Cold-Formed Steel Design Support

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Presentation Outline

- Introduction
- Tech Note Functions
- Tech Note Limitations
- Tech Note ID System
- Available Tech Notes
- Tech Note Development
- Tech Note Maintenance
- Tech Note Development & Maintenance Status
- Closing
Introduction

Cold-Formed Steel (CFS) Specification and Standards
CFS Design Manual and Guides
CFSEI Mission
CFSEI History

AISI Specifications and Standards for Cold-Formed Steel (CFS)

- American Iron and Steel Institute (AISI)
- Specification: North American Specification for the Design of Cold-Formed Steel Structural Members, S100-12
- Framing Standards: S200 Series (9)
- Test Standards: S900 Series (14)
- Other Standards
- Design Manual and Design Guides
AISI Specification

North American Specification for the Design of Cold-Formed Steel Structural Members, S100-12

www.ncsea.com

AISI CFS Framing Standards, S200 Series

- AISI S200-12, General Provisions
- AISI S201-12, Product Data
- AISI S202-11, Standard Code of Standard Practice for Cold-Formed Steel Structural Framing
- AISI S210-07 (2012), Floor and Roof System Design
- AISI S212-07 (2012), Header Design
- AISI S213-07/S1-09 (2012), Lateral Design
- AISI S214-12, Truss Design
- AISI S220-11, Nonstructural Members
- AISI S230-07 (2012), Prescriptive Method for One and Two Family Dwellings
AISI Test Standards, S900 Series

- AISI S901-13, Rotational-Lateral Stiffness Test Method for Beam-to-Panel Assemblies
- AISI S902-13, Stub-Column Test Method for Effective Area of Cold-Formed Steel Columns
- AISI S903-13, Standard Method for Determination of Uniform and Local Ductility
- AISI S904-13, Standard Test Methods for Determining the Tensile and Shear Strengths of Screws
- AISI S905-13, Test Standard for Cold-Formed Steel Connections

AISI Test Standards, S900 Series

- AISI S906-13, Standard Procedures for Panel and Anchor Structural Tests
- AISI S907-13, Test Standard for Cantilever Test Method for Cold-Formed Steel Diaphragms
- AISI S908-13, Base Test Method for Purlins Supporting a Standard Seam Roof System
- AISI S909-13, Standard Test Method for Determining the Web Crippling Strength of Cold-Formed Steel Beams
- AISI S910-13, Test Method for Distortional Buckling of Cold-Formed Steel Hat-Shaped Compression Members
AISI Test Standards, S900 Series

- AISI S911-13, Method for Flexural Testing of Cold-Formed Steel Hat-Shaped Beams
- AISI S912-13, Test Procedure for Determining a Strength Value for a Roof Panel-to-Purlin-to-Anchorage Device Connection
- AISI S913-13, Test Standard for Hold-Downs Attached to Cold-Formed Steel Structural Framing
- AISI S914-13, Test Standard for Joist Connectors Attached to Cold-Formed Steel Structural Framing

AISI Design Manual, Design Guides, and Other Standards

- D100, Cold-Formed Steel Design Manual
- Design Guides:
  - D110, Cold-Formed Steel Framing Design Guide
  - D111, Design Guide for Cold-Formed Steel Purlin Roof Framing Systems
  - D112, Brick Veneer Cold-Formed Steel Framing Design Guide
- Other Standards
  - S110, Standard for Seismic Design of Cold-Formed Steel Structural Systems - Special Bolted Moment Frames
  - S310, North American Standard for the Design of Profiled Steel Diaphragm Panels
AISI Standards – Free Download

- Current AISI Standards available as a free download:
  - S200 Framing Standard Series
  - S310 Diaphragm Design Standard
  - S900 Test Standard Series
- http://www.cfsei.org/publications

CFSEI History

- 1990s – West coast steel manufacturers realize many engineers do not understand AISI Specification
- 1994 – Light Gauge Steel Engineers Association (LGSEA) founded
  - 14 members
  - Mission: Provide engineers easy to use design guidance and technical information
- 2004 – Over 800 LGSEA members
- 2005 – LGSEA becomes part of Steel Framing Alliance
- 2006 – LGSEA renamed to Cold-Formed Steel Engineers Institute (CFSEI)
CFSEI Mission

- To enable and encourage the efficient design of safe and cost-effective cold-formed steel (CFS) framed structures.
- Mission fulfilled by:
  - Webinars
  - Annual Expo
  - Answer questions by phone, email, and website
  - Technical Notes on Cold-Formed Steel Construction (Tech Notes)

Tech Note Functions
Tech Note Example

Tech Note Functions

- Explain existing building code provisions
  - L001-10, Design of Diagonal Strap Bracing Lateral Force Resisting Systems for the 2006 IBC
- Explain new building code provisions and specifications
  - L000-08, Changes from the 1997 UBC to the 2006 IBC for Lateral Design with CFS Framing
Tech Note Functions

- Provide information not covered by the building code or building code referenced documents
  - L300-09, Design of End Posts for Diaphragm Shear Walls: A Perspective
    - “This Technical Note contains one perspective, presented herein by the author, a respected expert in the field of cold-formed steel design, rather than a specific codified design approach.”
  - G104-14, Welded Box-Beam Flexure Design
    - “This Tech Note illustrates the extrapolation of S100 Section D1.1 provision to a box-beam configuration.”

Tech Note Functions

- Provide design examples
  - W200-09, Header Design
- Provide design aids
  - G101-08, Design Aids and Examples for Distortional Buckling
- Collect related technical information from a variety of sources
  - F101-12, Screws for Cold-Formed Steel-to-Wood and Wood-to-Cold-Formed Steel Attachments
Tech Note Functions

- Provide inspection guidelines
  - G500-11, Guidelines for Inspecting Cold-Formed Steel Structural Framing in Low Rise Buildings
- Provide information on construction practices
  - W500-12, Construction Bracing for Walls
  - F140-10, Welding Cold-Formed Steel

Tech Note Limitations
Tech Note Limitations

- Tech Notes are not the building code
- Tech Notes do not provide all the information needed
  - Intended to be used by experienced engineers and other professionals
- Tech notes do not repeat information clearly covered in other documents, such as:
  - AISI Specifications and Standards
  - AISI and other industry design guides

Legal Disclaimer

- Not intended to preclude the use of other materials, assemblies, structures or designs when these other designs and materials demonstrate equivalent performance for the intended use
- Not intended to exclude the use and implementation of any other design or construction technique
Tech Note ID System

CFSEI Category, Subcategory, and Revision Date
LGSEA

Tech Note Identification System

CFSEI X###-YY

- Letter (X): main category
- Three numbers (###): subcategory
- Two-digit number after dash (YY): revision year
- Example: W200-09, Header Design
Tech Note Identification System
CFSEI X###-YY

Main Category (X) and Subcategories (###)

- **C** - Component Assemblies (Trusses and Wall Panels)
  - C100 - Roof truss design
  - C500 - Truss Installation
- **D** - Durability and Corrosion Protection
- **F** - Fasteners and Connection Hardware
  - F100 - Fasteners in AISI Specification (Screws, Bolts, Welds)
  - F300 - Non-threaded fasteners (PAFs)
- **G** - General
  - Design aids, load paths, inspection observations, etc.
- **J** - Floor and Joist Systems
  - Member design, openings, bracing, and installation
- **L** - Lateral Systems
  - L100 - Shearwalls
  - L200 - Roof and Floor Diaphragms
Tech Note Identification System
CFSEI X###-YY

Main Category (X) and Subcategories (###)
- M - CFS in Mixed Structural Systems
- R - Roof and Ceiling Systems
- W - Wall Systems
  - Headers, openings, bracing, installation, etc.
- T - Thermal, Fire, and Acoustic
  - T100 - Fire
  - T200 - Acoustic
  - T300 - Thermal

Tech Note Identification System
LGSEA
- Some tech notes from LGSEA days exist with different numbering system
  - 562, Powder-Actuated Fasteners in Cold-Formed Steel Construction
- Undergoing “CFSEI re-branding” and being archived
- Notes updated to CFSEI numbering system include reference to LGSEA number
  - F300-09, Pneumatically Driven Pins for Wood Based Panel Attachments
    - “This Technical Note updates and replaces LGSEA Technical Note 561b.”
Tech Note Identification System
LGSEA

LGSEA Tech Note Example

- 562, Powder-Actuated Fasteners in Cold-Formed Steel Construction

Re-branded LGSEA Tech Note Example

- F300-09
- “This Technical Note updates and replaces LGSEA Technical Note 561b.”
Available Tech Notes

CFSEI and LGSEA Tech Notes
Archived, Withdrawn, or Replaced

Available Tech Notes
Statistics

- Available, Not Archived/Superseded = 40
  - CFSEI = 36
  - LGSEA = 4
- Available, Archived/Superseded = 6
  - CFSEI = 5 (Tech Note with two different revision years)
  - LGSEA = 1
- Withdrawn or Replaced = 22
Available Tech Notes by Main Category

- C - Component Assemblies (Trusses and Wall Panels) = 1
- D - Durability and Corrosion Protection = 6
- F - Fasteners and Connection Hardware = 8
- G - General = 13
- J - Floor and Joist Systems = 1
- L - Lateral Systems = 7
- M - CFS in Mixed Structural Systems = 0
- R - Roof and Ceiling Systems = 0
- W - Wall Systems = 8
- T - Thermal, Fire, and Acoustic = 2

Where Do I Find Available Tech Notes?

- CFSEI website, [www.cfsei.org](http://www.cfsei.org)
  - Free to CFSEI members
  - Available for purchase in the online store for non-members, $5 each
- In your email Inbox
  - New tech notes are emailed to CFSEI members
Tech Note Development

Topic Sources, Evaluation
Author and Reviewer Qualifications
Author Assistance
Review
Time Frame

Tech Note Development

Topic Sources

- Surveys by CFSEI Technology Development Committee
  - Last survey done in 2011
- Suggestions from members
- Resulting from committee meetings
  - AISI Committee on Framing Standards
  - AISI Committee on Specifications
- CFS design questions from engineers contacting CFSEI
  - 1.800.79.STEEL (1.800.797.8335)
  - info@cfsei.org
  - Ask an Expert on CFSEI website, www.cfsei.org
Tech Note Development Topic Evaluation

- CFSEI Technology Development Committee
  - Evaluates scope
    - too limited, too broad, or already covered in another document?
  - Ranks the suggested topics
  - Identifies potential authors and reviewers

Tech Note Development Author and Reviewer Qualifications

- Demonstrated expertise of subject
- Volunteers
  - May be person who suggests the topic
- More than one author and reviewer for each Tech Note, collaborative effort
- Identified and contacted by:
  - CFSEI Technology Development Committee
  - CFSEI Technical Review Committee
  - CFSEI Staff
The design example should be:

- real-world, (something that could be expected to be encountered in a regular design practice),
- practical, (something that could and should be built, and is constructable by an experienced framing crew), and
- economical, (design examples should show solutions that are cost competitive).
Tech Note Development Review

CFSEI Technical Review Committee
- Reviews performed by more than one person
- Multiple reviews may be required to ensure appropriate technical differences of engineering judgment are represented

Tech Note Development Time Frame

- Suggestion to Tech Note, 6 months to 1 year
- CFSEI Technical Review Committee shall “perform their duties in a timely manner so that the structural engineering community may have the most up to date information available.”
Tech Note Maintenance

Regular Review
Archived
Withdrawn

Tech Note Maintenance
Regular Review

- CFSEI Technology Development Committee reviews Tech Notes on regular basis
- Goal is to update, archive, or withdraw notes every 5 years to keep technical content current
- Some Tech Notes are not updated, they are replaced or superseded by another document
  - 556a-4, Shear Transfer at Top Plate: Drag Strut Design, was superseded by the AISI Shear Wall Design Guide
Tech Note Maintenance Archived

- Information not current, but has technical merit and value
- Available on the CFSEI website
- Example: 558b-1, Lateral Load Resisting Elements: Diaphragm Design Values
  - Published 1998
  - Archived 2011 with cover page

Tech Note Maintenance Archived Tech Note

558b-1, Lateral Load Resisting Elements: Diaphragm Design Values
Tech Note Maintenance
Archived Tech Note Cover Page

558b-1, Lateral Load Resisting Elements: Diaphragm Design Values

Tech Note Maintenance
Withdrawn

- Information not current, and has limited merit and value
- Not available, but listed on the CFSEI website
- Example: 560c, Clinch (Integral) Fastening of Cold-Formed Steel
  - Published 1999
  - Withdrawn 2011
Tech Note Status
Development & Maintenance, September 2014

Tech Note Development Status
Topic Suggestions

- Suggestions received regularly
- Topic backlog, more than 20
  - Anti-terrorism to sustainability
- Top three ranked by CFSEI Technology Development Committee
  - Anti-terrorism requirements for government projects
  - Blast resistant design
  - Design and detailing exterior walls for story drift movement
Tech Note Development In Production

More than 20 in production, from initial draft to final formatting, including:

- Bridging and bridging anchorage
- Clip angles used in cold-formed steel construction
- Design of built-up compression members
- Fire stopping cold-formed steel head of wall joints
- Wall stud splicing

Tech Note Maintenance Status

CFSEI Tech Note Updates

- G000-08, Cold-Formed Steel Design Software
- G100-07, Using Chapter F of North American Specification for the Design of CFS Structural Members
- G101-08, Design Aids and Examples for Distortional Buckling
- G900-08, Design Methodology for Hole Reinforcement of Cold-Formed Steel Bending Members
- W100-08a, Single Slip Track Design
**Tech Note Maintenance Status**

**Future Archive**

- L000-08, Changes from the 1997 UBC to the 2006 IBC for Lateral Design with CFS Framing
- Two versions:
  - D001-07, Durability of Cold-Formed Steel Framing Members
  - D100-08, Corrosion Protection of Screw Fasteners
  - D200-07, Corrosion Protection for Cold-Formed Steel Framing in Coastal Areas
  - G800-07a, ASTM Standards for Cold-Formed Steel
  - L001-09, Design of Diagonal Strap Bracing Lateral Force Resisting Systems for the 2006 IBC

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**Tech Note Maintenance Status**

**LGSEA Re-brands**

- 360, Acoustic Insulation and Sound Transmission in CFS Construction
- 559, Design Considerations for Flexural and Lateral-Torsional Bracing
- 551e, Design Guide: Permanent Bracing of Cold-Formed Steel Trusses
- 562, Powder Actuated Fasteners in Cold-Formed Steel Construction
Closing

To enable and encourage the efficient design of safe and cost effective cold-formed steel (CFS) framed structures.

CFSEI Mission
Cold-Formed Steel Design Support Resources

- CFSEI
  - Tech Notes
  - Webinars
  - 1.800.79.STEEL, info@cfsei.org, Ask an Expert
  - AISI Standards, free download
- AISI and other industry design guides

Opportunities to Assist in CFSEI Mission

- Suggest Tech Note topic
- Tech Note author
- Tech Note reviewer
- Assist with CFSEI Technology Development Committee
Cold-Formed Steel Design Support

Questions

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