

CODE COMPLIANCE CERTIFICATION PROGRAM

for Cold-Formed Steel Structural and
Nonstructural Framing Members

February 6, 2023

Implemented by:
The Steel Framing Industry Association (SFIA)
Members and Associate Members



Endorsed by the



DISCLAIMER

A concerted effort has been made to select appropriate standards and to develop a reliable *Code Compliance Certification Program*. The Steel Framing Industry Association makes no representation, warranty or guarantee in connection with the standards or the *Code Compliance Certification Program*, and expressly disclaims any liability or responsibility for loss or damage resulting from participation; for any violation of federal, state or municipal regulations with which the underlying standards may conflict; or for the infringement of any patent from the use of the code-referenced standards.

No patent rights are implied by participation in the *Code Compliance Certification Program*. Nothing contained in the *Code Compliance Certification Program* is to be construed as granting any rights, by implication or otherwise, for the manufacture, sale, or use in connection with any method, apparatus or product covered by letters patent, nor as insuring anyone against liability for infringement of letters patent.

PREFACE

The Steel Framing Industry Association (SFIA) developed the *Code Compliance Certification Program* to verify that products produced by SFIA member companies meet the requirements of the building code. While building codes vary by jurisdiction, this program follows the most recent international standards published by the International Code Council, the most widely recognized building code authority in North America.

The use of steel framing products in building construction is an intelligent choice with benefits to the contractor, designer, owner and environment. The SFIA is dedicated to helping all stakeholders in our industry to be more successful by unifying the industry and expanding the market for the use of cold-formed steel framing systems through promotion, advocacy, education and innovation.

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A. General

A1 Scope

The *program requirements* listed herein are part of a *Code Compliance Certification Program* developed by the Steel Framing Industry Association (SFIA) for *structural* and *nonstructural* cold-formed steel framing. These *program requirements* are *verified* by a third party, the Program Administrator (*Administrator*), and enforced by the *Compliance Committee*, made up of SFIA members. This *Compliance Program* forms part of an agreement between participating SFIA member manufacturers and contractor/manufacturers (*Licensees*), the Steel Framing Industry Association (*Association*) and the *Administrator*.

Under the *Code Compliance Certification Program*, a *Licensee* certifies that the designated *structural* or *nonstructural* traditional flat and proprietary shapes including equivalent proprietary *nonstructural* cold-formed steel framing it produces meets or exceeds the requirements of the *applicable building codes* and referenced *applicable standards* and *all such products must be enrolled*. The *Administrator* *validates* the *Licensee's* certification by reviewing the *Licensee's* *product* and manufacturing practices and then performing appropriate testing and inspection.

Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this document specify different requirements, the most restrictive shall govern.

A2 Ownership

The Steel Framing Industry Association (SFIA) owns this *Code Compliance Certification Program*. The *Administrator* is contracted by the *Association* to perform services as outlined within the *program requirements*. The *Administrator* shall seek written approval from the *Association* before performing any other services determined necessary to administer the *Code Compliance Certification Program*.

A3 Eligibility

All *Association* members manufacturing cold-formed steel *structural* and/or *nonstructural* framing are required to participate within the *program requirements*. For *Licensees* with more than one manufacturing plant or facility, each plant or facility producing *products* must participate in the *Code Compliance Certification Program* independently. Each participating manufacturing facility shall be subject to audits as outlined in the *Program Requirements* herein.

Structural and *nonstructural studs* and *tracks* are currently required to be *certified* in the *Code Compliance Certification Program*. Assemblies, such as trusses, headers, and jambs, may be made from *products certified* under this *Compliance Program*, but the assemblies themselves may not be *certified*.

Manufacturers that only make one class of product, either *structural* or *nonstructural products*, can apply and be certified for only the class of product they produce. Eligibility for the certification of only one product class will be verified through the review of the applicant's *current product literature* that is provided in accordance with the SFIA By Laws (Article IV.1, section a, subsection 4). For clarity if they offer both classes of products for sale, all must be certified in the program.

A4 Definitions

Where the following terms appear in this program in italics, they shall have the meaning indicated herein. For terms not specifically defined in Section A4, the definitions in AISI S220, AISI S240, and AISI S100, or commonly accepted meanings within the context for which they are intended shall govern. A definition in this document supersedes all other definitions.

Acceptance Criteria. Criteria developed by ICC-ES for the evaluation of *products* related to an *Applicable Building Code*.

Accredited independent laboratory. Any laboratory that is certified under ISO 17025 and accredited to perform the tests listed in this *Code Compliance Certification Program*.

Administrator. Entity contracted by the Steel Framing Industry Association to carry out the Administrator functions of this *Code Compliance Certification Program*. The Administrator shall be accredited in accordance with ISO/IEC 17020.

Applicable Building Codes. The IRC for one- and two-family dwellings or the IBC for all other building structures.

Applicable Standards. Standards referenced in Section A5.

Approved. Approved by the *Administrator and/or Compliance Committee*.

Approved Part Drawing. Schematic that defines the dimensions, including thickness of *product*. The *Administrator* shall require additional dimensions and tolerances for features of *equivalent nonstructural members* that are deemed structurally significant to the *product* by the *Administrator*, if not already included in the SFIA Product Technical Guide.

Association. Steel Framing Industry Association.

Auditor. *Administrator's* agent who physically conducts facility audits and submits his findings to the *Administrator*.

Base Steel Thickness. The thickness of the bare steel, exclusive of all coatings.

Certification Label. The *Association*-owned identifier developed for this *Code Compliance Certification Program*. The design and information in the *Certification Label* is determined by the *Compliance Committee* in conjunction with the *Administrator*. *Certification Labels* are to be ordered from the printer identified by the *Association*, and the *Licensee* must submit a copy of the *Compliance Certificate* with the order.

Certified Minimum G40 Sample. An ASTM G40 galvanized coated steel sample meeting the minimum one-sided zinc coating weight of 0.12 oz./sq.ft., and less than the specified 0.20 oz./sq.ft. weight. The sample(s) are used in side-by-side B-117 tests to determine an *equivalent coating*.

Certified Production Facilities List: A listing of facilities that have been inspected and are authorized by the *Administrator* to produce *Certified Products*. The *Certified Production Facilities List* is maintained by the *Administrator* and made available through the *Administrator's* and *Association's* websites.

Certified Products. Products manufactured by the *Licensee* which are certified to meet the *Program* requirements.

Code Compliance Certification Program. The program described herein.

Compliance Certification. Documentation issued by the *Administrator* allowing the *Licensee* to state that the referenced *product* meets the requirements of the *Compliance Program*.

Compliance Committee. A committee comprised of five (5) *Association* members appointed by the *Association's* Board of Directors. The committee shall be comprised of three (3) manufacturer members, one from each size-category, one contractor member and one distributor member.

Corrective Action. Measures taken to remedy items of noncompliance.

Custom Product. A product manufactured and sold to a custom shape or dimension. A *Custom Product* can not be promoted in any literature or on a website. It must be a product manufactured to a custom request. Custom Products are not required to be enrolled into the Compliance Program and therefore cannot bear the SFIA label.

Day or Days. For purposes of this program's requirements, the term refers to calendar (not business) days.

Design Thickness. The steel thickness used in design, exclusive of coating. The *design thickness* is used to calculate physical properties and performance, except where AISI S100 indicates otherwise.

Documentation. The data furnished to substantiate a claim.

Equivalent Coating. A Metallic Coating for nonstructural members that meets the AISI S220 requirement that a protective coating must provide an equivalent corrosion resistance. Equivalence shall be determined by meeting or exceeding the performance of a *certified minimum G40 sample* in a side-by-side test following the requirements of ASTM B117 specification. Equivalence is determined per Section B2.

Equivalent Nonstructural Member. An *equivalent nonstructural member* is a member that meets the performance requirements of the building code and this *Code Compliance Certification Program* but does not have the same dimensional and/or thickness characteristics as *Standard Products* defined in AISI S220.

Flange. For a C-shape or *stud*, U-shape or track, that portion of the framing member that is perpendicular to the *web*.

Grade. The designation of the minimum yield strength.

IAS. International Accreditation Service is a division of the International Code Council (ICC).

Licensee. A manufacturer of *products* that signs license agreements with the *Association* and the *Administrator* that permit participation in the *Compliance Program*.

Lip or Return Lip. The part of a framing member that extends from the *flange* as a stiffening element.

Marking. Identification on individual *product* or groups of like *products* to meet the requirements of Section D.

Metallic Coating. A property of a coating applied to a cold-formed steel member described as the content of metal in percentage of dry film weight. A metallic coating for *nonstructural members* shall have a minimum metallic content of 50.0%.

Mil. A unit of measurement equal to 1/1000 inch.

Nominal Moment. The nominal flexural strength of a member when lateral-torsional buckling limit state is restrained, but local and distortional buckling are unrestrained as determined by AISI S100. If products fall outside the parameters of AISI S100, they must be tested in accordance with Appendix B

Nonstructural Member. A member in a steel framed system which is limited to a transverse (out-of-plane) load of not more than 10 lb/ft² (240 Pa), a superimposed axial load, exclusive of sheathing materials, of not more than 100 lb/ft (1460 N/m), or a superimposed axial load of not more than 200 lbs (890 N). *Nonstructural Members* may be *Standard* or *Equivalent* as defined herein.

Notice of Deficiencies. A report from the *Administrator* to the *Licensee* indicating a *product* or process is out of compliance with the *Program Requirements*.

Notify/Notice or Notification. Written correspondence (or the act of) that is physically transferred between parties (hard-copies). In addition to physical transfer, electronic transfer is acceptable.

Product. A *structural member* or *nonstructural member*.

Program Requirements. The requirements of this *Compliance Program*, as specified herein.

Proprietary Nonstructural. Product that is not the traditional C-shape or not listed in the SFIA Product Technical.

Punchout. A hole located along the centerline of the *web* of a steel framing member made during the manufacturing process.

Revocation of Compliance Certification. A notification by the *Administrator* that a *product* manufactured at a particular manufacturing facility fails to meet the *program requirements*. The result of the revocation is that the *Licensee* no longer has the authority to certify *products* at that plant.

Standard Coating. Any coating listed in Section B2, Table A4.1 from AISI S240 for *structural*, or Table 1 Type NS for *nonstructural*.

Standard Nonstructural Member. A *nonstructural* cold-formed steel framing member that meets the dimension requirements of Figure 1 and AISI S220.

Structural Member. A member that resists design loads [factored loads] as required by the *applicable building code*, except when defined as a *nonstructural member*.

Stud. A member having a longitudinally extending *web* bordered on each lateral side by perpendicular, longitudinally extending *flanges*, with the *flanges* bordered on one side by the *web* and on the other side by a perpendicular longitudinally extending *lip*.

Substantiate. The process by which the *Administrator* determines that a *Licensee's* certification meets the *program requirements*.

Third Party: A person or company that is not the SFIA Member company and has no financial association with the SFIA Member.

Track. A "C" shaped member having a longitudinally extending *web* bordered on each lateral side by perpendicular, longitudinally extending *flanges*.

Unit. A package of like or similar products.

Web. That portion of a framing member that connects the *flanges*.

END OF DEFINITIONS

A5 Referenced Standards

The following *Standards* or portions thereof, are referenced within this compliance program and shall be considered part of the requirements of this program.

1. American Iron and Steel Institute (AISI), 1140 Connecticut Avenue, NW, Washington, DC 20036.

AISI S100, North American Specification for the Design of Cold-Formed Steel Structural Members.

AISI S220, North American Standard for Cold-Formed Steel Framing – Nonstructural members.

AISI S240, North American Standard for Cold-Formed Steel Structural Framing

AISI S916, Test Standard for Cold-Formed Steel Framing - Nonstructural Interior Partition Walls with Gypsum Board

2. American Society for Testing and Materials International (ASTM), 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959.

ASTM A 90/A90M, Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

ASTM A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

ASTM A428/A428M, Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles.

ASTM A463/A463M, Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process.

A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

A792/A792M, Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

A875/A875M, Standard Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process.

ASTM A1003/A1003M, Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

ASTM B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.

ASTM C645, Standard Specification for Nonstructural Steel Framing Members.

ASTM C840, Standard Specification for Application and Finishing of Gypsum Board.

ASTM C1002, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

ASTM E72, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

3. International Code Council, Inc. (ICC), 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001.

2021 International Building Code® (IBC)

2021 International Residential Code® (IRC)

4. ICC Evaluation Service (ICC-ES), 3060 Saturn Street, Suite 100, Brea, CA 92821.

ICC-ES AC46, Acceptance Criteria for Cold-Formed Steel Framing

ICC-ES AC86, Acceptance Criteria for Cold-Formed Steel Framing Members- Interior Nonload-bearing Wall Assemblies.

ICC-ES AC10, Acceptance Criteria for Quality Documentation (AC10)

ICC-ES AC85, Acceptance Criteria for Test Reports

A6 Administrator Roles and Responsibilities

A6.1 Licensee Application

Upon receipt of an application from a potential *Licensee*, the *Administrator* shall review and respond within thirty (30) days of receipt of the application. The *Administrator's* response shall acknowledge receipt of the application and any documents that accompany it, including the required quality manual, and shall indicate whether additional information is required. After review and approval of the applicant's documents, an initial announced audit shall be scheduled by the *Administrator*. The *Administrator* shall conduct the initial, announced audit of the *Licensee's* manufacturing facility within ninety (90) days after receiving a satisfactory application and shall verify that the quality control program in use at the manufacturing facility is the same as is represented by the *approved* quality manual.

A6.2 Certification

The *Administrator* shall execute a License Agreement with *Association* members which will authorize use of the *Certification Label*, provided the manufacturer continues to demonstrate compliance with the *program requirements*. Compliance shall be verified by the *Administrator* by conducting manufacturing facility audits, described in Section A6.4, to validate *Licensee's* certification. The *Administrator* shall control the use of the *Association's Certification Labels* and shall maintain a *Certified Production Facilities List* on the *Administrator's* website.

A6.3 Notification

The *Administrator* shall *notify Licensees*, in writing, concerning audit results and any required *Corrective Actions*. The *Administrator* shall *notify Licensees* within thirty (30) days of any changes proposed by the *Compliance Committee and approved by the Board of Directors*, to the *Code Compliance Certification Program*. The notification shall include the dates enforcement will become effective.

A6.4 Audits

The initial facility audit will be an announced audit while future audits will be unannounced. Subsequent audits will be conducted semi-annually by the *Auditor*. Audits shall be performed during regular business hours. The *Licensee* shall be responsible for providing the *Administrator* a list of normal business hours, including a schedule of all plant or facility closings and shutdowns for the *Administrator* to use in scheduling plant audits. The *Administrator* shall be notified of all emergency or unscheduled closings as soon as possible. The *Licensee* shall be liable for all expenses incurred by the *Administrator* for rescheduled audits due to emergency or unscheduled closings. The *Licensee* shall be responsible for any charges if an *Auditor* arrives for an unannounced visit when the plant or facility is closed and he has not been notified. A designated contact of the *Licensee* will be responsible for working with the *Auditor* during in-facility audits. The *Licensee* shall identify at least one secondary contact in the event that the primary audit contact is not available when the *Auditor* arrives. If an audit contact is not available, the *Auditor* will work with the *Licensee's* available personnel to conduct the audit. If the audit cannot be completed, a re-audit shall be conducted. The audit contact shall be familiar with all production and quality control processes at that plant and shall provide full access to all areas as requested by the *Auditor*.

For products eligible and required for enrollment in the Program and that *Licensee* purchases from a third party, the Licensee remains responsible for the products compliance. This can be accomplished in one of three ways:

1. If the third-party manufacturer is part of the SFIA Code Compliance Program and the product is labeled it will not be subject to an additional audit.
2. If the third-party manufacturer is not part of the SFIA Code Compliance Program and the product is not labeled, it is subject to audit at the *Licensee's* facility.
3. If neither option 1 nor 2 is completed the product shall be labeled 'Not SFIA.'

When performing audits, the *Auditor* shall have copies of the *Code Compliance Certification Program*, referenced documents, the *Licensee's* quality control manual, and any other information submitted by the *Licensee* to support approval. During manufacturing facility audits, the *Auditor* shall *verify* the following:

- a. That the manufacturing facility utilizes the quality control program approved by the *Administrator* for participation in the *Code Compliance Certification Program*.
- b. That the *Certified Products* being produced are in compliance with those approved for participation in the *Code Compliance Certification Program*.
- c. That *products* are being marked in accordance with Section D.
- d. That three samples of *Nonstructural Members or Equivalent Nonstructural Members* and three samples of *Structural Members* shall be evaluated for compliance with Section B, Section C, and Section E of this *Compliance Program*.
- e. Three additional specimens of Nonstructural or Equivalent Nonstructural Product shall be 12" inches long, without punch-outs, to use for salt fog testing, as applicable.

A6.5 Testing

Independent quality control testing shall be performed on randomly selected samples chosen by the *Auditor* at the *Licensee's* facility. The *Auditor* shall select and appropriately mark the samples so he can identify origin and *verify* that they are prepared for testing without alteration as set forth in this section. The *Licensee* shall package the selected samples for shipment to the accredited laboratory. The *Auditor* shall witness the packaging, and the *Auditor* shall ship the samples. Samples shall be shipped to and tested at the IAS accredited independent laboratory designated by the *Administrator*. The *Licensee* shall be liable for all expenses incurred for quality control testing in conjunction with the audits. Samples selected for the *Administrator's* evaluation shall be selected from three samples of finished *nonstructural product* and three samples of finished *structural product*. Tests shall be conducted on samples selected during the audit and returned to the *Administrator* for evaluation of the following properties:

- a. Base Steel Thickness – The samples shall be evaluated for compliance with Section B1.2. The coating shall be removed from the samples as specified in ASTM A90/A90M.

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- b. Mechanical Properties – The samples shall be evaluated for compliance with Section B1.1. The materials shall be verified for the properties listed in the approved drawing and quality control manual. Testing for mechanical properties shall be in accordance with ASTM A370.
- c. Coatings – The samples shall be evaluated for compliance with Section B2. Standard zinc/zinc alloy coatings shall be evaluated by weight following the procedures specified in ASTM A90/A90M. Standard aluminum/aluminum alloy coatings shall be evaluated by weight following the procedures specified in ASTM A428/A428M. *Equivalent Coatings* shall be evaluated by performance following the procedure specified in ASTM B117 and Section B2 of this program. The sample area shall be on either surface of the *web* and equal to the *web* flat width by 12” long of the *web* surface area (not *flanges, lips, etc.*). This area should be solid material away from knockouts. Sample shall be taped at ends (four sides of sample area) ¼” from the edge. If a *Nonstructural Member* fails the coating weight test, it shall automatically be tested to satisfy the requirements of an *Equivalent Coating* by the *Administrators* designated lab.
- d. Product Shape – The samples shall be evaluated for compliance with Section C.
- e. Marking – *Products* manufactured at the *Licensee’s* facility, including *products* from which the samples were taken, shall be evaluated for compliance with Section D.

A6.6 Reporting

The *Administrator* shall submit a comprehensive report of the *Auditor’s* findings to the *Licensee* following each audit of the *Licensee’s* manufacturing facilities. All findings of the *Auditor* shall be discussed with the audit contact or company representative at the time of the on-site audit. *The Auditor* shall leave behind written, signed notes about the audit. The *Administrator* shall issue an audit report which contains all official comments and decisions with respect to compliance or non-compliance with the *Code Compliance Certification Program*. The report shall outline any matters requiring clarification or corrective action, or any other required action on the part of the *Licensee*, with deadlines for response. The *Auditor’s* report detailing the manufacturing facility’s audit results shall be considered confidential and shall be issued to the *Licensee’s* designated representative through the *Administrator’s* office. Retention of tests results by the *Administrator* will conform to the SFIA Record Retention policy.

At the same time as submission to the *Licensee*, the *Administrator* shall submit a confidential copy of the report to the *Association’s* Technical Director. The Technical Director shall have the authority to over-ride test reports, provided by the *Administrator*, when the results are clearly an entry error, technical discrepancy, or process failure by the *Administrator*. The Technical Director shall report any proposed over-ride to the Compliance Committee. If the Compliance Committee does not agree with a specific action by the Technical Director, the results of the report would stand.

The *Administrator* shall prepare reports about the status of the *Compliance Program* as requested by the *Compliance Committee*.

A.6.7 Notice of Deficiencies

As a result of an audit, any issue(s) of non-compliance with the *program requirements* shall result in the issuance of a *Notice of Deficiencies* as part of the audit report. *Licensees* are required to respond to all *Notice of Deficiencies* within the time frame stipulated in the audit report. Examples of deficiencies may include but are not limited to the following:

- a. Discrepancies and/or inconsistencies between the approved quality control manual and the actual practices observed by the *Auditor* that do not affect *Certified Product* compliance with the program performance requirements.
- b. Lack of records that trace finished goods back to the master coil used in their manufacture.
- c. Improper use of *Certification Labels*.
- d. Illegible *markings*.
- e. Disregard of *marking* requirements (e.g.: not including all of the required items, such as not including manufacturer's identification or product's minimum thickness).
- f. Extensive lapse in *marking* requirements.
- g. Dimensional failures of products

Unresolved *Notice of Deficiencies* will result in issuance of a *Notice of Non-compliance* in accordance with Section A6.10.

A6.8 Certification of Compliance

Association Manufacturer and *Contractor/Manufacturers Members* must apply for *Code Compliance Certification Authorization* for each manufacturing facility which manufactures eligible *products* within 30 days of joining the association, adding a new product, or of opening a new facility. *In addition, Association Manufacturer* and *Contractor/Manufacturers Members* must receive *Code Compliance Certification Authorization* for each manufacturing facility which manufactures products within 180 days of joining the Association, adding a new product, or of opening a new facility.

The *Administrator* shall be responsible for *Compliance Certification*. *Compliance Certification* shall be based upon receipt from a potential *Licensee* of an approved quality manual, submission to the initial manufacturing facility audit, and other specifications necessary to demonstrate compliance with the *Program Requirements*. When the *Administrator* determines that the *Program Requirements* have been satisfied, he shall issue a *Compliance Certification* and add the manufacturer's facility to the *Production Facilities List*. The *Compliance Certification* shall include the certification date, *Licensee's* name, facility location, and list of products that have been certified. and the *Compliance Certification* shall be sent to the *Licensee* and to the *Association*.

The *Licensee*, upon receipt of a *Compliance Certification*, is permitted to use the *Certification Label* as approved in writing by the *Administrator* (see Section entitled *Certification Labels*).

When a *Code Compliance Certification Authorization* is issued to a *Licensee*, the *Licensee* is included on the *Certified Production Facilities List* which is accessible via the Internet or the *Administrator's* website. The *Certified Production Facilities List* shall contain the following information: the *Licensee's* name, facility address, and list of products that have been certified, and contact information. Hyperlinks to the *Licensee's* website may also be included at the *Licensee's* option. Maintenance of the *Certified Production Facilities List* shall be the responsibility of the *Administrator*.

A6.9 Notice of Failure

The *Licensee* shall be sent a *notification* of failure if the initial application or initial manufacturing facility audit does not demonstrate compliance with all the *Program Requirements*. The *notification* shall be sent via next day delivery service or electronic notification with receipt confirmation. The *notice* of failure shall include the *Licensee's* name, facility location and the reason the applicant did not qualify under the *Program Requirements*. A list of corrective actions that are required shall also be included.

A6.10 Noncompliance

A *notice* of non-compliance with the *Program Requirements* shall be issued to the *Licensee* by the *Administrator* when issues of non-compliance exist. Examples of issues of non-compliance may include, but are not necessarily limited to, the following:

- a. Failure to respond satisfactorily within 30 days of receipt of the *Notice of Deficiencies* resulting from an audit report.
- b. Failure to respond with an itemized action plan to satisfy the *Notice of Deficiencies*.
- c. Failure to meet the *Program Requirements* for audit samples of *Structural Products* with respect to yield, tensile, elongation, coating and/or thickness.
- d. Failure to meet the *Program Requirements* for audit samples of *Nonstructural Products* with respect to yield, coating, and/or thickness.
- e. Failure to have product available for inspection and sampling for an Auditor when requested during an audit.
- f. Failure to permit *Auditor* to enter manufacturing facility and conduct an audit within 15 minutes of arrival.

The *Notice of Non-compliance* issued to the *Licensee* by the *Administrator* shall state the reason(s) for issuance of the *Notice of Non-compliance*, the required action(s) that must be taken by the *Licensee* to correct the items found not to be in compliance, instructions for responding to the *Administrator*, and a time frame within which an action plan addressing each item of noncompliance must be received by the *Administrator* in order to avoid the issuance of a *Revocation of Compliance Certification*.

A6.11 Licensee's Response

Licensee shall be given a period of 30 days from the date of receipt of the audit report to address the Action Items in the *Notice of Deficiencies* to the satisfaction of the *Administrator*.

The *Licensee* shall be required to respond within 10 days of receipt of a *Notice of Non-compliance* with an action plan that outlines a proposal to resolve the non-compliance issue(s). The *Administrator* shall either accept the action plan or work with the *Licensee* to revise the plan to his satisfaction. Following approval of the action plan by the *Administrator*, the *Licensee* shall have 30 days from receipt of approval to implement the plan. If *Licensee* provides the *Administrator* with an unaffiliated third-party certification (*mill certification* or certification from an accredited independent laboratory) that the *Administrator* can verify through traceability that conflicts with the *Administrator's* results, this *Notice of Non-compliance* will not count towards Revocation of Compliance Certification. Nonetheless, the *Licensee* shall respond with an action plan as required above and the *Administrator* shall conduct a follow-up audit within 30 days after implementation of the plan to verify compliance. Re-sampling for compliance testing will only apply to the class of *Product* with failures. However, the retest will cover all parameters of testing for that class of products, not solely the failure item.

If there is a subsequent failure on the follow-up audit for any reason, the failure will count as one notice of non-compliance.

A6.12 Revocation of Compliance Certification

A manufacturing facility shall be removed from the *Production Facilities List* maintained by the *Administrator* when a *Revocation of Compliance Certification* is issued. The following shall be cause for a *Revocation of Compliance Certification* to be issued:

- a. Failure of the *Licensee* to respond with an action plan to a, *Notice of Deficiencies* or a *Notice of Non-Compliance* after an unannounced audit.
- b. Failure to implement an approved action plan once it has been submitted and approved by the *Administrator*.
- c. Issuance of a *Notice of Non-Compliance*, including a non-compliance following a follow-up audit on three separate occasions within any rolling twelve-month period.

Example of 3 strikes to Revocation

| Date | Process |
|------------------|--|
| 1/1/2015 | Inspection performed |
| 1/20/2015 | Letter of Results (LOR) released with structural failures - NONC issued |
| 1/30/2015 | Mill cert provided (NONC doesn't count towards Revocation) |
| 3/10/2015 | Resampling performed |
| 3/30/2015 | Letter of Results (LOR) with structural failures - NONC issued (1st strike) |
| 7/1/2015 | Resampling performed with Inspection |
| 7/20/2015 | Letter of Results (LOR) released with structural failures - NONC issued (2nd strike) |
| 9/1/2015 | Resampling performed |
| 9/15/2015 | Letter of Results (LOR) with structural failures - NONC issued (3rd strike, revocation issued) |
| 10/1/2015 | Issues resolved and reapplied for class of product |
| 11/1/2015 | Initial inspection for structural product was performed with regular inspection |
| 11/15/2015 | Letter of Results (LOR) released with structural failures - no NONC issued, this is the initial inspection |
| 1/1/2016 | Resampling performed |
| 1/20/2016 | Letter of Results (LOR) with no failures |
| 1/20/2016 | Compliance Certification re-issued for class of product |

There are three distinct NONCs

1. General
2. Structural
3. Nonstructural

Note: The General NONC can be added as the 3rd NONC for the class of product that has 2 NONCs; however, structural cannot be added to nonstructural or vice versa.

A *Revocation of Compliance Certification* issued for a specific manufacturing facility shall affect only the class of *Certified Products* produced at that facility and shall not impact the status of other manufacturing facilities operated by the same *Licensee*. Upon receipt of a *Revocation of Compliance Certification* for a class of products at a facility, the *Licensee* shall immediately:

- a. Discontinue use of *Certification Labels* for that class of products.
- b. Cease all references to participation in the *Compliance Program* for that class of *products* from that facility.
- c. Remove all *Certification Labels* from the affected *products* within the *Licensee's* possession.
- d. Label the Revoked class of products as "Not SFIA Compliant." Label must be in the same size and font as other labeling on similar products.

Continued use of labels after *Revocation of Compliance Certification* or false claims of certification will result in suspension/termination of the *Licensee's Association* membership.

A *Revocation of Compliance Certification* for products produced at a particular facility only applies to that particular facility and class of product. The *Licensees'* other facilities that produce the same product may continue to market *Certified Products* produced at those facilities not listed in the *Administrator's Notice of Revocation of Compliance Certification*. However, when doing so, *Licensees* shall market such *Certified Products* in such a way that they do not cause confusion or deception to consumers, distributors or others. A new *Notice of Compliance Certification* may be applied for as soon as required *Corrective Actions* have been taken to remedy any action items in the *Notice of Revocation of Compliance Certification*. Once the application is received by the *Administrator*, an unannounced audit will be conducted within 30 days, to verify that *Corrective Actions* have sufficiently addressed issue(s) of *non-compliance*. *Certification Labels* are not allowed to be used until a new *Compliance Certification* is issued. The *Licensee* may appeal a *Revocation of Compliance Certification* to the *Compliance Committee*.

A6.13 Certification Label

The official *Certification Label* must be used by *Licensees* to identify all *Certified Products*. It may also be used on product literature to identify *Certified Products*. The *Administrator* shall have sole authority to authorize use of *Certification Labels* on products or literature.

By applying *Certification Labels*, the *Licensee* is certifying that the products bearing the label comply with the *Program Requirements* and have been manufactured as good-faith reproductions of *Products* listed on the *Certified Production Facilities* link of the *Association* website in design, construction and fabrication.

Only *Certification Labels* developed and approved by the *Compliance Committee* in conjunction with the *Administrator* may be applied. *Certification labels* are to be ordered from the printer identified by the *Association*, and the *Licensee* must submit a copy of the *Compliance Certificate* with the order. *Certification Labels* shall be applied to the bulk packaging at the time and place of manufacture and may be added to the marking required by AISI for all members. The *Certification Label* may not be modified by the *Licensee* without written consent from the *Compliance Committee*. The *Certification Label* may not be used or placed in such a manner as to imply any other endorsements or certifications by the *Association* or the *Administrator*. Only products approved for certification shall be permitted to have *Certification Labels* applied to them.

A6.14 Communications

When changes to the referenced standards take place and are adopted into the *Compliance Program*, the *Administrator* shall notify *Licensees* in writing. *Notification* shall include instructions detailing the process required to maintain *certification* approval based upon use of those updated standards and the timeline for enforcement to commence.

A6.15 Questions

Questions about the *Compliance Program* or applicability of specific sections of the program shall be addressed to the *Administrator*. If the *Compliance Program* is not clear on the issue, the *Administrator* or the *Licensee* may refer the matter in writing to the *Compliance Committee* for a written interpretation.

A7 Membership

A manufacturer is required to sign License Agreements with the *Association* and the *Administrator* in order to participate in the *Code Compliance Certification Program*. The manufacturer agrees to abide by the *Program Requirements* as set forth in these *Program Requirements* and other referenced *Program* documents. The License Agreements shall automatically renew annually provided that the *Licensee* continues to comply with the *Program Requirements* as set forth in these *Program Requirements* and continues to pay all applicable fees. Failure to comply with the *Program Requirements* shall constitute a breach of the License Agreements, and may result in *Revocation of Compliance Certification*.

A8 Licensee Roles and Responsibilities

The participating *Licensee* is a manufacturer of *product* who certifies that *Certified Products* included in the *Code Compliance Certification Program* comply with the *Program Requirements*. The *Licensee* shall have the following duties and responsibilities:

- a. Continuously manufacture *Certified Products* in compliance with those tested for inclusion in the *Code Compliance Certification Program*.
- b. Maintain an adequate quality control program or programs to ensure that *Certified* structural and nonstructural cold-formed steel framing *Products* are manufactured in accordance with the *Program Requirements*. (Minimum quality control requirements for participation in this *Program* are specified in Section A11.)
- c. Provide the *Administrator* with an annual schedule of plant or facility closings and *notify* the *Administrator* of any changes when they occur.
- d. *Notify* the *Administrator* immediately of any changes in location, addition or deletion of plants or facilities that manufacture or assemble *Certified Products*.
- e. Permit free access during normal working hours for the *Administrator's Auditor*, within 15 minutes of his arrival at the facility, and allow him access into the manufacturing areas, warehouse areas, material storage facility areas, and provide the *Administrator's Auditor* with any requested quality control records that validate the certification process.
- f. Provide a primary and secondary audit contact at each manufacturing plant or facility who will be available to accompany the *Auditor* throughout the audit process and has the authority to sign the appropriate audit form.
- g. Address all *Notice of Deficiencies* assigned as a result of the audit process and document *Corrective Actions*, in writing, to the *Administrator* within the prescribed timeframe.
- h. Apply Certification Labels only as authorized by the Code Compliance Certification Program.
- i. Comply with all marking and labeling requirements.
- j. Pay all applicable fees due to the Associations or the Administrator, and other costs as described in the underlying Agreement or in the *Code Compliance Certification Program*. Failure to pay fees on a timely basis shall subject *Licensee* to *Revocation of Compliance Certification* or exclusion from the *Code Compliance Certification Program*.

A8.1 Literature and Technical Data

Manufacturers shall submit to the *Administrator* the following technical data, certified by a professional engineer, in accordance with the *Applicable Standards* for the *Administrator's verification*. The manufacturer shall make available the certified data to the *Administrator* for products that are not listed in the Technical Guide.

A8.1.1 Structural Members

- a. Physical Properties Data conforming to the requirements of AC46; including properties per AISI or from Testing to cover web crippling or section reductions.
- b. Members intended to be used for curtain wall framing shall submit; Non-Composite Wall Limiting Heights based upon the stud being fully braced laterally and torsionally, containing data for all the combinations of the following criteria. The maximum brace length to restrain lateral-torsional buckling (L_u) shall be shown next to each *product* in the table.
 - I. Deflection Limits: L/240, L/360, L/600
 - II. Lateral Loads: 15, 20, 25 and 30 psf
 - III. Spacing: 12", 16", 24" on-center spacing
- c. Members intended to be used for curtain wall framing shall submit; Non-Composite Wall Limiting Heights based upon the stud being braced at 48 inches on-center (vertically), laterally and torsionally, containing data for all the combinations of the following criteria:
 - I. Deflection Limits: L/240, L/360, L/600
 - II. Lateral Loads: 15, 20, 25 and 30 psf
 - III. Spacing: 12", 16", 24" on-center spacing
- d. Members intended to be used for axial load-bearing framing shall submit; Axial capacity tables based on stud bracing at 48" on-center (vertically) laterally and torsionally. Containing data for all the combinations of the following criteria:
 - I. Deflection Limits: L/240, L/360, L/600
 - II. Lateral Loads: 15, 20, 25 and 30 psf
 - III. Spacing: 12", 16", 24" on-center spacing
 - IV. Heights of 8,9,10,12,14 and 16 feet
- e. Members intended to be used for floor joist framing shall submit; Allowable span tables based on joist bridging of 96" on-center along the length of the tension flange and continuous bracing of the compression flange. Span tables shall contain data for all the combinations of the following criteria: Spacing of 12", 16" & 24" on center.
 - I. Live load deflection limits of L/360 and L/480.
 - II. Load combinations of dead load / live load of:
 - i. 10 psf / 20 psf
 - ii. 10 psf / 30 psf
 - iii. 10 psf / 40 psf
 - iv. 10 psf / 50 psf
 - v. 15 psf / 125 psf
 - vi. 40 psf / 125 psf

A8.1.2 Nonstructural Members and Equivalent Nonstructural Members

- a. Physical Properties Data conforming to the requirements of AC46; including properties per AISI or from Testing to cover web crippling or section reductions.
- b. Screw capacities for *equivalent nonstructural member* material containing allowable values for shear (bearing), pullout and pullover in accordance with AISI S100, Section E4.
- c. Non-Composite Wall Limiting Heights based upon the stud being fully braced laterally and torsionally, containing data for all the combinations of the following criteria. The maximum brace length to restrain lateral-torsional buckling (L_u) shall be shown next to each *product* in the table.
 - I. Deflection Limits: $L/120$, $L/240$, $L/360$
 - II. Lateral Loads: 5, 7.5, 10 psf
 - III. Spacing: 12", 16", 24" on-center spacing
- d. Non-Composite Wall Limiting Heights based upon the stud being braced at 48 inches on-center (vertically), laterally and torsionally, containing data for all the combinations of the following criteria:
 - I. Deflection Limits: $L/120$, $L/240$, $L/360$
 - II. Lateral Loads: 5, 7.5, 10 psf
 - III. Spacing: 12", 16", 24" on-center spacing
- e. Composite Limiting Heights calculated and tested as described in Appendix C, meeting the requirements of AC86 or AISI S916, and published with data for all the combinations of the following criteria:
 - I. Deflection Limits: $L/120$, $L/240$, $L/360$
 - II. Lateral Loads: 5, 7.5, 10 psf
 - III. Spacing: 12", 16", 24" on-center spacing

Where the member has zero span or is not recommended for an application, an ellipse shall be shown in the space.

A8.2 Other Marketing

Licensees may use the *Certification Label* in marketing when it appears to directly relate to references to this *Code Compliance Certification Program*. The use of the *Certification Label* may only be used on pages where all *products* represented on that page are *Certified*. Wherever the *Code Compliance Certification Program* is used or referenced in marketing, the *Licensee* shall include the statement "Check the updated list of *Certified Production Facilities* at [Administrator's] website at https://www.archtest.com/certification/SFIA_SteelFraming_Intertek.aspx." *Licensees* may not use *Certification Labels* until all appropriate agreements between the manufacturer, the *Association* and the *Administrator* are executed, and the *products* are qualified under this *Program* and a *Compliance Certification* has been issued. Appropriate clarifications, highlights, footnotes, etc. must be included to ensure clarity about which products are qualified under the *Compliance Program* and which are not.

No *Licensee* shall be permitted to use *Certification Labels* in future literature if it has received a *Revocation of Compliance Certification* and has not had all relevant facilities re-certified. The *Certification Label* shall not be used to indicate that the *Association* or the *Administrator* in any way endorses the *Licensee* or its *Certified Products*.

Licensees that leave the *Association* or the *Program* shall immediately destroy all *Certification Labels* and remove or destroy any literature, signage or emblems that imply participation in the *Program* or membership in the *Association*.

The *Administrator* shall be responsible to review all *Product* literature and *product* websites of each *Licensee* at the time of the unannounced audits to verify compliance with the *Program Requirements*.

A8.3 Communications

All official communication with administration and/or *Compliance Committee* shall be in writing or by electronic submission. Verbal communications are not considered to be official. All communications concerning the *Compliance Certification Program* shall be done through the *Administrator*.

A8.4 Similar Products

It is the intent of this program that all C-shape products must be enrolled in the program and carry the SFIA label. Custom Products and products not enrolled may not bear the SFIA label.

A9 Compliance Committee

A9.1 Role and Responsibility

The *Association's Compliance Committee* shall have the responsibility for the maintenance and oversight of the *Code Compliance Certification Program*, including but not limited to the following duties:

- a. Contract with the *Administrator* and periodic review of the *Administrator's* performance.
- b. Monitor the *Administrator's* records.
- c. Formulate general policy to ensure the uniformity and equity of the *Compliance Program's* administration.
- d. Monitor all *Applicable Building Codes* and *Applicable Standards*, and update the *Code Compliance Certification Program* as deemed necessary.

The SFIA Technical Director shall instruct the *Administrator* on how to implement this program, clarify and answer *Administrators* questions. The SFIA Technical Director shall be the liaison between the *Compliance Committee* and the *Administrator*.

The *Compliance Committee* shall receive periodic reports from the *Administrator* about the status of the *Code Compliance Certification Program*, including *new Licensees*. All reports from the *Administrator* are to be aggregated and generic to protect the confidentiality of the *Licensee*, except where required to rule on an appeal. The *Compliance Committee* shall respond to requests for technical interpretations posed by the *Administrator* or *Licensees*. The *Compliance Committee* shall review appeals from *Licensees* relative to the *Program Requirements* or *Administrator's* decisions.

A9.2 Revisions to Standards

The *Compliance Committee* shall stay apprised of changes to building codes and standards. The *Compliance Committee* will implement changes to this Program as deemed appropriate.

A9.3 Review of Appeals

The *Administrator* is responsible for the execution of the functions described in these *Program Requirements*. However, any *Licensee* may appeal *Revocation of Compliance Certification* decisions made by the *Administrator* by sending a written appeal to the *Compliance Committee* Chairperson, and sending the *Administrator* a copy within 30 days of receipt of written Notice of *Revocation of Compliance Certification*. The appeal shall state the reason(s) that the *Licensee* is seeking review of the *Administrator's* determination.

The *Licensee's* written appeal shall contain sufficient information and/or documentation to accurately identify the factual background, the nature of the dispute and the decision or desired outcome sought. The *Administrator* shall submit materials to the *Compliance Committee* supporting his determination within 10 days of the *Licensee's* appeal.

The *Compliance Committee* shall rule on the appeal within fourteen (14) days of receiving the *Licensee's* appeal and the *Administrator's* materials. In its review of the *Licensee's* appeal, the *Compliance Committee* shall consider input from the appealing *Licensee* and the *Administrator*, and may seek and consider input from the *Association's* technical staff and legal counsel. Input may also be requested from other qualified individuals or organizations with pertinent laboratory, technical or industry experience.

During the appeal process, the *Licensee* may not use *Certification Labels* on the Revoked class of *products*. Any Revoked products produced shall be labeled "Not SFIA Compliant" with a font type and size similar to other labeling. If the *Administrator's* decision is sustained by the *Compliance Committee*, *Revocation of Compliance Certification* shall continue as per Section A6.9.

A10 Communications

The *Licensee* and the *Administrator* shall not make any public comments, including statements at *Association* meetings, on the status of any particular *Product* or *Licensee* except to refer all inquiries to the *Certified Manufacturing Facilities List*. The *Association*, *Licensee* and the *Administrator* are obliged to maintain the confidentiality of proprietary information received from participating companies. This obligation is detailed in the formal agreement between the *Association* and the *Administrator*, and in the individual agreements between the *Licensee*, *Administrator* and *Association*. The *Administrator* shall maintain the *Certified Manufacturing Facilities List* on its servers. The servers shall be accessible through a seamless link from the SFIA website.

A11 Quality Documentation

All *Licensees* are required to submit a quality control manual to the *Administrator*. The quality control manual should document how the *Licensee's* quality control program and procedures meet the requirements of ICC-ES AC10 and applicable sections of AC46. The prospective *Licensee* shall forward a copy of the quality control manual to the *Administrator* before the *Program* applicant is approved as a *Licensee*. Quality control manuals shall include manufacturer's *Approved Part Drawings* for each *product*. Each of the *Licensee's* manufacturing facilities capable of producing *products* shall have on file a physical copy of the quality manual, referenced documents and the *Compliance Program*.

B. Materials

B1 Sheet Steel Properties

B1.1 Mechanical Properties

Structural members, Nonstructural Members, and Equivalent Nonstructural Members shall be cold-formed to shape from sheet steel with mechanical properties complying with ASTM A1003/A1003M but be limited to the following material types and *grades*:

Structural members:

1. ASTM A1003/A1003M Type H (high ductility): Structural Grade 33 [230] Type H (ST33H) [ST230H] or Structural Grade 50 [340] Type H (STH) [ST340H]

Nonstructural members and Equivalent Nonstructural Members shall be cold-formed to shape from sheet steel with mechanical properties complying with ASTM A1003/ A1003M, but be limited to the following material types and *grades*:

Nonstructural members

1. Type NS (nonstructural): Nonstructural Grade 33 [230] (NS33) [NS230] or Nonstructural Grade 40 [275] (NS40) [NS275] or Nonstructural Grade 50 [340] (NS50) [NS340] or Nonstructural Grade 57 [395] (NS57) [NS395] or Nonstructural Grade 60 [410] (NS60) [NS410] or Nonstructural Grade 65 [450] (NS65) [NS450] or Nonstructural Grade 70 [480] (NS70) [NS480] or Nonstructural Grade 80 [550] (NS80) [NS550].

B1.2 Thickness

Structural Members:

1. *Structural Members* shall have a minimum *base steel thickness* that is equal to or greater than the associated thickness values listed in Table 1 (below).
2. In no case shall a member have a minimum *base steel thickness* less than 95% of the *design thickness*.

Table 1 - Thickness for Standard Structural Members

| Designation Thickness | Minimum Base Steel Thickness | | Design Thickness | |
|-----------------------|------------------------------|-------|------------------|-------|
| | (inch) | (mm) | (inch) | (mm) |
| 33 | 0.0329 | 0.836 | 0.0346 | 0.874 |
| 43 | 0.0428 | 1.087 | 0.0451 | 1.146 |
| 54 | 0.0538 | 1.367 | 0.0566 | 1.435 |
| 68 | 0.0677 | 1.720 | 0.0713 | 1.811 |
| 97 | 0.0966 | 2.454 | 0.1017 | 2.583 |
| 118 | 0.1180 | 2.997 | 0.1242 | 3.155 |

Nonstructural Members:

Standard Nonstructural Members:

1. *Standard Nonstructural Members* shall comply with AISI S220 and shall in no case have a minimum *base steel thickness* less than 95% of the *design thickness*.

2. *Standard Nonstructural Members* shall have a minimum *base steel thickness* that is equal to or greater than the associated thickness values listed in Table 2 (below).

Table 2 - Thickness for Standard Nonstructural Members

| Designation Thickness | Minimum Base Steel Thickness | | Design Thickness | |
|------------------------------|-------------------------------------|-------------|-------------------------|-------------|
| | (inch) | (mm) | (inch) | (mm) |
| 18 | 0.0179 | 0.455 | 0.0188 | 0.478 |
| 27 | 0.0269 | 0.683 | 0.0283 | 0.719 |
| 30 | 0.0296 | 0.752 | 0.0312 | 0.792 |
| 33 | 0.0329 | 0.836 | 0.0346 | 0.874 |

Equivalent Nonstructural Members:

1. *Equivalent Nonstructural Members* shall comply with AISI S220 and shall in no case have a minimum *base steel thickness* less than 95% of the *design thickness*.

2. *Equivalent Nonstructural Members* shall have a minimum *base steel thickness* that is equal to or greater than the thickness specified on the *Approved Part Drawing*.

3. *Equivalent Nonstructural Members* shall meet the performance requirements of the Building Code and this *Code Compliance Certification Program*.

B2 Corrosion Protection

1. *Structural Members* shall have a minimum *standard coating* that complies with the requirements of AISI S240, Table A4.1, reproduced below.

**Table A4-1
Coating Designations**

| Coating Classification | Coating Designator | Minimum Coating Requirements | | | |
|------------------------|--------------------|--|--|--|--|
| | | Zinc Coated ^A oz/ft ² (g/m ²) | Zinc Iron ^B oz/ft ² (g/m ²) | 55% Al-Zinc ^C oz/ft ² (g/m ²) | Zinc-5% ^D oz/ft ² (g/m ²) |
| Metallic Coated | CP 60 | G60 [Z180] | A60 [ZF180] | AZ50 [AZM150] | GF30 [ZGF90] |
| | CP 90 | G90 [Z275] | Not Applicable | AZ50 [AZM150] | GF45 [ZGF135] |
| Painted Metallic | PM | The metallic coated substrate shall meet the requirements of metallic coated. In addition, the paint film shall have a minimum thickness of 0.5 mil per side (primer plus topcoat) with a minimum primer thickness of 0.1 mil per side. ^E | | | |

^A Zinc-coated steel sheet as described in ASTM A653/A653M.

^B Zinc-iron alloy-coated steel sheet as described in ASTM A653/A653M.

^C 55% Aluminum-zinc alloy-coated steel sheet as described in ASTM A792/A792M.

^D Zinc-5% aluminum alloy-coated steel sheet as described in ASTM A875/A875M.

^E In accordance with the requirements of ASTM A1003/A1003M.

2. *Nonstructural Members* shall have a minimum *standard coating* that complies with the requirements of Table 3, Type NS (below).
3. *Nonstructural Members* may have an *Equivalent Coating* in lieu of a *Standard Coating*, and may be used without pre-approval but shall be evaluated by performance following the procedure specified in ASTM B117 and the requirements defined in this program for *Equivalent Coating*.
4. Samples of nonstandard coatings, metallic Type NS, shall be tested side-by-side via the ASTM B117 test procedure with a *certified minimum* (single side) *G40 sample* to establish equivalence.
Insert the *certified G40 sample* and alternative coating sample into the B117 test chamber and run until *certified G40 sample* has 10% rust, or if after 144 hours, the presence of rust doesn't reach 10%, the test may be stopped. In comparing the alternative sample to the *certified G40 sample*, it must have same or less % of rust than the G40 sample to pass. The alternative sample shall be compared to the new ratioed percentage of rust.
*** For certified G40 samples that are coated on the test side with a weight of more than 0.12 oz of zinc, the allowable level of red rust on the alternative coating will be ratioed up by the following: [(measured coating thickness)/0.12] x % red rust measured on the *certified G40 sample*.
5. If the manufacturer would like their nonstandard coating to be added to the list of standard coatings within this program, independent third-party testing would need to be submitted to the Compliance Committee for review and approval.

**TABLE 3 Nonstructural Coating Weight
[Mass] Requirements (Metallic Coatings)**

| Product Designation | Coating Designation | | | |
|---------------------|-------------------------------|--------------------------------|---------------------------|-----------------------------|
| Type NS | G40 [Z120] ^A | AZ50 [AZM150] ^B | GF20[ZGF60] ^C | T1-25 [T1M 75] ^D |
| | T2-100 [T2M 300] ^D | 20Z/20Z [60G/60G] ^E | ZM20 [ZMM60] ^F | |

^A Zinc-coated steel sheet as described in Specifications [A653/A653M](#), [A1063/A1063M](#).

^B 55 % aluminum-zinc alloy-coated as described in Specification [A792/A792M](#).

^C Zinc-5 % aluminum alloy-coated steel sheet as described in Specification [A875/A875M](#).

^D Aluminum-coated Type 1 and Type 2 steel sheet as described in Specification [A463/A463M](#).

^E Zinc-coated steel sheet as described in Specification [A879/A879M](#).

^F Zinc-aluminum-magnesium alloy-coated as described in Specification [A1046/A1046M](#).

C. Product Shape

C1 Dimensions

C.1.1 – Standard C - Shapes

Structural Members shall have any combination of the basic dimensions listed in Table C1 (below):

| Web Depth* | Flange Width and Return Lip * | |
|------------|-------------------------------|------|
| 2- 1/2" | 1-3/8" | 3/8" |
| 3-1/2" | 1-5/8" | 1/2" |
| 3-5/8" | 2" | 5/8" |
| 4" | 2-1/2" | 5/8" |
| 5-1/2" | 3" | 5/8" |
| 6" | 3-1/2" | 1" |
| 8" | | |
| 10" | | |
| 12" | | |
| 14" | | |
| 16" | | |

*Any web depth can be combined with any flange width. However, flanges are required to use the return lip shown. Track members shall have a minimum 1-1/4" flange.

Nonstructural Members shall meet the dimensional requirements of AISI S220 including the following:

1. *Studs* shall have a *web* (outside) depth equal to those shown in Figure 1 of ASTM C645. *Tracks* shall have an inside depth equal to those shown in Figure 1 of ASTM C645.
2. *Studs* shall have a minimum *flange* width of 1.25 inches in accordance with Section 6.2 of AISI S220. *Tracks* shall have a minimum *flange* (leg) width of 1.00 inch per Section 6.2 of AISI S220.
3. *Studs* shall have minimum return lip of 0.1875 inches in accordance with Section 5.1.3 of ASTM C645.

C.1.2 Non-Standard C - Shapes

Non-standard C-shapes approved product drawings shall include all critical dimensions. The approved product drawing shall include tolerances for all critical dimensions. Tolerances shall at a minimum match the prescribed tolerances in C2 for Standard C-Shapes.

C2 Manufacturing Tolerances

Structural members shall comply with the manufacturing tolerances listed in AISI S240. (Table A5-1 Manufacturing Tolerances and Figure 2 Manufacturing Tolerances from AISI S240 are reproduced below for reference.)

**Table A5-1
Manufacturing Tolerances for Structural Members**

| Dimension ¹ | Item Checked | Studs, in. (mm) | Tracks, in. (mm) |
|------------------------|----------------|------------------------------|--------------------------|
| A | Length | +3/32 (2.38) | + 1/2 (12.7) |
| | | -3/32 (2.38) | -1/4 (6.35) |
| B ² | Web Depth | +1/32 (0.79) | +1/32 (0.79) |
| | | -1/32 (0.79) | +1/8 (3.18) |
| C | Flare | +1/16 (1.59) | +0 (0) |
| | Overbend | -1/16 (1.59) | -3/32 (2.38) |
| D | Hole Center | +1/16 (1.59) | NA |
| | Width | -1/16 (1.59) | NA |
| E | Hole Center | +1/4 (6.35) | NA |
| | | -1/4 (6.35) | NA |
| F | Crown | +1/16 (1.59) | +1/16 (1.59) |
| | | -1/16 (1.59) | -1/16 (1.59) |
| G ³ | Camber | 1/8 per 10 ft (3.13 per 3 m) | 1/32 per ft (2.60 per m) |
| | | | 1/2 max (12.7) |
| H ³ | Bow | 1/8 per 10 ft (3.13 per 3 m) | 1/32 per ft (2.60 per m) |
| | | | 1/2 max (12.7) |
| I | Twist | 1/32 per ft (2.60 per m) | 1/32 per ft (2.60 per m) |
| | | 1/2 max (12.7) | 1/2 max (12.7) |
| J | Flange | +1/8 (3.18) | +1/4 (6.35) |
| | | -1/16 (1.59) | -1/16 (1.59) |
| K | Stiffening Lip | +1/8 (3.18) | NA |
| | | -1/32 (0.79) | |

¹ All measurements are taken not less than 1 ft (305 mm) from the end.
² Outside dimension for stud; inside for track.
³ 1/8 inch per 10 feet represents L/960 maximum for overall camber and bow. Thus, a 20-foot-long member has 1/4 inch permissible maximum; a 5-foot-long member has 1/16-inch permissible maximum.

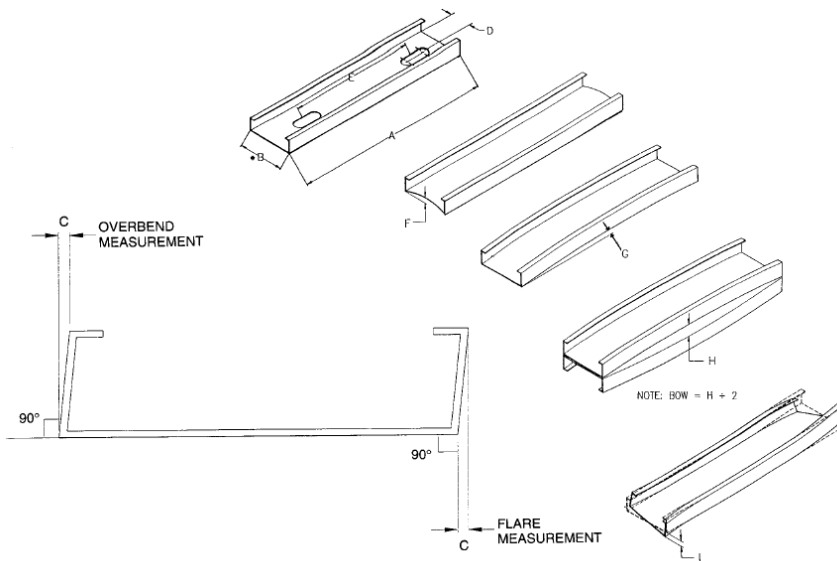


FIG. 2 Manufacturing Tolerances

Nonstructural Members shall comply with the manufacturing tolerances listed in AISI S220. (Table A6-1 Manufacturing Tolerances and Figure 2 Manufacturing Tolerances from AISI S220 are reproduced below for reference.)

**Table A6-1
Manufacturing Tolerances for Nonstructural Members**

| Dimension ¹ | Item Checked | Studs, in. (mm) | Tracks, in. (mm) |
|------------------------|-----------------------|-------------------------|-------------------------|
| A | Length | +1/8 (3.18) | + 1(25.40) |
| | | -1/4 (6.35) | -1/4 (6.35) |
| B ² | Web Depth | +1/32 (0.79) | +1/8 (3.18) |
| | | -1/32 (0.79) | -0 (0) |
| C | Flare | +1/16 (1.59) | +0 (0) |
| | Overbend | -1/16 (1.59) | -3/16 (4.76) |
| D | Hole Center Width | +1/8 (3.18) | NA |
| | | -1/8 (3.18) | NA |
| E | Hole Center Length | +1/4 (6.35) | NA |
| | | -1/4 (6.35) | NA |
| F | Crown | +1/8 (3.18) | + 1/8 (3.18) |
| | | -1/8 (3.18) | - 1/8 (3.18) |
| G | Camber | 1/32 per ft (2.6 per m) | 1/32 per ft (2.6 per m) |
| | | 1/2 max (12.7) | 1/2 max (12.7) |
| H | Bow | 1/32 per ft (2.6 per m) | 1/32 per ft (2.6 per m) |
| | | 1/2 max (12.7) | 1/2 max (12.7) |
| I | Twist | 1/32 per ft (2.6 per m) | 1/32 per ft (2.6 per m) |
| | | 1/2 max (12.7) | 1/2 max (12.7) |
| J | Flange Width | +1/8 (3.18) | +1/2 (12.7) |
| | | -1/16 (1.59) | -1/16 (1.59) |
| K | Stiffening Lip Length | +1/8 (3.18) | NA |
| | | -1/32 (0.79) | NA |

¹ All measurements shall be taken not less than 1 ft (305 mm) from the end.

² Outside dimension for stud; inside for track.

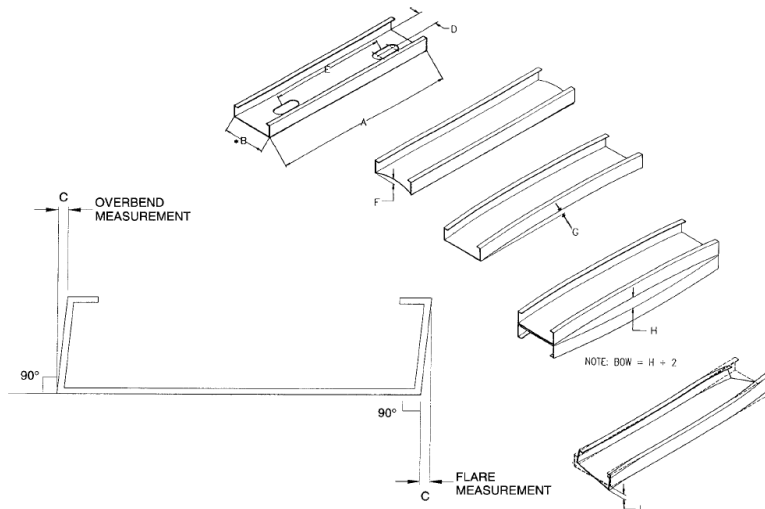


FIG. 2 Manufacturing Tolerances

C3 Punchouts

C3.1 Standard Punchouts

Structural Members and *nonstructural members* may or may not have *punchouts*. *Punchouts* shall comply with items 1 through 7:

1. *Punchouts* shall be symmetrical along the centerline of the *web* and be spaced along the centerline of the *web* of the framing member.
2. *Punchouts* shall have center-to-center spacing of not less than 18 inches (457mm); *Structural member punchouts* shall have a center-to-center spacing of not less than 24 inches (610mm).
3. Non-circular *punchouts* shall have a width not greater than half the member depth or 2-1/2 inches (63.5mm), whichever is less.
4. Non-circular *punchouts* shall have a length not exceeding 4-1/2 inches (114mm).
5. The distance from the end of the member and the near edge of the last *punch out* to the end of the member shall not be less than 10 inches (254mm).
6. Non-circular *punchouts* shall have corner radii greater than or equal to two times the minimum *base steel thickness*.
7. Holes shall have a minimum width of 9/16 inch (14mm).

Any configuration or combination of holes that fits within the *punchout* width and length limitations shall be permitted.

C3.2 Non-Standard Punchouts

Shapes with non-standard punchouts shall be included in the approved product drawings. The approved product drawing shall include tolerances for all punchouts. Test data shall be submitted to verify structural capacities of the members at the punchouts.

D. Product Identification

D1 Nomenclature

Structural Members and *Standard Nonstructural Members* shall be identified with a product designator as defined by Section A5.2 of AISI S240 and Section A6.3 of AISI S220 respectively. The product designator shall consist of the following sequential codes:

1. A three or four-digit numeral indicating member *web* depth in 1/100 inch.
2. A letter indicating:
S = *Stud* or joist framing member which has *lips*
T = *Track* section
3. A three-digit numeral indicating *flange* width in 1/100 inch, followed by a dash.
4. A two or three-digit numeral indicating designation thickness.

Example: 362S162-54

362=3-5/8 depth; S=*Stud*; 162=1-5/8" *Flange*, 54=0.0538" minimum thickness

Equivalent Nonstructural Members shall declare a similar standard product for the basis of equivalence. *Equivalent nonstructural members* shall have nomenclature that indicates member depth, type of member, *flange* width and thickness.

D2 Product Marking

D2.1 Individual Structural Members

Code requirements for marking *Structural Members* are included in AISI S240, Section 5.5.2

1. Individual members shall have a legible label, stencil, or embossment at a maximum distance of 96 in. (2440 mm) on center, on the member, with the following minimum information:
 - a. The rollformer's identification (that is, name, logo or initials).
 - b. The minimum steel thickness, in mils or inches, exclusive of protective coatings.
 - c. The minimum yield strength in kips per square inch (megapascals).
 - d. The appropriate coating designator in accordance with AISI S240, Section A4.1.
 - e. A label or mark indicating product is SFIA certified shall be added to the individual member.

Note:

- Members 6'-0" and shorter are not required to have the individual member marking applied.

- Members produced on a press brake are not required to have individual member labeling applied.

D2.2 Individual Nonstructural Members and *Equivalent Nonstructural Members*

Code requirements for marking *Nonstructural Members* are included in AISI S220, Section A6.5.2.

1. Individual members shall have a legible label, stencil, or embossment at a maximum distance of 96 in. (2440 mm) on center, on the member, with the following minimum information:
 - a. The rollformer's identification (that is, name, logo or initials).
 - b. The minimum steel thickness, in mils or inches, exclusive of protective coating.
 - c. The minimum yield strength in ksi (MPa) if other than 33 ksi (230 MPa).
 - f. The protective coating type and weight, if other than as specified in AISI S220, Section A5.1.
 - g. The designator NS
 - h. A label or mark indicating product is SFIA certified shall be added to the individual member.

Note:

- Members 6'-0" and shorter are not required to have the individual member marking applied.
- Members produced on a press brake are not required to have individual member labeling applied.

D2.3 Groups of Members

D2.3.1 Individual Components Grouped in Bundles

Code requirements for marking units of Structural Members are included in AISI S240, Section A5.5.1, Product Identification, as reproduced below:

Groups of like members shall be marked with a label or a tag attached thereto. Marking shall include the rollformer's identification (name, logo or initials), length, quantity, and rollformer's member designator including member depth, *flange* size, and minimum steel thickness in mils or inches exclusive of protective coating.

Code requirements for marking *Nonstructural Members and Equivalent Nonstructural Members* are included in AISI S220, Section A6.5.1., Product Identification, as reproduced below:

Groups of like members shall be marked with a label, or a tag attached thereto. Marking shall include the roll-former's identification (name, logo, or initials), length, quantity, and roll-former's member designator including member depth, flange size, minimum steel thickness in mils or inches exclusive of protective coating, and the designation "NS".

Per A6.13 of this Program, Certification labels shall be applied to the bulk packaging.

D2.3.2 Individual Members Fabricated into Panels

Code requirements for marking *units* of *Structural Members* are included in AISI S240, Section A5.5.1, "Product Identification".

Panels fabricated from components manufactured per the SFIA Certification program and bearing the required individual member marking shall have a SFIA certification label affixed to the panel indicating that the components are SFIA Certified. The label shall meet the requirements of section A6.13.

D3 Color-Coding

Code requirements for color-coding *Structural* and *Nonstructural Members* are shown below. *Equivalent Nonstructural Members* shall follow the guidelines for the *similar Nonstructural Member* thickness.

1. Where color-coding of members or bundles of like members is employed, the standard color-coding below shall be used:

Color Coding for Members

| Color | Minimum Base Metal Thickness, mils | Minimum Decimal Equivalent | |
|-----------|---------------------------------------|----------------------------|---------------|
| | | In. | (mm) |
| Dark Gray | 15 | 0.0155 | (0.0150) |
| None | 18 | 0.0179 | (0.455) |
| Brown | 19 / Approved 20EQ | 0.0190 * | (0.0190) * |
| Black | 27 | 0.0269 | (0.683) |
| Pink | 30 | 0.0296 | (0.752) |
| White | 33 | 0.0329 | (0.836) |
| Yellow | 43 | 0.0428 | (1.087) |
| Green | 54 | 0.0538 | (1.367) |
| Orange | 68 | 0.0677 | (1.720) |
| Red | 97 | 0.0966 | (2.454) |
| Blue | 118 | 0.1180 | (2.997) |

* or per approved technical data

E. Performance Requirements

E1 Strength

Nonstructural and Equivalent Nonstructural Members shall meet the requirements of Section 5.1 of ASTM C645 for strength. *Equivalent Nonstructural Members* shall have a *Nominal Moment* (in the strong axis direction) equal to or greater than the *Nominal Moment* of the similar *standard member*. The *Nominal Moment* shall be determined by calculations as defined in AISI S100 or through testing described in Appendix B.

E2 Screw Performance

Nonstructural and Equivalent Nonstructural Members shall comply with Screw Penetration requirements in paragraph 9.1 and Section 10 of ASTM C645. The manufacturer shall provide third party test results confirming that its *members* comply for each specified *product* thickness.

E3 Connections

Licensees shall publish screw shear, pullout and pullover values. *Licensees of Equivalent Nonstructural Members* shall provide data that confirms the values are equal to, or greater than, those for similar *Standard Nonstructural Members*. For *Equivalent* and *Standard Nonstructural Members*, F_u shall be equal to F_y , as no tensile strength requirements are specified for Type NS steels in ASTM A 1003/A 1003M. Calculations for *Equivalent Nonstructural Members* shall be conducted in accordance with the equations in Section E4 of AISI S100.

E4 Composite Stiffness

Licensees shall publish composite limiting heights in accordance with section A8.1.2 (f) of this program.

Appendix B – Method for Flexural Testing Cold-Formed Steel Beams

1. Scope

- 1.1. This method establishes test procedures for determining the nominal flexural strengths of cold-formed steel C-sections subject to bending.
- 1.2. This test method provides requirements for spacing discrete intermediate bracing to evaluate both local buckling and distortional buckling limit states.
- 1.3. This method provides an alternative for evaluating the strength of flexural members that cannot be addressed using the analytic provisions of AISI S100.

2. Referenced Documents

- 2.1. American Iron and Steel Institute (AISI), Washington, DC:
AISI S100-07 North American Specification for the Design of Cold-Formed Steel Structural Members, 2007 Edition, Supplement 2 for the *International Building Code 2012*.
- 2.2. ICC Evaluation Service, Whittier, CA:
AC85 Acceptance Criteria for Test Reports, 2009, International Building Code, December 2012.
- 2.3. ASTM International (ASTM), West Conshohocken, PA:
 - A370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*
 - E4, *Standard Practices for Force Verification of Testing Machines*
 - E6, *Standard Terminology Relating to Methods of Mechanical Testing*

3. Symbols

- a = shear span length of test specimen beam. See Figure 1 and 2
b = center span length of test specimen beam. See Figure 1 and 2.
L = total span length of test specimen, measured center-to-center of end supports. See Figures 1 and 2.
P= total failure load of a test specimen.
t = nominal base steel thickness, exclusive of coating.

4. Apparatus

- 4.1. Test method shall generally be suitable for either hydraulic or screw operated testing machines.
- 4.2. In lieu of a test machine, the load may be applied by a hydraulic cylinder. A calibrated load cell shall be used to measure the applied load to within $\pm 1\%$ of the expected ultimate load.
- 4.3. Mid-span beam deflections shall be measured with linear displacement transducers (LDT) with least reading capabilities of 0.001 inch.

4.4. Lateral support fixtures used in the test shall be installed in a manner that does not impede the horizontal displacement of the test specimen.

5. Beam Test Specimens

5.1. Test specimens shall be composed of two C-sections of like geometry, dimensions and material properties.

5.2. Discrete angle braces shall link the flanges of the two C-sections together to form a box section and provide lateral-torsional stability to the specimen.

5.3. Center span length for all test specimens shall be the larger of 4 times the calculated distortional buckling half-wavelength of the C-section or 36-in as detailed in Figures 1 and 2.

a. Generally the default center span length $b = 36\text{-in}$ will exceed 4 times the calculated distortional buckling half-wavelength, λ_d , which itself is typically several times the depth of the C-section.

b. However, $b = 4\lambda_d$ for some 6-in deep sections may be on the order of $(4 \times 6) = 24\text{-in}$, requiring a modification to the reference test specimen geometry shown in Figures 1 and 2.

5.4. Longitudinal spacing of the angles used to brace the compression *flanges* of the C-sections influences the flexural failure mode of the test specimen.

a. For local buckling, the longitudinal spacing of the compression flange braces shall be 3-in on-center within the center span, as detailed in Figure 1.

b. For distortional buckling, a single discrete angle brace may be located at the mid-span of the center span, as shown in Figure 2.

1. When the center span $b = 36\text{-in}$ is much greater than $4\lambda_d$ of the specimen, concern for lateral-torsional buckling may prompt the need for a mid-span compression brace.

2. Consideration must be given to the magnitude of λ_d of the test specimen before installing a mid-span brace, so the brace does not inadvertently restrain, impede, restrict or hinder distortional buckling.

c. Multiple braces spaced 6-in on-center shall be secured to the compression *flanges* within the shear spans of both specimen types and shall be secured with one screw to each compression flange within shear spans.

5.5. Spacing of the braces between the tension *flanges* of the two C-sections shall be 12" on-center for all test configurations.

5.6. Bearing stiffeners are required at each end bearing location and at the points of load application. These stiffeners are attached to the *webs* of the C-sections to prevent *web* crippling at these load transfer points.

5.7. Local buckling test specimens made with C-sections containing *web* knock-outs shall have one *web* knockout located at the mid-span of the constant moment region as shown in Figure 1.

5.8. Distortional buckling test specimens made with C-sections with *web* knockouts shall have one *web* knockout located at a distance of $\frac{1}{2}$ the calculated distortional buckling half-wavelength from the mid-span of the constant moment region as shown in Figure 2.

5.9. Mechanical properties of the test specimens shall be determined from tensile tests conducted in accordance with ASTM A370.

- a. A minimum of three samples for mechanical properties testing shall be obtained from the slit coil used to roll-form each C-section specimen configuration.
- b. Base steel thickness, t , shall be measured from one stud of each test specimen pair.
- c. A third party shall witness the production of the test specimens and provide a certified chain of custody for samples obtained for mechanical property testing, if samples cannot be taken from the *webs* of the test specimens.
- d. Base steel thickness of the material used to fabricate the test specimens shall not vary from the specified (design) thickness by more than $\pm 5\%$.

6. Flexural Test Setup

- 6.1. Four-point bending test configuration with loads applied at the third-points of the specimen span shall be adopted to determine the nominal flexural strength of the test specimens.
 - a. The local buckling test set-up is illustrated in Figure 1 and the distortional buckling test set-up is shown in Figure 2.
 - b. The load distribution beam applies two equal loads to either side of the center span to create a constant moment region with no shear stresses.
 - c. Flexural and distortional buckling failures are expected to occur in the constant moment region of the test specimens.
 - d. Failures outside the constant moment region may indicate that adjustments to the test configuration geometry are warranted.
- 6.2. Total span length (L) between outside supports shall be 108-in. The center span (b) shall be 36-in, and the two shear spans (a) to either side shall be 36-in. unless modifications to these span lengths can be justified by the requirements of Section 5.3
- 6.3. Flexural test specimens shall be supported by a pin condition at one end and by a roller condition at the other end. Similarly, the load distribution beam straddling the center span shall be supported by a pin condition at one end and a roller condition at the other end. The relative sequence of these support conditions is kinematically irrelevant.
- 6.4. External bracing members may be used to restrain the test specimen from lateral-torsional buckling. External bracing shall be limited to the shear spans or region between the point loads and the reaction points.
 - a. External bracing members shall provide lateral support to guide, but not impede, the lateral displacement of the compression flanges and the vertical displacement of the beam specimen.
 - b. Discrete external bracing shall be surfaced with HDPE along the interfaces with the test specimen.
 - c. External bracing may be located at the beam specimen ends and at load points. Additional external bracing may be used within the center span of the distortional buckling specimens.

7. Beam Test Procedure

- 7.1. Initial load, or preload, may be applied to seat the test assembly. This preload shall not exceed 10% of the expected maximum test load.
- 7.2. Test load shall be applied at a maximum rate of 0.10 inch per minute. Loads shall be recorded to a precision of ± 1 percent of the expected maximum test load (P_t).

- 7.3. Mid-span beam displacements shall be recorded to the nearest 0.001 inch along with each recorded load to enable evaluation of the load-deflection behavior.
- 7.4. Test load versus deflection plots shall be displayed in real-time to allow monitoring of the structural response.
- 7.5. Peak test load is the maximum recorded load that the assembly supports during the test. The peak load per C-section member is considered to be one-half of the peak test load.
- 7.6. A minimum of three test assemblies of each C-section specimen configuration shall be tested for both flexural failure modes. More may be required, in accordance with AISI S100 Chapter F1:
 - a. "Evaluation of the test results shall be made on the basis of the average value of test data resulting from tests of not fewer than three identical specimens, provided the deviation of any individual test result from the average value obtained from all tests does not exceed +/- 15 percent."
 - b. "If such deviation from the average value exceeds 15%, more tests of the same kind shall be made until the deviation of any individual test result from the average value obtained from all tests does not exceed +/- 15%, or until at least three additional tests have been made."
 - c. "No test result shall be eliminated unless a rationale for its exclusion can be given. The average value of all tests made shall then be regarded as the nominal strength [resistance], R_n, for the series of tests."

8. Calculations

- 8.1. Evaluation of results to determine the flexural design strength of the tested specimens shall be made in accordance with the procedures in Chapter F1 of AISI S100, as modified by the following provisions.
- 8.2. Peak load determined by testing shall be multiplied by a strength reduction factor, RF, as determined below:

$$RF = [(F_{y\text{-specified}} / F_{y\text{-measured}}) (t_{\text{specified}} / t_{\text{measured}})] \leq 1.0$$

where:

- RF = reduction factor for the member
- F_{y-specified} = Specified yield strength of the member (ksi)
- F_{y-measured} = Measured yield strength of the member (ksi)
- t_{specified} = Specified design thickness of the member (inches)
- t_{measured} = Measured base steel thickness of the member (inches)

- 8.3. Factored peak loads for each test specimen configuration shall be used to calculate the nominal moment capacity of the tested components:

$$M_n = (RF P_t / 4) a$$

where:

- M_n = nominal moment capacity of a single C-section (in-k)
- P_t = peak test load to entire test specimen (k)
- RF = strength reduction factor
- a = measured shear span length (in)

- 8.4. Nominal moment capacity of each C-section configuration shall be determined from the average of all applicable individual M_n values obtained from the tests.

9. Test Report

- 9.1. In addition to all relevant requirements of ICC AC85 Acceptance Criteria for Test Reports, the test report shall include the following:
- Mechanical properties of the cold-formed steel C-section test members, including yield strength, tensile strength, percentage elongation and base steel thickness.
 - A description of the loading procedure used and the rate of loading.
 - Representative load versus deflection curves for each specimen configuration.
 - Individual test peak load values, derived load reduction factors, calculated safety factors.
 - Descriptions of each observed failure.
 - Photographs that supplement the detailed drawings of the test setup and the description of the failure mode(s).
 - The report shall include the nominal moment for each tested member.
 - Tabulated values of the Allowable Strength Design (ASD) and Resistance Factor Design (LRFD) loads for each C-section configuration evaluated.

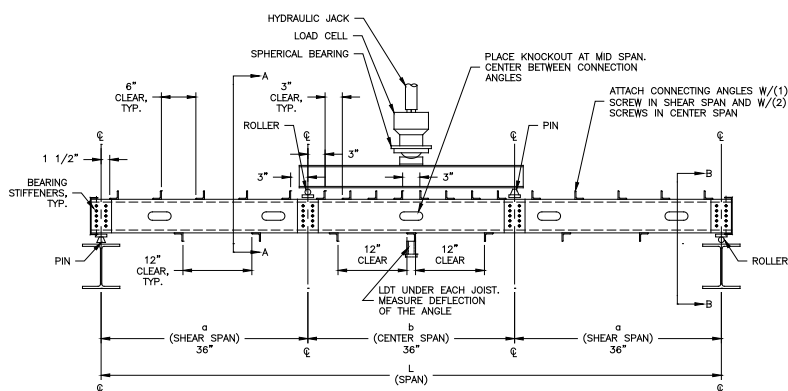


Figure 1

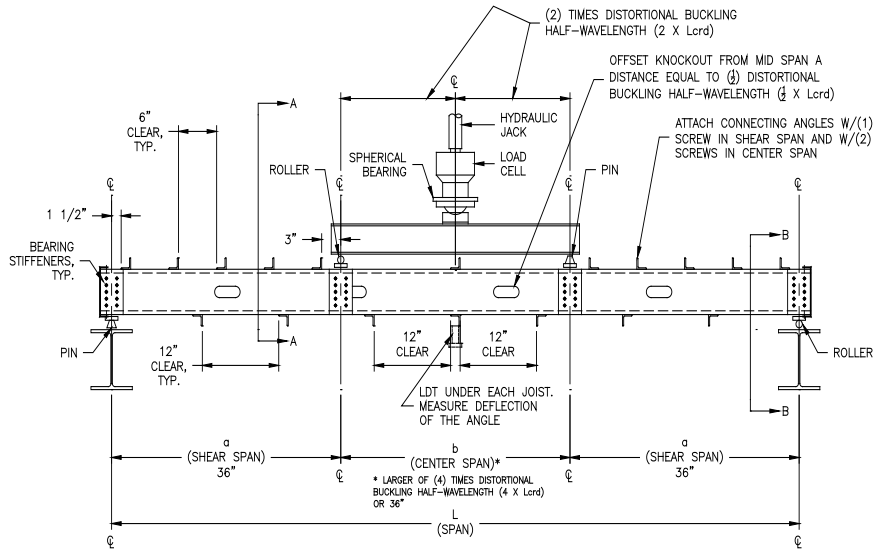
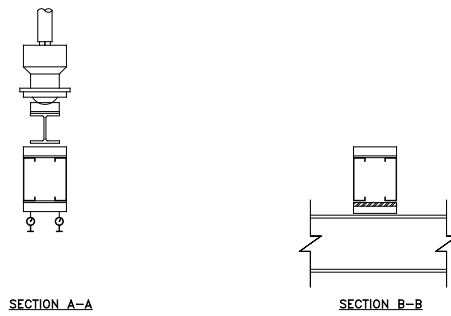


Figure 2



Appendix C – Composite Wall Testing and Analysis Protocol

Composite testing shall default to International Code Council Evaluation Service (ICC-ES) Acceptance Criteria AC86, Acceptance Criteria for Cold-Formed Steel Framing Members – Interior Non load-Bearing Wall Assemblies, and the requirements and specifications below.

1. *Gypsum Board – 5/8"* Gypsum board with a flexural strength up to 200 pounds of force (lbf) when tested in accordance with ASTM C473, method B, with bearing edges perpendicular to the panel length (strong axis) shall be considered “generic” and required for baseline testing. For the development of additional limiting height tables for proprietary products, manufacturers may use gypsum board with strength greater than 200 lbf as long as the manufacturer of the gypsum board is clearly specified in the load tables.
2. *Gypsum Sheathing Orientation:* Gypsum board shall be placed with the long edge parallel to the wall studs (vertical).
3. *Sheathing Gap:* The bottom of the wall shall have a gap between the sheathing and structure (test apparatus) complying with ASTM C840 Section 7.1.3.1. This Standard requires a gap at the bottom of the board for field installation. Tested assemblies shall include a ¼ gap between the bottom of the board and the bottom of the assembly.
4. *Gypsum Board Joint Locations:* These will be aligned on opposite sides of the wall for horizontal joints.
5. *Screw Spacing from Gypsum Board to Stud/Track:* Screws shall be installed per the following table based on ASTM C840 Section 8.5 & 15.3.1.

| Stud spacing (inches) | Screw Size | Screw spacing minimum (inches) |
|-----------------------|------------|--------------------------------|
| 12 | #6 | 16 |
| 16 | #6 | 16 |
| 24 | #6 | 12 |

6. *Screw Type:* Screw size, in accordance with ASTM C1002 Section 8.4, is #6 (major diameter not less than 0.136”).
7. *Screw Spacing from Gypsum to Stud/Track:* There shall be no screws from track to stud (steel to steel connection). The perimeter and field spacing of screws shall be the same, as shown in the table above.
8. *Gypsum Screw Placement:* As noted above, gypsum board to steel screws shall not engage both the track and the stud. It does not matter where the first screw goes, as long as it doesn’t go through both track and stud.

9. *Track Leg*: The track leg length does not influence the composite behavior of the test specimen. The track shall have a maximum 1.25 inch leg (flange) length for the 4' end reaction strength test.
10. *Framing Screws*: No framing screws will be used.
11. *Gap Between Stud & Track*: The gap does not impact the stiffness test, but it does affect the end reaction test. Therefore, no gap requirement is specified for the panel test; ¼ gap at bottom only is required for the short (4') end reaction test.
12. *Tested Depths per Thickness*: Composite testing shall be required on all depths of nonstructural products offered by the manufacturer. Interpolation is not permitted between depths, but thickness interpolation is permitted.
13. *Tested Thicknesses*: If all thicknesses have the same yield strength, then only low and high thicknesses are required to be tested. If there is a yield strength change, then the low and high of each yield strength variation shall be tested.
14. *Tested Assembly Heights*: Three test series shall be performed for each product. The three test series will consist of a 4-foot strength test series and two stiffness test series (short and tall.)

| Test Wall Span (ft) | | | | | | | |
|------------------------------|--------------|-----------|--------|--------|----|--------|----|
| Test Assembly | Member Depth | | | | | | |
| Short Walls | 1-5/8" | 2-1/2" | 3-1/2" | 3-5/8" | 4" | 5-1/2" | 6" |
| t _{design} < 0.025" | 8 | 8 | 8 | 8 | 8 | 12 | 12 |
| t _{design} > 0.025" | 8 | 8 | 10 | 10 | 10 | 16 | 16 |
| Tall Walls | 1-5/8" | 2-1/2" | 3-1/2" | 3-5/8" | 4" | 5-1/2" | 6" |
| All thicknesses | 12 | 12 | 16 | 16 | 16 | 20 | 20 |

For all test wall panels in the matrix above, a single, vertically oriented gypsum panel shall be used (single piece) for all walls up to 12'. For a 14' wall height, use 12' + 2'. For the 16' height (if used), use 12' + 4'; for 20', use 12' + 8'. This would put the joints in the same place for all companies for all tests. It shall be acceptable for the 8' and 10' samples to be cut from 12' board.

15. *Material Witnessing*: As required by AC86.
16. *Test Laboratory Certification*: All testing shall be conducted by an IAS accredited test laboratory approved to conduct AC86 /ASTM E72 testing.