THE STEEL FRAMING INDUSTRY ASSOCIATION

SFIA 104: Equivalent “EQ” Cold-Formed Steel Studs

AGENDA

- Welcome & housekeeping
- A word about SFIA
- Speaker introduction
- Presentation
- Q&A

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WELCOME & HOUSEKEEPING

- Thank you for attending our webinar today!
- Mics are muted. Please ask any questions in the chat or Questions windows.
- A PDF of the presentation and a Certificate of Attendance will be available in your Steel Framing Learning Portal account after the webinar.
- Please submit your AIA number to Meredith Perez in the chat or email it to Meredith@CFSteel.org if you wish to have your learning units recorded.
- If you are a group viewing the presentation from a single computer, please email Meredith for the **Group AIA attendance form** so we can report LUs for everyone who attended. Meredith@CFSteel.org

MAJOR PROGRAMS AND SERVICES: TOOLS, INFORMATION AND SUPPORT

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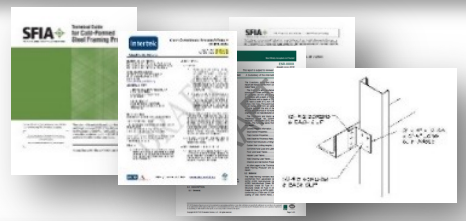

Marketing / Promotion

BuildSteel™
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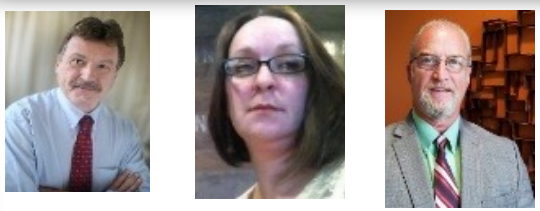
Business Planning

Structural Tons Reported	Q1'19	Q2'19	Q3'19	Q4'19	Total 2019
East	51,100	52,368	-	-	103,468
North Central	18,368	20,529	-	-	38,897
South Central	27,605	28,445	-	-	56,050
West	34,441	35,854	-	-	70,295
Total					

NonStructural Tons Reported	Q1'19	Q2'19	Q3'19	Q4'19	Total 2019
East	64,593	66,000	-	-	130,593
North Central	21,539	23,172	-	-	44,711
South Central	22,240	24,899	-	-	47,139
West	24,017	27,806	-	-	51,823
Total	132,389	141,877	0	0	274,266

SFIA Staff



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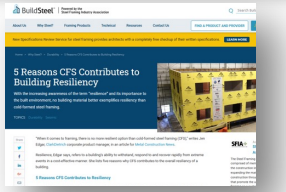

Research and Innovation

Advocacy

Certification

INTRODUCING OUR SPEAKER!

Jose Manuel Estrada, NOMA

ClarkDietrich

Building Code Compliance

With 18 years of experience in design, planning, analysis, and product development. Jose has developed a deep understanding of building modeling, budgeting, forecasting, and project management within the context of building materials, engineering and architecture.

In his current role as Building Code Compliance at ClarkDietrich, Mr. Estrada is responsible for all development of code, standards and guidelines impacting the cold-formed steel.

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SFIA 104-23: EQUIVALENT “EQ” COLD-FORMED STEEL STUDS

PRESENTER: JOSE MANUEL ESTRADA

DATE: APRIL 26, 2023

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Education

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COURSE DESCRIPTION

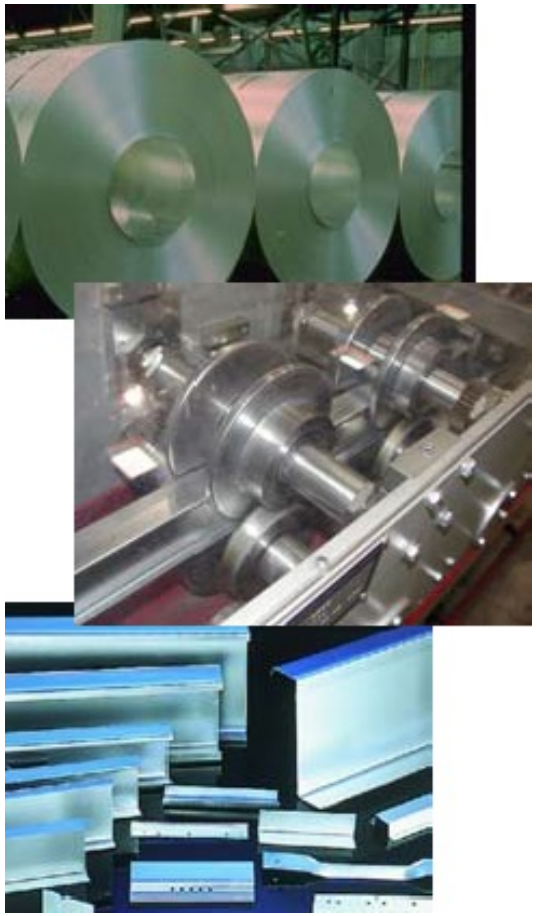
This presentation will describe Equivalent, or EQ products used for **NONSTRUCTURAL** cold-formed steel framing. It will address relevant codes and standards issues, explain the physical differences between EQ and conventional studs, including yield strength and coating differences. Examples will be provided showing how to use limiting heights tables for EQ and conventional studs. And provide tips for how to best identify, specify and build with EQ Products and remain compliant to the Building Codes

LEARNING OBJECTIVES

Participants will be able to :

- Identify the **basic characteristics** of cold-formed steel and differences between EQ versus traditional studs for nonstructural applications
- Identify the **primary codes and standards** that govern traditional and EQ nonstructural CFS studs
- Identify the **minimum structural and coating requirements** for traditional and EQ drywall studs
- Use limiting heights tables to select wall studs or assemblies
- Properly Specify fire- and sound-rated partitions

COLD-FORMED STEEL BACKGROUND



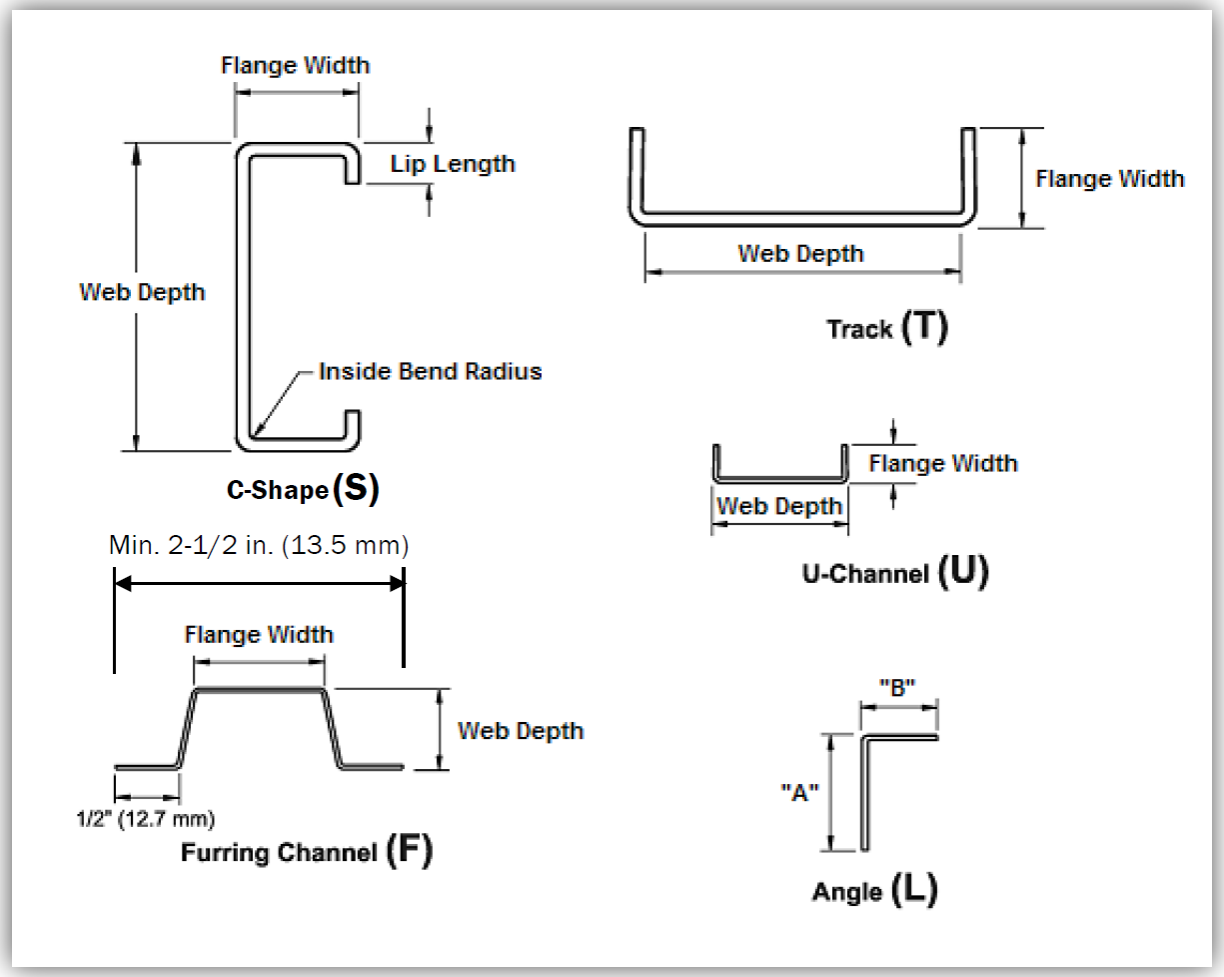


Figure A5-2 of AISI S220-20

COLD-FORMED STEEL BACKGROUND

MEMBER DEPTH:

(Example: 3-5/8" = 3.625" ~ 362 x 1/100 inches)
All member depths are taken in 1/100 inches.
For all "T" Sections, member depth is the inside to inside dimension.

FLANGE WIDTH:

(Example: 1-1/4" = 1.25" ~ 125 x 1/100 inches)
All flange widths are taken in 1/100 inches.

SFIA NS 362 S 125 - 18

STYLE:

(Example: Stud or Joist section = S)
The five alpha characters utilized by the designator system are:
S = Stud or Joist Sections
T = Track Sections
U = Channel Sections
F = Furring Channel Sections
L = Angle or L-header

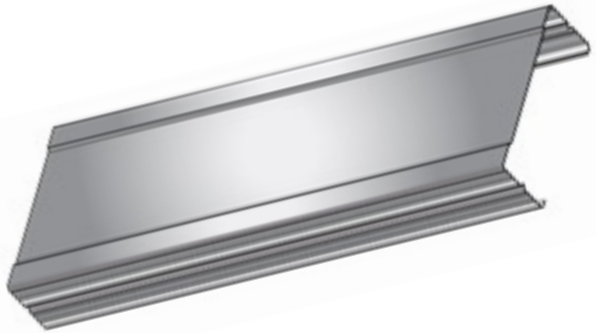
MATERIAL THICKNESS:

(Example: 0.018 in = 18 mils; 1 mil = 1/1000 in.)
Material thickness is the minimum base metal thickness in mils. Minimum base metal thickness represents 95% of the design thickness.

EQUIVALENT PERFORMANCE OR “EQ” STUDS

Profile and Material Properties Optimize Performance

- Proprietary Shapes
  - Ribs
  - Embossing
- Higher Yield Strengths



EQUIVALENT STUDS:

HOW DO EQ STUDS PERFORM AS WELL AS TRADITIONAL STUDS WHEN THEY ARE THINNER?

- **Steel** – Manufacturers have taken advantage of higher strength steels available today as well as new steel processing
- **Physical Configuration** – Ribs and other reinforcing devices have been added to the flanges and/or webs. In addition, most EQ studs have longer return lips
  Every bend adds strength
- **High Performance Coatings** – Manufacturers are using new technology to protect the base steel so that it can meet the protective coating requirements.

DEVELOPMENT OF EQ STUDS DRIVEN BY:

- Technology within the cold-formed framing industry changed
- Higher yield strength steel enhances stud performance - required thinner steel to be used
- Physical design and configuration of EQ studs produced a stronger stud
- AISI S220 Section A1.2.4 – permitted conformance to standard through performance testing (formerly in ASTM C645)
- EQ studs support green building and sustainability

MARKET DRIVERS

Speed of Construction	Weight of Construction	Non-Combustibility
Design Flexibility	Sustainability/LEED	Market Development

EQ studs make up over 90% of the NS market in the United States!

MATERIAL THICKNESS: NONSTRUCTURAL

Thickness Property	Equivalent or EQ stud	Conventional drywall stud
Mil Thickness	18-mil	30-mil
Design Thickness	0.0190”	0.0312”
Minimum Delivered Base Steel Thickness*	0.0181”	0.0296”
Yield Strength	70 ksi	33 ksi

* Minimum base metal thickness represents 95% design thickness (AISI S220 A5.1)

CODES & STANDARDS

- Intentional effort to migrate most important requirements from ASTM to AISI Standards

2012 IBC	2015 IBC	2018 IBC	2021 IBC
ASTM C645	AISI S220, ASTM C645 Section 10	AISI S220	AISI S220

- Many secondary standards incorporated by reference
- Additionally incorporated into **SFIA Code Compliance Program**

2211.2 Nonstructural members. CDP

For cold-formed steel *light-frame construction*, the design and installation of nonstructural members and connections shall be in accordance with AISI S220.

NONSTRUCTURAL STUD LIMITATIONS: AISI S220

Members limited to a transverse (out-of-plane) load no greater than 10 lb/ft^2. (15 lbs/ft^2 for pressurized air plenums, ceilings, and elevator shaft enclosures).

Members limited to an axial live load of no greater than 100 lbs/ft. (excluding sheathing materials).

Members limited to a superimposed axial load no greater than 200 lbs.

Not exclusive to EQ Studs but all encompassing of AISI S220 products

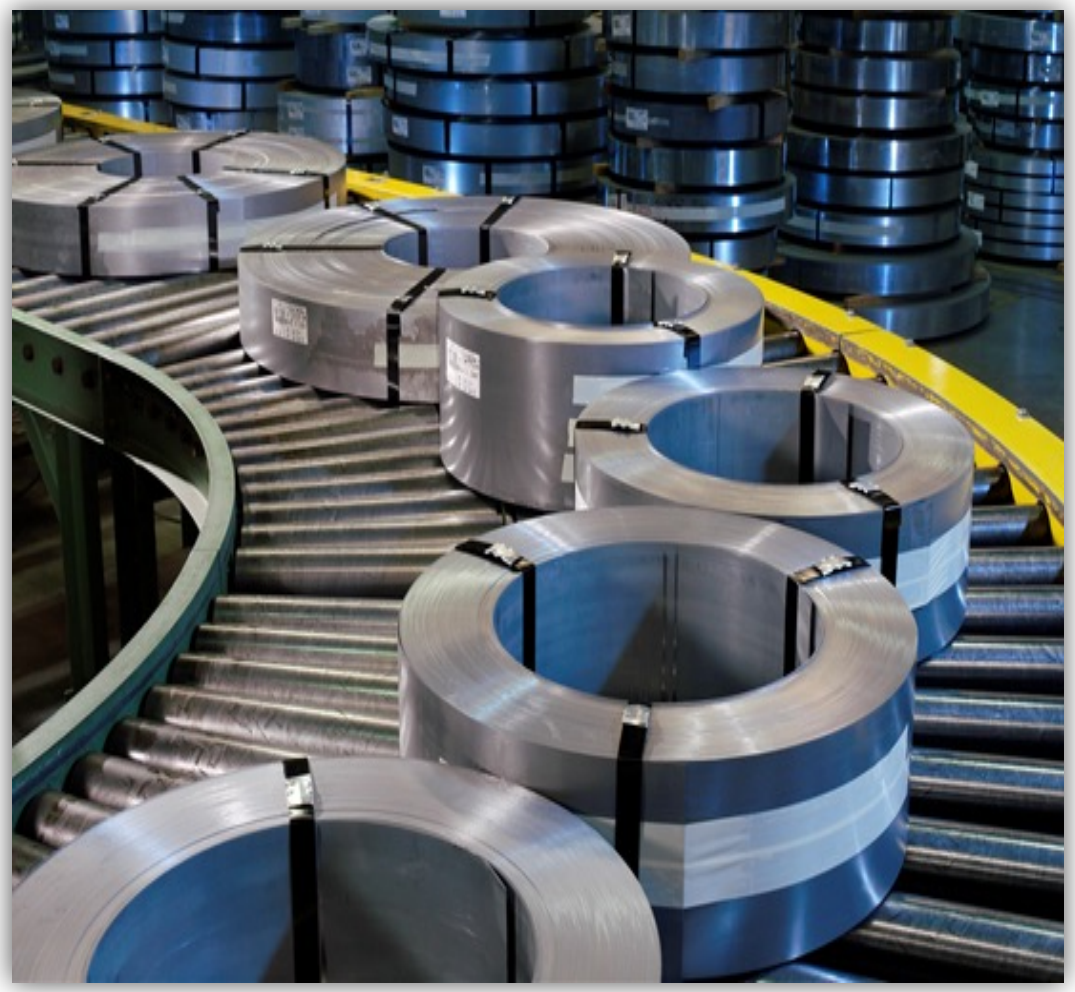
AISI S220: STANDARD FOR COLD-FORMED STEEL NONSTRUCTURAL MEMBERS

- A3 Material requirements for steel
- A4 Corrosion Protection
  Protective coating requirements for members
- A5 Products
  - Minimum thickness requirements
  - Minimum physical configuration
  - Manufacturing tolerances
  - Knockout requirements
  - Marking and Identification requirements

SFIA NS 362 S 125-18-70KSI

AISI S220 – A3 MATERIALS

- In the US and Mexico, CFS nonstructural members shall be shape from steel complying with the requirements of ASTM A1003/A1003M Type NS
- In Canada ref. ASTM A653 Type SS or ASTM A792 Type SS



AISI S220 – A4 CORROSION PROTECTION

- A4.1 – Protective Coatings
  - Members shall have a protective coating conforming to ASTM A653 - G40 minimum - or shall have a protective coating with an **EQUIVALENT CORROSION RESISTANCE**
- **SFIA Code Compliance Certification Program**

TABLE 1 Nonstructural Coating Weight [Mass] Requirements (Metallic Coatings)

Product Designation	Coating Designation			
Type NS	G40 [Z180][A;]	AZ50 [AZ150][B]	GF20 [ZGF60][C]	T1-25 [T1M-75][D]
	T2-100 [T2M 300][E]	20Z/20Z [60G/60G[E]		ZM20 [ZMM60][F]

[A] Zinc-coated steel sheet as described in Specification A653/A653M.
[B] 55% aluminum-zinc alloy-coated steel sheet 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 allow-coated as described in Specification A1046/A1046M.

Table 1 of SFIA CCCP Manual dated February 2023

WHAT IS SPECIAL ABOUT INNOVATIVE COATINGS?

- Inhibit corrosion and enhance adhesion
- Chemically reacts with the zinc on the substrate to greatly enhance corrosion resistance
- Imperfections in the existing zinc or zinc-alloy coating are filled
- Compatible with any zinc or zinc-alloy coated substrate

AISI S220 – A5.9 PUNCHOUTS

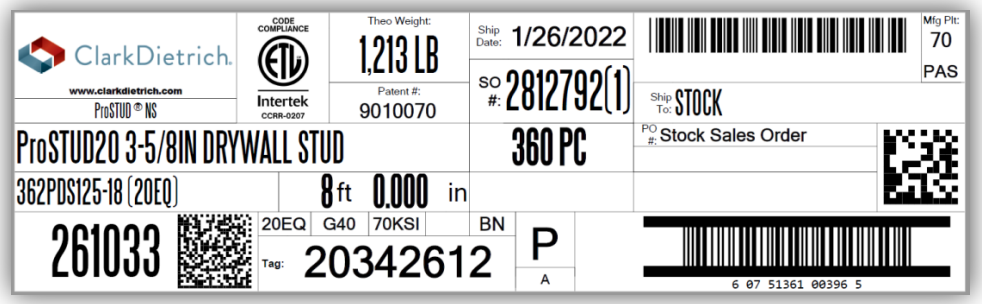
(Conventional and EQ Studs)

- Along web centerline
- 24” center-to-center spacing
- Width not greater than half the depth or 2-1/2”, whichever is less
- Length not greater than 4-1/2”
- Minimum 12” from center of last hole to end of stud

AISI S220 – A5.5 PRODUCT IDENTIFICATION

A5.5.1 – Identification of Groups of Like Members (Skids)

- Skids members must indicate:
  - Roll-former's identification
    - Name, logo, or initials
  - Length
  - Quantity
  - Member Designator
    - Depth
    - Flange Width
    - Minimum Steel Thickness
    - NS



AISI S220 – A5.5 PRODUCT IDENTIFICATION

A5.5.2 – Identification of Individual Framing Members

ID marking spaced at maximum distance of 96” maximum on center

1. Roll-former’s Identification
2. Minimum Steel Thickness (mils or inches)
3. Minimum Yield Strength
4. Protective Coating Type & Weight
5. The Designation “NS”

2021 IBC – ALTERNATIVE MATERIALS

- **So how does an EQ stud that is thinner than the minimum required comply with the code?**

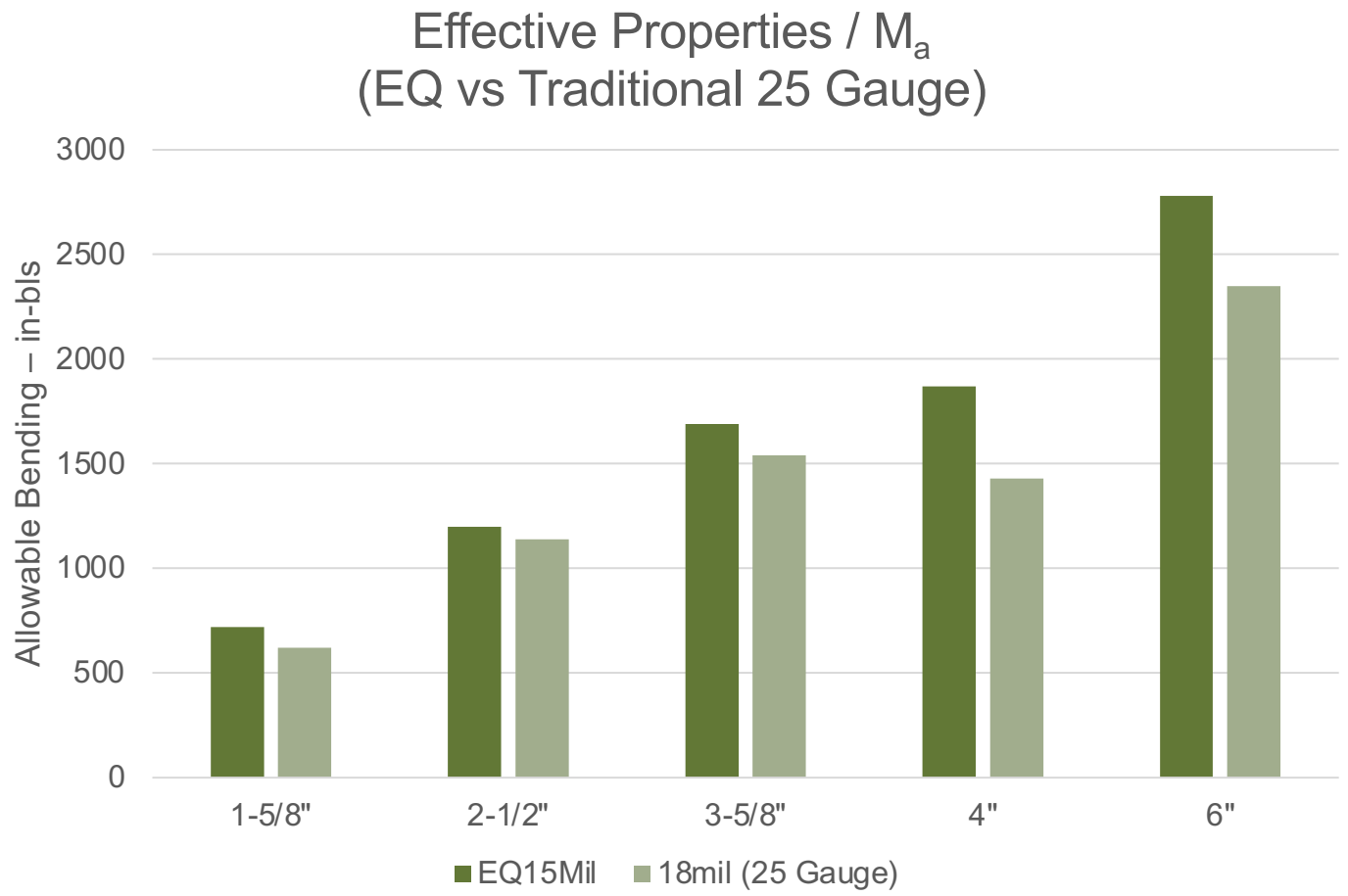
- IBC 104.11 Alternative materials, design and methods of construction and equipment

EQ STUDS IN SFIA CODE COMPLIANCE CERTIFICATION PROGRAM

- Bending moment ≥ traditional stud
- Published screw data (shear, pull over and pullout)
  - **Be greater or equal to traditional studs**
- Meet screw spin-out performance tests (AISI S220 Section B3.1.4)
- Published composite limiting height tables (AISI S916 aka AC86)
- Meet corrosion protection requirements set by AISI S220

Look for the SFIA label for assurance

BENDING VALUES (M_a)



The EQ studs must have a greater M_a than comparable traditional studs.

Notes:

- 162xxx125-15 – EQ15mil
- 162S125-18 – Conventional

EQ and Traditional Stud values taken from Published literature dated

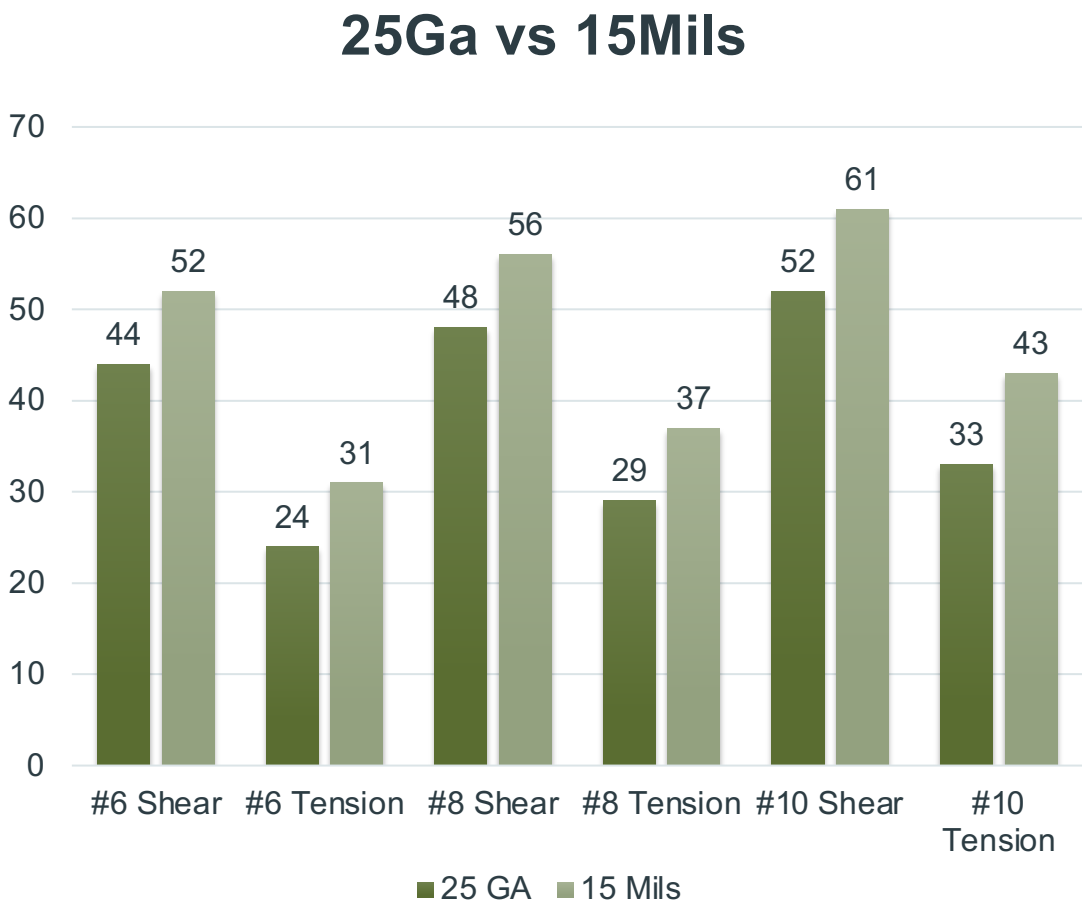
- 8/17/21 – EQ15Mil (ProStud)
- 2/2023 – 18Mil (SFIA Manual)

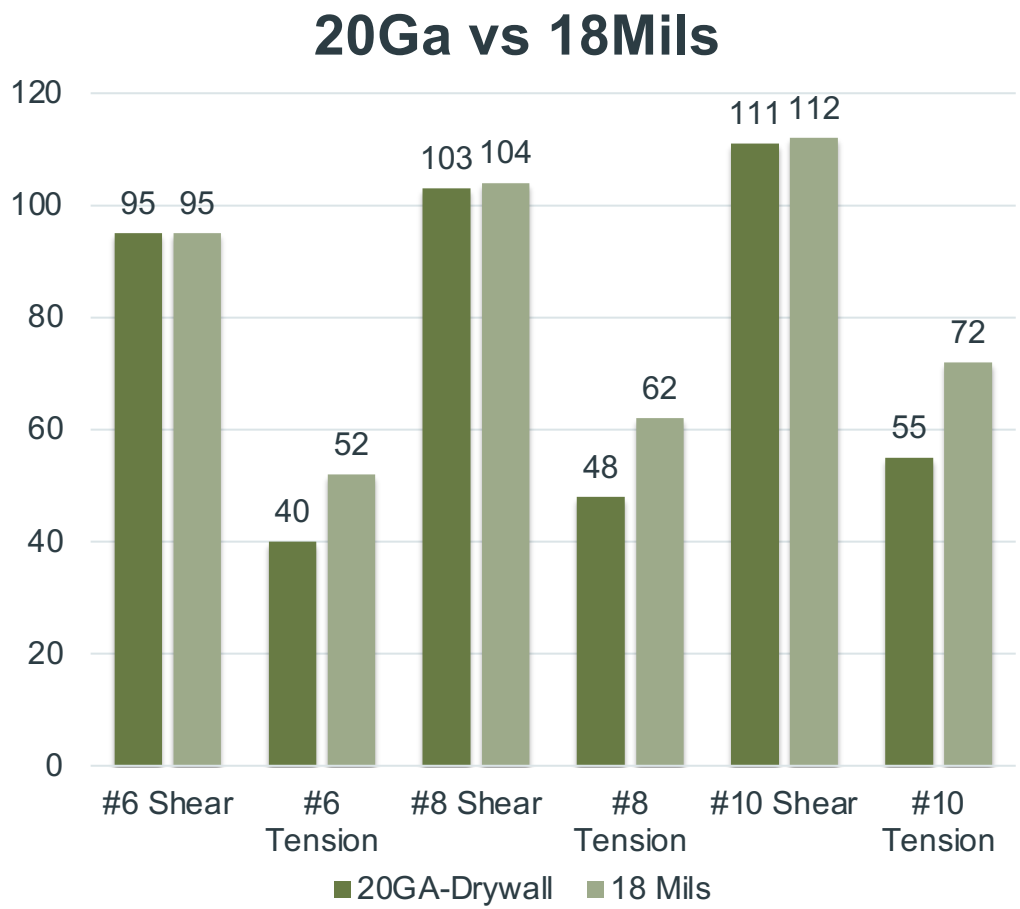
AISI S220 – B3.1 SCREW CONNECTIONS

- B3 Connection Design - in accordance with Chapter J of AISI S100
- B3.1.1 - Screws shall be in compliance with ASTM C1513
- B3.1.4 – Performance Requirements
  - Screw Penetration per Section D3 – AISI S220
  - Nonstructural Members shall be capable of pulling the head of the screw below the surface of the gypsum board in less than 2 seconds without spin out in accordance with Appendix 1 of AISI S220

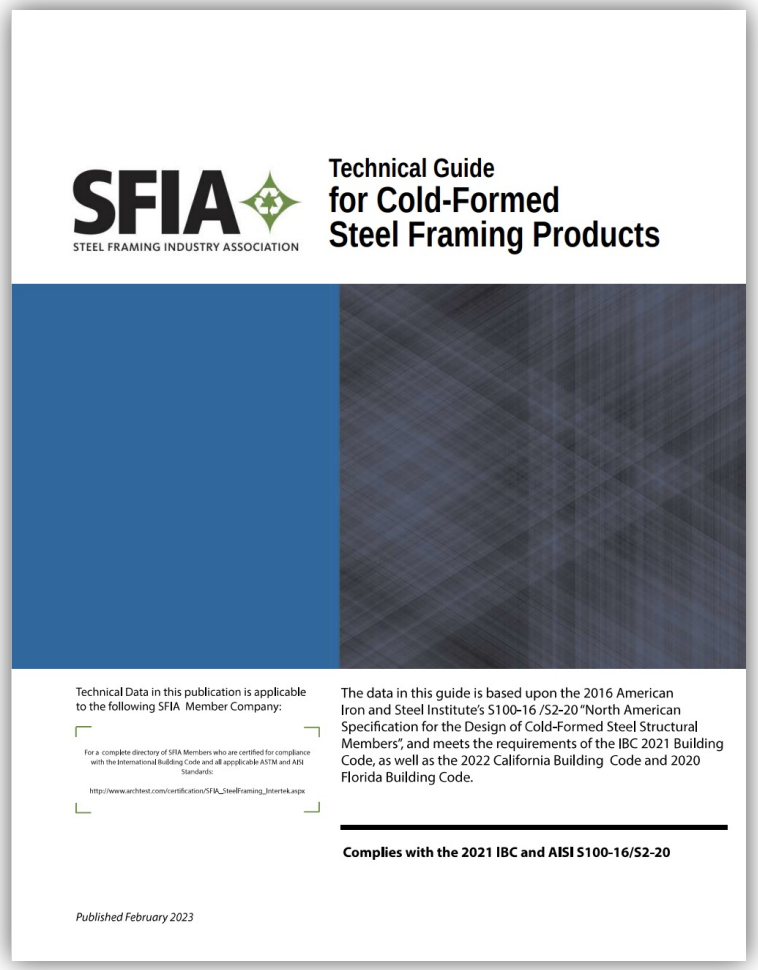
- SFIA CCCP E2 – Manufacturer shall provide 3rd party test confirming that its members comply for each specified ***product thickness***

AISI S220 – B3.1 SCREW CONNECTIONS





LIMITING HEIGHTS TABLES



SFIA
STEEL FRAMING INDUSTRY ASSOCIATION

Technical Guide
for Cold-Formed
Steel Framing Products

Technical Data in this publication is applicable to the following SFIA Member Company:

For a complete directory of SFIA Members who are certified for compliance with the International Building Code and all applicable ASTM and AISI Standards:

http://www.architest.com/certification/SFIA_SteelFraming_Intertek.aspx

The data in this guide is based upon the 2016 American Iron and Steel Institute's S100-16 /S2-20 "North American Specification for the Design of Cold-Formed Steel Structural Members", and meets the requirements of the IBC 2021 Building Code, as well as the 2022 California Building Code and 2020 Florida Building Code.

Complies with the 2021 IBC and AISI S100-16/S2-20

Published February 2023

Limiting Wall Heights - Non-Composite

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Interior Nonstructural Non-Composite

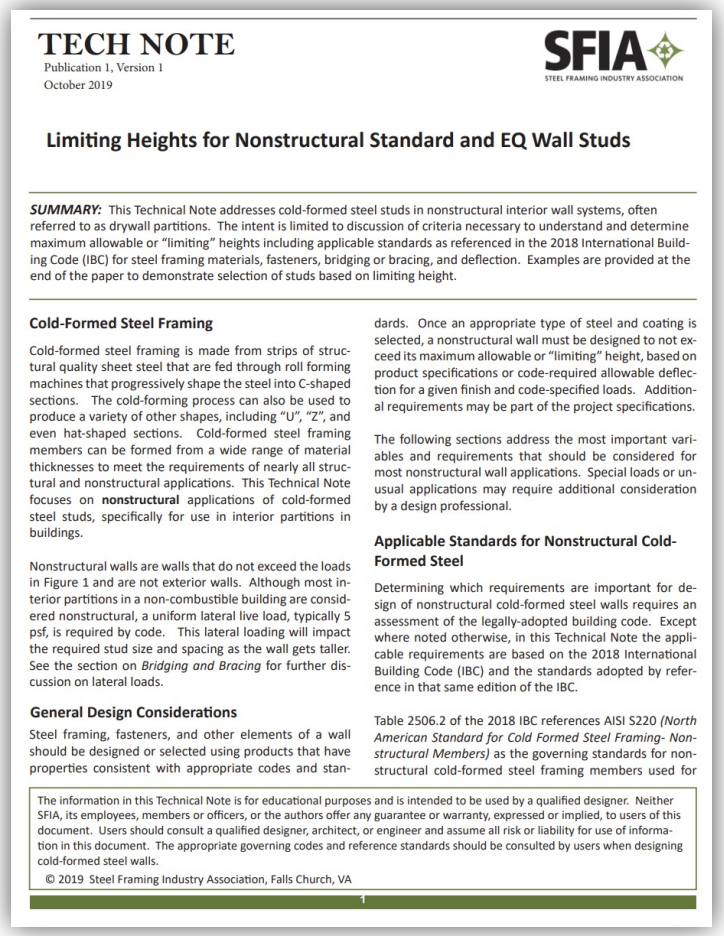
			5 psf			7.5 psf			10 psf		
Stud Member	Spacing in, oc	Fy, ksi	L/120	L/240	L/360	L/120	L/240	L/360	L/120	L/240	L/360
350S125-68	12	33	26'-10"	21'-3"	18'-7"	23'-6"	18'-7"	16'-3"	21'-2"	16'-11"	14'-9"
	16		24'-4"	19'-4"	16'-11"	21'-2"	16'-11"	14'-9"	18'-4"	15'-4"	13'-6"
	24		21'-2"	16'-11"	14'-9"	17'-3"	14'-9"	12'-10"	15'-0"	13'-6"	11'-8"
350S125-68	12	50	26'-10"	21'-3"	18'-7"	23'-6"	18'-7"	16'-3"	21'-3"	16'-11"	14'-9"
	16		24'-4"	19'-4"	16'-11"	21'-3"	16'-11"	14'-9"	19'-4"	15'-4"	13'-6"
	24		21'-3"	16'-11"	14'-9"	18'-7"	14'-9"	12'-10"	16'-11"	13'-6"	11'-8"
362S125-18	12	33	13'-6"	13'-6"	12'-4"	11'-1"	11'-1"	10'-9"	9'-7"	9'-7"	9'-7"
	16		11'-9"	11'-9"	11'-2"	9'-7"	9'-7"	9'-7"	8'-3"	8'-3"	8'-3"
	24		9'-7"	9'-7"	9'-7"	7'-10"	7'-10"	7'-10"	6'-9"	6'-9"	6'-9"
362S125-27	12	33	18'-4"	16'-6"	14'-4"	14'-11"	14'-4"	12'-6"	12'-11"	12'-11"	11'-4"
	16		15'-10"	14'-11"	13'-0"	12'-11"	12'-11"	11'-4"	11'-2"	11'-2"	10'-4"
	24		12'-11"	12'-11"	11'-4"	10'-7"	10'-7"	9'-11"	9'-2"	9'-2"	9'-0"
362S125-30	12	33	19'-8"	17'-0"	14'-10"	16'-1"	14'-10"	12'-11"	13'-11"	13'-6"	11'-9"
	16		17'-0"	15'-6"	13'-6"	13'-11"	13'-6"	11'-9"	12'-0"	12'-0"	10'-8"
	24		13'-11"	13'-6"	11'-9"	11'-4"	11'-4"	10'-3"	9'-10"	9'-10"	9'-4"
362S125-33	12	33	21'-2"	17'-6"	15'-4"	17'-4"	15'-4"	13'-5"	15'-0"	13'-11"	12'-2"
	16		18'-4"	15'-11"	13'-11"	15'-0"	13'-11"	12'-2"	13'-0"	12'-8"	11'-0"
	24		15'-0"	13'-11"	12'-2"	12'-3"	12'-2"	10'-7"	10'-7"	10'-7"	9'-8"

EQ stud Limiting Heights tables must be provided by manufacturers

AISI S220 – D1. COMPOSITE ASSEMBLIES

- Tests of composite assemblies, when required by Section B2 of AISI S220, shall be in accordance with **AISI S916**, or other *approved* test methods with the calibration in accordance with Section K2.1 of AISI S100 [CSA S136]
- **AISI S916-20** – Test Standard for Determining the Strength and Stiffness of Cold-Formed Steel-Framed Nonstructural Interior Partition Walls Sheathed with Gypsum Board
- *ICC-ES AC86 Cold-Formed Steel Members-Interior Nonloadbearing Wall Assemblies*

NONSTRUCTURAL LIMITING HEIGHTS



TECH NOTE
Publication 1, Version 1
October 2019

SFIA
STEEL FRAMING INDUSTRY ASSOCIATION

Limiting Heights for Nonstructural Standard and EQ Wall Studs

SUMMARY: This Technical Note addresses cold-formed steel studs in nonstructural interior wall systems, often referred to as drywall partitions. The intent is limited to discussion of criteria necessary to understand and determine maximum allowable or "limiting" heights including applicable standards as referenced in the 2018 International Building Code (IBC) for steel framing materials, fasteners, bridging or bracing, and deflection. Examples are provided at the end of the paper to demonstrate selection of studs based on limiting height.

Cold-Formed Steel Framing

Cold-formed steel framing is made from strips of structural quality sheet steel that are fed through roll forming machines that progressively shape the steel into C-shaped sections. The cold-forming process can also be used to produce a variety of other shapes, including "U", "Z", and even hat-shaped sections. Cold-formed steel framing members can be formed from a wide range of material thicknesses to meet the requirements of nearly all structural and nonstructural applications. This Technical Note focuses on **nonstructural** applications of cold-formed steel studs, specifically for use in interior partitions in buildings.

Nonstructural walls are walls that do not exceed the loads in Figure 1 and are not exterior walls. Although most interior partitions in a non-combustible building are considered nonstructural, a uniform lateral live load, typically 5 psf, is required by code. This lateral loading will impact the required stud size and spacing as the wall gets taller. See the section on *Bridging and Bracing* for further discussion on lateral loads.

General Design Considerations

Steel framing, fasteners, and other elements of a wall should be designed or selected using products that have properties consistent with appropriate codes and standards. Once an appropriate type of steel and coating is selected, a nonstructural wall must be designed to not exceed its maximum allowable or "limiting" height, based on product specifications or code-required allowable deflection for a given finish and code-specified loads. Additional requirements may be part of the project specifications.

The following sections address the most important variables and requirements that should be considered for most nonstructural wall applications. Special loads or unusual applications may require additional consideration by a design professional.

Applicable Standards for Nonstructural Cold-Formed Steel

Determining which requirements are important for design of nonstructural cold-formed steel walls requires an assessment of the legally-adopted building code. Except where noted otherwise, in this Technical Note the applicable requirements are based on the 2018 International Building Code (IBC) and the standards adopted by reference in that same edition of the IBC.

Table 2506.2 of the 2018 IBC references AISI S220 *(North American Standard for Cold Formed Steel Framing- Nonstructural Members)* as the governing standards for nonstructural cold-formed steel framing members used for

- Design Considerations
- Applicable Standards
- Alternative Products
- Fasteners
- Bridging and Bracing
- Deflection
- Stud Selection Based on Limiting heights

https://www.cfsteel.org/sfia-technical-publications

NON-COMPOSITE: FULLY BRACED

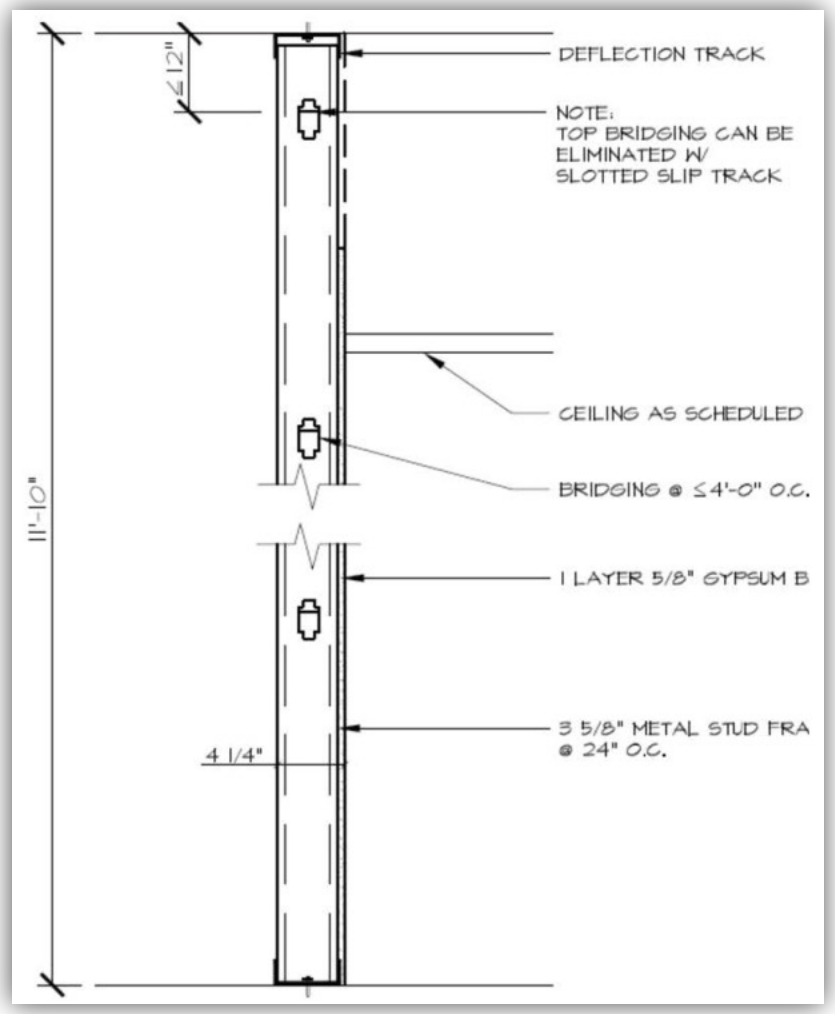
- **Design example from SFIA Technical Note limiting heights tables: Non-composite, fully braced wall.**
- Comparisons between three different drywall studs:
  - NS 33 mil (0.0346” design thickness);
  - NS 30 mil (0.0312” design thickness); and
  - a proprietary ‘EQ’ 20 stud (0.0200” design thickness, multiple-stiffened with high yield strength).

EQ - 3-5/8” studs @ 24”o.c., 11’-10” total wall height

5 PSF lateral load — Check at deflection limit of L/240

Composite? — **NO** (Unclad entirely one side – must add bracing @ 48”o.c. max)

Stud Size		Deflection L/240	OK?
362 S 125 - 33	Limiting Heights *(ft. - in.)*	13' - 11"	*YES*
362 S 125 - 30		13' - 5"	*YES*
362 S 125 - 20EQ		11'-10"	*YES*

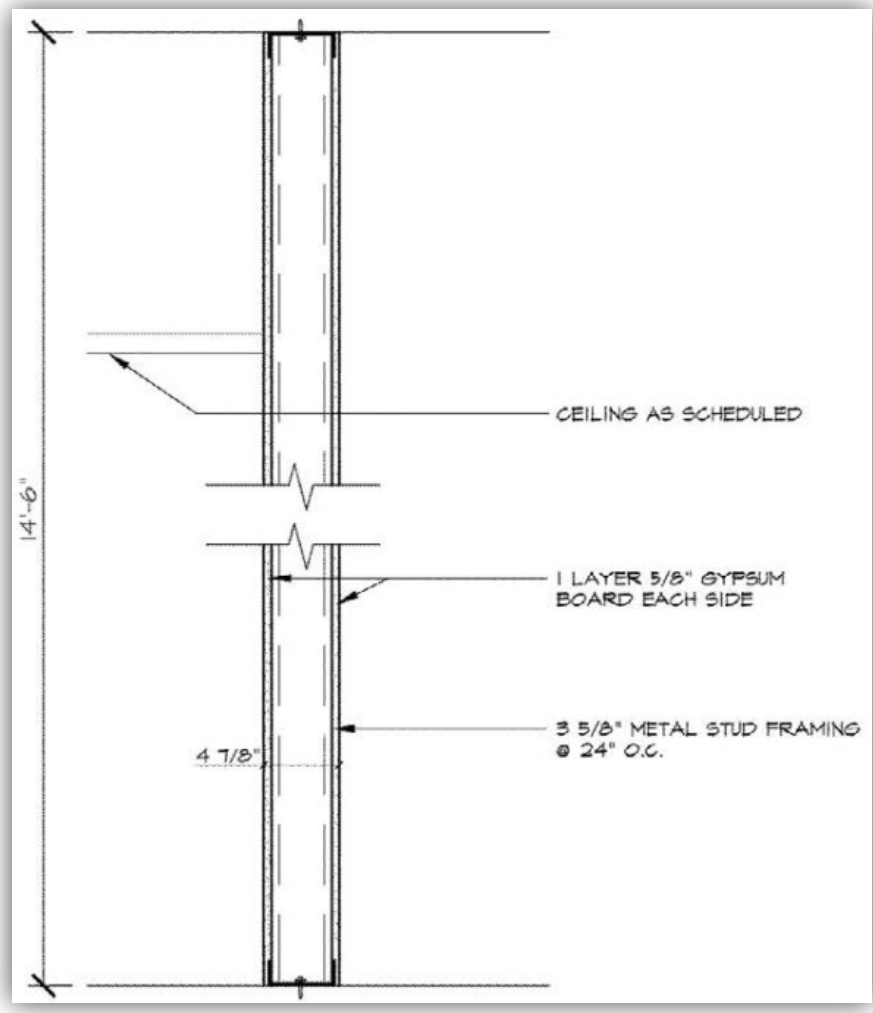


COMPOSITE WALL EXAMPLE

- **Design example from SFIA Technical Guide limiting heights tables: Full Composite Wall**
- Comparisons between three different drywall studs:
  - NS 33 mil (0.0346” design thickness);
  - NS 30 mil (0.0312” design thickness); and
  - a proprietary ‘EQ’ 20 stud (0.0200” design thickness, multiple-stiffened with high yield strength).

EQ - 3-5/8” studs @ 24”o.c., 14’-6” total wall height
5 PSF lateral load — Check at deflection limit of L/240
Composite? — **YES** (Cladded Full Height, Gypsum Board with the long direction vertically on both sides of wall)

Stud Size		Deflection L/240	OK?
362 S 125 - 33	Limiting Heights *(ft. - in.)*	15 - 3	*YES*
362 S 125 - 30		14 - 6	*YES*
362 S 125 - 20EQ		14 - 8	*YES*



FIRE AND SOUND RATINGS

- ASTM E119 and E90 are performance standards
  - Qualifies minimum product requirements for protection of Wall Assemblies

The rules are the same for "EQ" and Traditional Steel Framing

- *EQ studs have either been fire-tested or have gone through an extensive engineering evaluation in order to be listed.*
- An assembly must adhere to the way the tested assembly was constructed or with the engineering analysis
- Fire-rated assemblies using EQ studs are more likely to have current fire-testing reports since the EQ studs are more recent products
- Many of today's commonly used fire-rated assemblies with conventional studs were tested decades ago
- There is no requirement for re-testing once an assembly passes the fire test

FIRE AND SOUND – RATED PARTITIONS

Steps you can take now:

- Verify that the literature and sample submissions for the studs submitted for approval on the project comply with the requirements of the assemblies shown on the partition schedule
- Verify in the field that the proper thickness of product and profile of stud is being installed per the assembly test results or engineering analysis

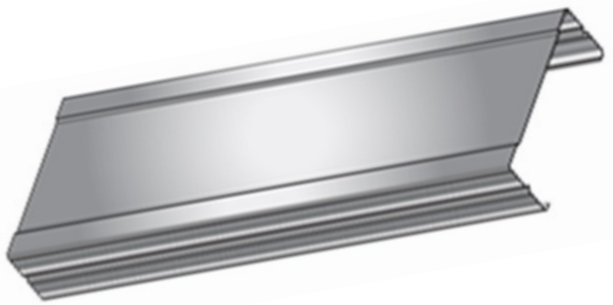
ALL PRODUCTS ARE REQUIRED TO BE LABELED SO THIS SHOULD BE AN EASY VISUAL INSPECTION

CONVENTIONAL STUDS VS EQ STUDS

	TRADITIONAL	EQUIVALENT
Meet Specified Deflection Criteria	✓	✓
Properly Spaced	✓	✓
Must be sized for the Partition Height	✓	✓
Designed for the Proper Load	✓	✓
Meet ASTM A1003 Steel Sheet Requirements	✓	✓
Coating Requirements	✓	✓
Configuration Requirements	✓	✓
Marking/Labeling Requirements	✓	✓
Screw Penetration Tests	✓	✓
Both traditional and EQ studs must meet these same requirements		

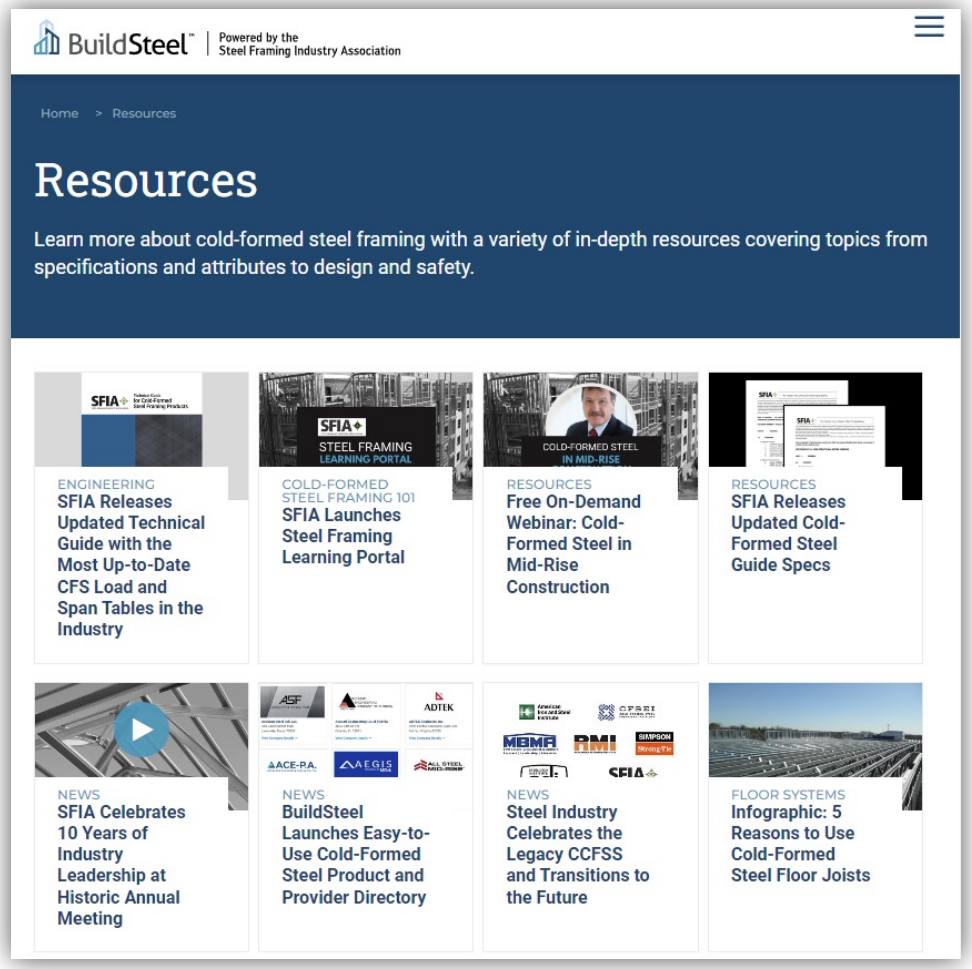
SUMMARY

- EQ studs are now the standard nonstructural product offering in the metal stud industry
- EQ studs meet the material and manufacturing requirements of appropriate standards
- SFIA certified products assure code complaint products



RESOURCES

- **Steel Framing Industry Association** – www.cfsteel.org
- Stud Code Compliance Certification Program (cfsteel.org)
  - Steel Framing Industry Association (SFIA) (intertek.com)
  - Cold-formed Steel Framing Code Compliance Certification (SFIA) (archtest.com)
- Codes and Standards (cfsteel.org)
- Directory of Fire/Sound Assemblies - http://www.steelframing.org/search/
- UL Product IQ - UL Product iQ (ulprospector.com)
- Cold-formed Steel Framing Resources - BuildSteel.org
- GA-600-2021 – https://gypsum.org/



SFIA 104-23: EQUIVALENT “EQ” COLD-FORMED STEEL STUDS

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