are finished to a smoothness that doesn’t catch on a cloth or glove. Tolerances of fabricated forms are more stringent – generally half of standard tolerance. AESSS 4 involves the use of a mock-up and acceptance is based upon the approved conditions of the mock-up.

● Custom elements in AESSS C are those with other requirements defined in the contract documents.

10.1.2. A mock-up shall be required for AESSS 3, 4 and C. If a mock-up is to be used in other AESSS categories, it shall be specified in the contract documents. When required, the nature and extent of the mock-up shall be specified in the contract documents. Alternatively, when a mock-up is not practical, the first piece of an element or connection can be used to determine acceptability.

**Commentary:**
Generally, a mock-up is produced and approved in the shop and subsequently placed in the field. The acceptability of the mock-up can be affected by many factors, including distance of view, lighting and finishing. The expectations for the location and conditions of the mock-up at time of approval should be defined in the contract documents.

10.2. Contract Documents

The following additional information shall be provided in the contract documents when AESSS is specified:

(a) Specific identification of members or components that are AESSS using the AESSS Categories listed in Section 10.1.2 and Table 10.1.

(b) Fabrication and/or erection tolerances that are to be more restrictive than provided for in this Appendix, if any.

(c) For Category AESSS C, the AESSS matrix included in Table 10.1 shall be used to specify the required treatment of the element.

(d) Any variations from the AESSS characteristics of Table 10.1.

(e) Any other special requirements for AESSS members and components, such as the orientation of HSS weld seams and bolt heads.

10.3. Approval Documents

All members designated as AESSS shall be clearly identified to a Category, either AESSS 1, 2, 3, 4 or C, in the approval documents. Tack welds, temporary braces, backing and fixtures used in fabrication of AESSS shall be shown in the fabrication documents. Architecturally sensitive connection details shall be submitted for approval by the owner’s designated representative for design prior to completion of the approval documents.

*Code of Standard Practice for Structural Stainless Steel Buildings, 2020*
*Public Review Draft dated July 6, 2020*
*AMERICAN INSTITUTE OF STEEL CONSTRUCTION*
Commentary:
Variations, if any, from the AESSS Categories listed must be clearly noted. These variations could include machined surfaces, locally abraded surfaces, and forgings. In addition, if distinction is to be made between different surfaces or parts of members, the transition line/plane must be clearly identified/defined on the approval documents.
### Table 10.1
**AESSS Category Matrix**

<table>
<thead>
<tr>
<th>Category Description</th>
<th>AESSS C</th>
<th>AESSS 2</th>
<th>AESSS 3</th>
<th>AESSS 4</th>
<th>SSSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface preparation and cleaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharp edges ground smooth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous weld appearance</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Standard structural bolts</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welds removed</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Components protected for shipping and erection</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Visual escapes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-half standard fabrication tolerances</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fabrication marks not apparent</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welds uniform and smooth</td>
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<tr>
<td>Mill marks removed</td>
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<td></td>
</tr>
<tr>
<td>Butt and plug welds ground smooth</td>
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<td></td>
<td></td>
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<tr>
<td>HSS weld seam oriented for reduced visibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cross sectional abutting surface aligned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Joint gap tolerances minimized</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All welded connections</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>HSS seam not apparent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welds contoured and blended</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Visible flanges are free of visible pits below the specified finish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding show-through minimized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**User Note:**

1. Refer to Section 6.5 for shop cleaning requirements.
2. Rough surfaces are deemed rough and ground smooth, sharp edges resulting from flame cutting, grinding and especially shearing are softened.
3. Interim welds are made continuous by seal welding. Shear of hollow structural sections is acceptable as produced.
4. All bolt heads in connections are on the same side, as specified, and consistent from one connection to another.
5. Weld spatter, spatter and surface discontinuities are removed. Weld projections up to 1/32 in. (2 mm) is acceptable for butt and plug welded joints.
6. Components not tapped keep protective cover to prevent damage to finish.
7. Visual inspection is either a physical sample, a section inspection, a complete mock-up or a full-scale mock-up, as specified in the contract documents.
8. These descriptions are one-half of those for standard structural stainless steel as specified in this Code.
9. Members markings during the fabrication and erection process are not visible.
10. All mill marks are not visible in the finished product.
11. Sections are oriented away from view or as indicated in the contract documents.
12. The matching of abutting cross sections is required.
13. This characteristic is similar to 2.2 above. A clear distance between abutting members of 1/8 in. (3 mm) is required.
14. HSS seams are treated so they are not apparent.
15. In addition to a contoured and blended appearance, welded transitions between members also are contoured and blended.
16. The steel surface imperfections are filed and sanded.
17. Welding show-through on the visible back side of a welded element can be minimized in the design of the welds and careful welding procedure. Weld show-through can be mitigated with grinding and refinishing on some surface finishes.
18. Additional characteristics may be added for custom elements. Surface finishes other than cleaned mill material must be included as part of the project specification.
10.4. Fabrication

10.4.1. The fabricator shall handle the stainless steel with care to avoid marking, contaminating, or distorting the stainless steel members:

(a) Slings shall be synthetic material such as nylon or polyester.
(b) Care shall be taken to minimize damage to any finished faces, edges or features.
(c) When temporary braces or fixtures are required during fabrication or shipment, or to facilitate erection, care shall be taken to avoid blemishes or unsightly surfaces resulting from the use or removal of such temporary elements.
(d) Tack welds not incorporated into final welds shall be treated consistently with requirements for final welds.
(e) All backing exposed to view and runoff tabs shall be removed and the welds ground smooth.
(f) All bolt heads in connections shall be on the same side, as specified, and consistent from one connection to another.

10.4.2. Members fabricated of unfinished stainless steel that are to be AESSS may still have erection marks on surfaces in the completed structure. Special requirements, if any, shall be specified as Category AESSS C.

10.4.3. The permissible tolerances for member depth, width, out of square, and camber and sweep shall be as specified in the references found in ANSI/AISC 370. The following exceptions apply:

(a) For Categories AESSS 3 and 4, the matching of abutting cross sections shall be required.

10.4.4. For curved structural members, whether composed of a single standard structural shape or built-up, the as-fabricated variation from the theoretical curvature shall be equal to or less than the standard camber and sweep tolerances permitted for straight members in the applicable ASTM or AWS standards.

Commentary:

The curvature tolerance for curved AESSS members is not reduced from that used for curved non-AESSS members because curved members have no straight line to sight and the resulting deviations are therefore indistinguishable. See also the Commentary to Section 6.4.2.

10.4.5. The tolerance on overall profile dimensions of welded built-up members shall meet the requirements in AWS D1.6/D1.6M. For Categories AESSS 2, 3 and 4,
the as-fabricated straightness tolerance for the member as a whole shall be one-half of that specified in AWS D1.6/D1.6M.

10.4.6. For Categories AESSS 3 and 4, copes, miters and cuts in surfaces exposed to view shall have a gap that is uniform within 1/8 in. (3 mm), if shown to be an open joint. If instead the joint is shown to be in contact, the contact shall be uniform within 1/16 in. (2 mm).

10.4.7. Unless otherwise noted in the contract documents, for Categories AESSS 1, 2 and 3, the surface condition of the stainless steel given in the ASTM or AWS specifications for the shape used shall be acceptable as the base for final graining or abrasive finishing. For Category AESSS 4, surface imperfections shall be weld filled and sanded to meet the acceptance criteria established with the mock-up required in Section 10.1.2.

10.4.8. For Categories AESSS 1, 2 and 3, welds shall meet AWS D1.6/D1.6M requirements, except that a) weld spatter exposed to view, if any, shall be removed and b) all heat staining shall be removed in accordance in ASTM A380. For Category AESSS 4, welds shall be contoured and blended, and spatter and heat staining exposed to view shall be removed in accordance in ASTM A380.

10.4.9. For Categories AESSS 1 and 2, weld projection up to 1/16 in. (2 mm) is acceptable for butt and plug welded joints. For Categories AESSS 3 and 4, welds shall be ground smooth/weld filled.

10.4.10. For Categories AESSS 1, 2 and 3, weld show-through shall be acceptable as produced. For Category AESSS 4, the fabricator shall minimize the weld show-through.

Commentary:
Weld show-through is a visual indication of the presence of a weld or welds on the opposite surface from the viewer. It is a function of weld size and material thickness and cannot be eliminated in thin material with thick welds. When weld show-through is a concern, this should be addressed in the mock-up.

10.4.11. AESSS shall be prepared as follows:
(a) All surface contaminants, including grease or oil, embedded iron, or other substances, if any is present, shall be removed by solvent cleaning to meet the requirements of SSPC-SP 1 and meet the passivation requirements of ASTM A967.
(b) Weld spatter, slivers and similar surface discontinuities shall be removed.
(c) Sharp corners resulting from shearing, flame cutting or grinding shall be eased.
10.4.12. For Categories AESSS 1 and 2, seams of hollow structural sections shall be acceptable as produced. For Category AESSS 3, seams shall be oriented as specified in the contract documents. For Category AESSS 4, seams shall be treated so they are not apparent.

10.5. Delivery of Materials

The fabricator shall use special care to avoid surface contamination, bending, twisting or otherwise distorting AESSS. All tie-downs on loads shall be synthetic material such as nylon or polyester to avoid damage to edges and surfaces of members. The standard for acceptance of delivered and erected members shall be equivalent to the standard employed at fabrication.

10.6. Erection

The erector shall use special care in unloading, handling and erecting AESSS to avoid contamination, marking or distorting the AESSS. The erector shall plan and execute all operations in such a manner that allows the architectural appearance of the structure to be maintained:

(a) Slings shall be synthetic material such as nylon or polyester.
(b) Care shall be taken to minimize damage to any exposed surface.
(c) When temporary braces or fixtures are required to facilitate erection, care shall be taken to avoid any contamination, blemishes, holes or unsightly surfaces resulting from the use or removal of such temporary elements.
(d) Tack welds not incorporated into final welds shall be ground smooth.
(e) All backing exposed to view and runoff tabs shall be removed and the welds ground smooth.
(f) All bolt heads in connections shall be on the same side, as specified, and consistent from one connection to another.
(g) For Category AESSS 4, open holes shall be filled with weld metal and smoothed by grinding to the standards applicable to the shop fabrication of the materials.
(h) Any surface contamination shall be removed in accordance with ASTM A967.