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Specifying Cold-Formed Steel Framing: A Guide for Architects and Engineers

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Specifying Cold-Formed Steel Framing

As the data requirements on construction projects become more complex, it's crucial that everyone in the value chain, including architects and structural engineers, operate under the same set of project requirements.

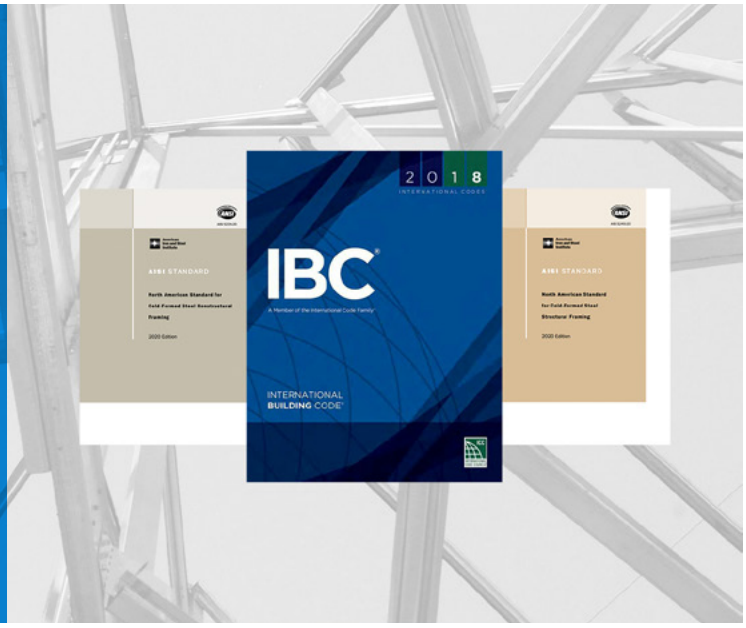
These projects requirements — the project specifications — serve as the field guide for the construction team. **Clear, accurate, and detailed specifications are the key to success.** They can reduce the need for field clarification, eliminate change-order requests, and help avoid cost overruns.

Unfortunately, many in-house architectural specifications are simply out of date. This is especially true for architectural specifications that involve cold-formed steel (CFS) framing.

That's why this guide will be invaluable to architects and structural engineers. The standards for steel framing have been evolving. The latest model building code, the 2018 International Building Code at the time of this writing, references steel framing standards from the American Iron and Steel Institute (AISI) exclusively.

In this eBook, you'll learn about the 2018 IBC's key changes, AISI's Quality Assurance/Quality Control requirements, and how to update your in-house specifications using free resources.

Complying with New Codes and Standards for Cold-Formed Steel Framing



When reviewing a project specification, it's critical that architects and structural engineers start by checking to see which version of the IBC has been adopted by the jurisdiction where the project is located.* Different versions of the IBC reference different CFS framing standards. The 2018 IBC references AISI standards exclusively.

The transition to AISI standards creates the potential for confusion during bidding and submittal processes if the construction documents call for compliance to one set of standards, but the local building codes reference another set.

Here's what architects and engineers can do to ensure they have the most current in-house architectural specifications covering steel framing:

1. Download AISI S220 and AISI S240

- AISI S220 North American Standard for Cold-Formed Steel Framing - Nonstructural Members
- AISI S240 North American Standard for Cold-Formed Steel Structural Framing

The steel industry is transitioning from ASTM to AISI standards, and the 2018 IBC reflects this change. While ASTM is still referenced widely in the 2018 IBC, it is not referenced relative to CFS framing. The 2018 IBC references AISI S220 for nonstructural CFS framing products and AISI S240 for structural CFS framing products.

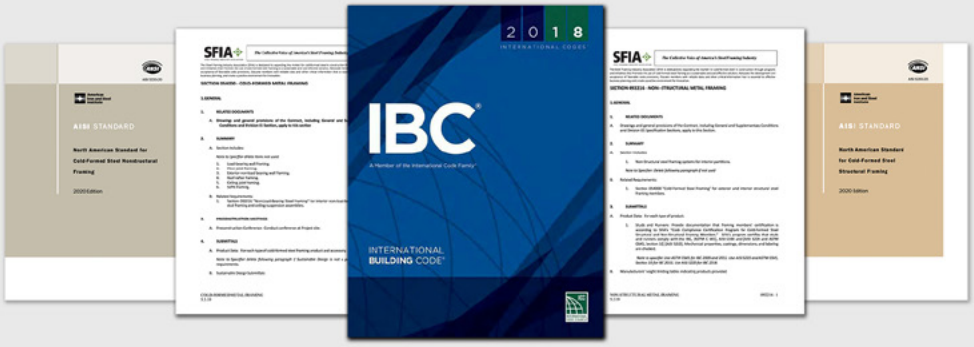
Older IBC editions reference ASTM C645 for non-structural CFS framing products, ASTM C955 for structural CFS framing products. The only ASTM reference in IBC 2015 is for a screw penetration test.

- Be sure your in-house specifications reflect AISI S220 and AISI S240, which are referenced by the 2018 IBC.
- The 2018 IBC also references AISI S202, AISI S230 and AISI S400, which may apply depending on your project.
- The AISI 2020-Series bundle, the latest set of AISI standards, is also available for download

2. Review your gypsum board and gypsum panel products specifications

Chapter 25 of the 2018 IBC — Gypsum Board, Gypsum Panel Products and Plaster — has seen significant changes.

- The 2018 IBC, Chapter 25, Table 2506.2, states that structural framing must con-



The steel industry's transition to AISI standards is reflected in the 2018 IBC. The free SFIA Guide Specifications can help architects and engineers to be up to date.

form with AISI S240. Nonstructural framing must conform to AISI S220

3. Look to AISI for design requirements

AISI includes design requirements for CFS framing, whereas ASTM does not. While not an AISI requirement, the advice of a registered design professional can be helpful.

- Problems can result if a building official cites the AISI reference, but the project specification references an ASTM standard for CFS framing
- In the worst-case scenario, the building might need to be re-engineered, or installed material may need to be replaced

4. Note that some AISI standards have been consolidated into AISI S240

- AISI S240 is now a comprehensive standard covering wall systems, floor systems, roof systems, lateral load-resisting systems, truss assemblies, and header assemblies
- The 2018 IBC references AISI S240
- Many states follow older IBCs, which reference multiple AISI standards. The 2015 IBC, for example, references 10 separate AISI standards

Confusion comes when architects and structural engineers reference the earlier standards on a project that complies with the 2018 IBC.

5. Download the free SFIA Guide Specifications

SFIA Guide Specifications — 054000 and 092216 of the MasterFormat® — cover structural and nonstructural CFS framing respectively.

- SFIA Guide Specification Section 054000 Cold-Formed Metal Framing
- SFIA Guide Specification Section 092216 Nonstructural Metal Framing

Architects and engineers can use these guides to update their in-house specifications.

Framing contractors can refer to these documents before bidding a project and can alert the architect when there are discrepancies.

** It is also important to know if any local code amendments have been adopted and how the code is interpreted by the local authority.*

Cold-Formed Steel Framing Quality Assurance and Quality Control

We have seen that architects and engineers need to be aware of potential conflicts between their project specifications and the building codes. Let's now turn to Quality Assurance and Quality Control when selecting CFS products and installing them.

1. AISI S240 is now the definitive standard for building walls correctly

- The 2018 IBC references AISI S240
- AISI S240 North American Standard for Cold-Formed Steel Structural Framing establishes minimum QA/QC requirements for material control and installation
- If you haven't seen QA/QC requirements in any project specifications, you will soon

2. SFIA certification programs fulfill the AISI QA/QC requirements for the manufacturing of CFS products

QA Product Certification: The steel framing industry's QA programs are process/document based. They involve manufacturing, training, sales, raw materials ordering, fabrication, and packaging processes to ensure CFS product quality.

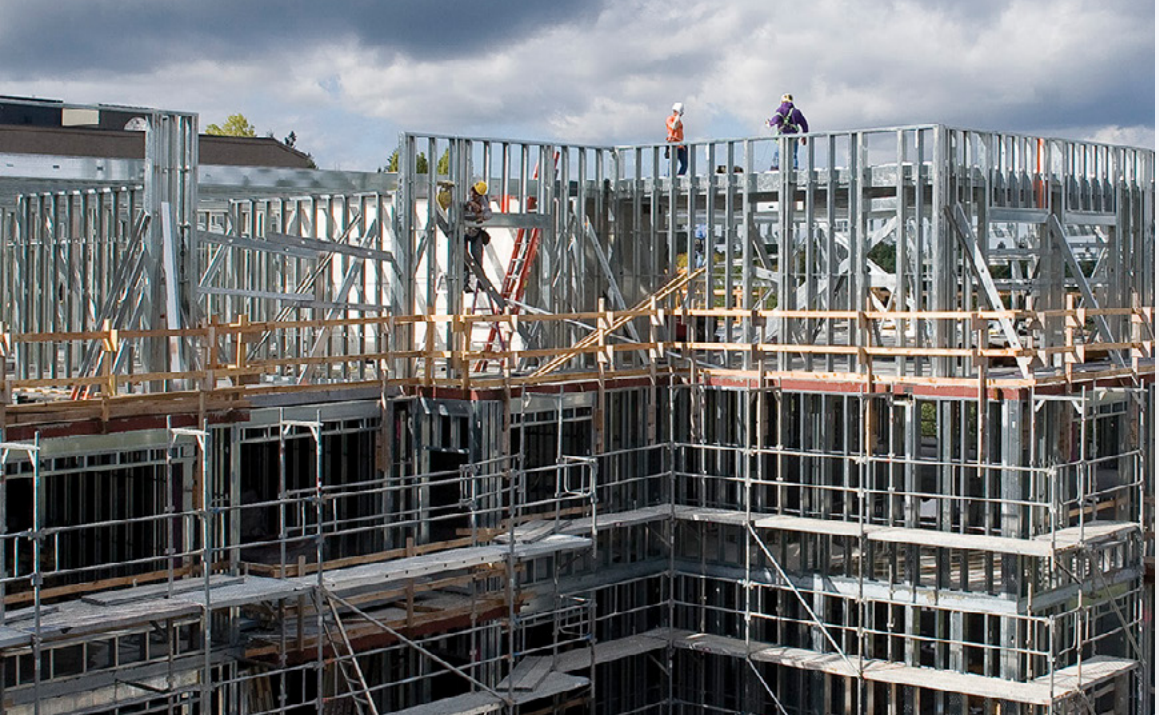
SFIA has two QA product certification programs:

1. The SFIA Code Compliance Certification Program for Cold-Formed Steel Stud and Track

- Requires the manufacturer to document the controls and procedures used during manufacturing to ensure the correct steel is ordered
- Requires manufacturing crews to monitor tolerances and stud shapes as the framing material comes off the line
- Requires strict record-keeping, including the ability to identify breakdowns in processes that may have resulted in product failures
- Is administered by Intertek Group, PLC, an independent third-party verifier

2. The SFIA Connector Manufacturing Compliance Certification Program

- Requires that a QA program be in place
- Certifies that the coating weights and mechanical property requirements of manufactured connectors match designs and part drawings



As CFS-framed projects grow in size and complexity, QA/QC will be paramount to project success. The addition of QA/QC to the AISI standards ensures high-quality results.

- Assures architects, owners, and building officials that the CFS framing connectors specified and installed meet recognized manufacturing standards

- Is administered by Intertek

QC Product Certification: The industry's QC programs combine a QA program with physical product testing.

The steel framing industry's QC programs provide a high level of certainty that CFS products are produced consistently.

3. SFIA certification programs fulfill the AISI QA/QC requirements for CFS installation

QA/QC in the CFS framing installation process is achieved in two ways:

Documentation: The framing contractor is required to provide documentation on their qualifications to install CFS framing.

- Some framing contractors become a SFIA Certified Professional Contractor

- A SFIA Certified Professional Contractor demonstrates technical knowledge of codes, standards, and applicable tolerances associated with CFS framing, as verified through inspection by a licensed professional engineer

- The SFIA Certified Professional Truss Fabricator program is also available

- Both Contractor and Truss Fabricator certifications require Observation Reports completed and documented by a licensed professional engineer

Product Selection: Framing contractors selecting CFS products must review product literature, statements of code compliance, limiting heights tables, and more.

- A SFIA Certified Professional Contractor meets these AISI QA/QC requirements

CERTIFIED
TRUSS FABRICATOR
COLD-FORMED STEEL
SFIA STEEL FRAMING INDUSTRY ASSOCIATION

CERTIFIED
CONTRACTOR
COLD-FORMED STEEL
SFIA STEEL FRAMING INDUSTRY ASSOCIATION

More Details for Writing the Perfect In-House Specifications

In this chapter, we'll discuss six additional considerations for your in-house specifications and also make some recommendations.

1. Flange Sizes

Product innovations are part of the industry's evolution. But, such changes can hinder projects if your specifications related to CFS framing are out of date. Here is an example:

Minimum flange sizes: The latest code — the 2018 IBC which references AISI — allows for structural track with a 3/4" flange (AISI S240). That differs from the ASTM C955 standard which requires a minimum 1-1/4" flange for structural track. The standard for nonstructural track is a 1" minimum for both ASTM C645 and AISI S220.

- If an architect specifies ASTM, then the structural track will be required to have 1-1/4" flanges
- On structural track, a 3/4" flange (AISI) vs. a 1-1/4" flange (ASTM) is a relatively large variance that could raise the framing contractor's costs and slow down its work

2. EQ (Equivalent) Studs

In the past, CFS framing manufactured in the United States came in standard thicknesses, tensile strengths, and profiles. But, some CFS manufacturers began engineering products known as "EQ" or equivalent studs.

- EQ studs are nonstructural CFS framing members with performance similar to traditional CFS members. They have a reduced base metal thickness, but a higher strength steel
- Framing contractors can build a quality wall using EQ studs
- The 2018 IBC has no issue with the use of EQ stud products, because AISI, the sole standard referenced by the 2018 IBC, is performance-based and sets no minimum thickness for CFS studs
- This contrasts with ASTM, which sets a minimum thickness for nonstructural steel framing at 0.0179 inches, or the equivalent of a 25-gauge stud. ASTM C645, however, allows for equivalent thickness with testing

What if your specifications list only ASTM standards for CFS framing? Then, based on the above points, your framing contractor will have less flexibility in choosing studs.

3. Other Industries

Other industry's set standards that affect steel framing. Here are two examples:

- Tile Council of North America calls for a 33 mil minimum CFS steel thickness spaced no more than 16" o.c. for walls covered with tile

- Gypsum Association recommends CFS framing with a base metal thickness of 30 mil (0.0296") when using cement boards, tile backer panels, and high-performance gypsum panels designed for increased abuse-resistance construction

- GA makes some allowances for thinner steel studs — down to a 0.019" thickness — on certain designs, so long as they are fastened with sharp-point, fine-thread screws (or sharp-point, high-low thread screws) using a screw gun set to 2500 RPMs

4. Costly Details

Some specification details can be a challenge to execute in the field. For example:

- While zinc coatings protect against corrosion, a specification may state, for example, "G90 for a nonstructural wall," when the minimum code requirement is far less strict. Since zinc is expensive, this small error can result in significantly higher costs

5. Out-of-Date References

Some specifications reference publications that are hard to find or no longer exist.

- One specification stated, "Comply with LGSEA Research Note." This publication would be hard to find, because LGSEA became CFSEI 15 years ago

Anyway, it's better to reference manufacturers' product data sheets for their superior reliability.

6. Out-of-Date Lists

Architects issue lists of approved manufacturers for their projects. Normally, this is helpful, but …

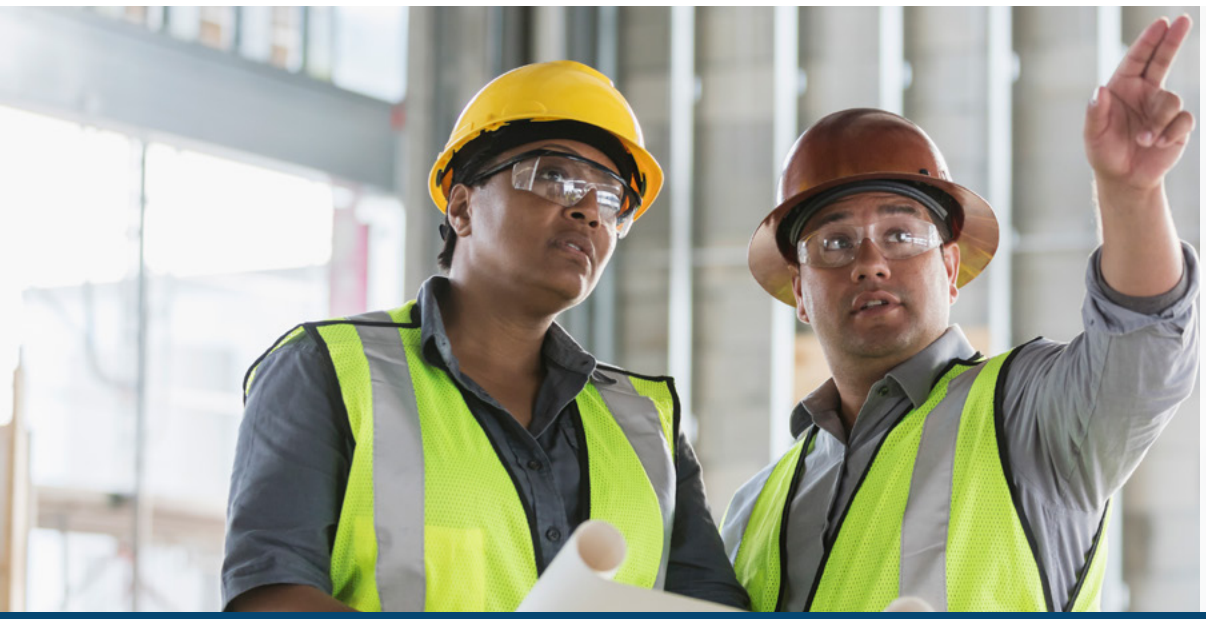
- Many steel framing manufacturers have merged, gone out of business, changed names, or operate far from a given project

Recommendations for Architects and Structural Engineers

1. Subscribe to a specification service

2. Request a free specification review using the SFIA Specifications Review Service

3. Download free of charge the SFIA Guide Specifications



Help your framing contractor to have the most flexibility on the job site. Include AISI S220 and AISI S240 standards in your in-house specifications.

Checklist for Architects and Engineers Writing CFS Specifications

Building a non-residential or multi-family structure structure is an incredibly complex process that requires attention to detail by a team of architects, engineers, contractors, suppliers, and manufacturers. To get that job done, the architectural specifications play a key role. Here's a checklist to keep your specifications up to date.

Download AISI S220 and AISI S240. The 2018 IBC references these AISI standards for CFS framing exclusively.

- AISI S220 North American Standard for Cold-Formed Steel Framing - Nonstructural Members
- AISI S240 North American Standard for Cold-Formed Steel Structural Framing
- The 2018 IBC also references AISI S202, AISI S230 and AISI S400, which may apply depending on your project

Review your gypsum board and gypsum panel products specifications. Note the 2018 IBC, Chapter 25.

- The 2018, IBC Chapter 25, Table 2506.2, states that structural framing must conform with AISI S240, and nonstructural framing must conform with AISI S220

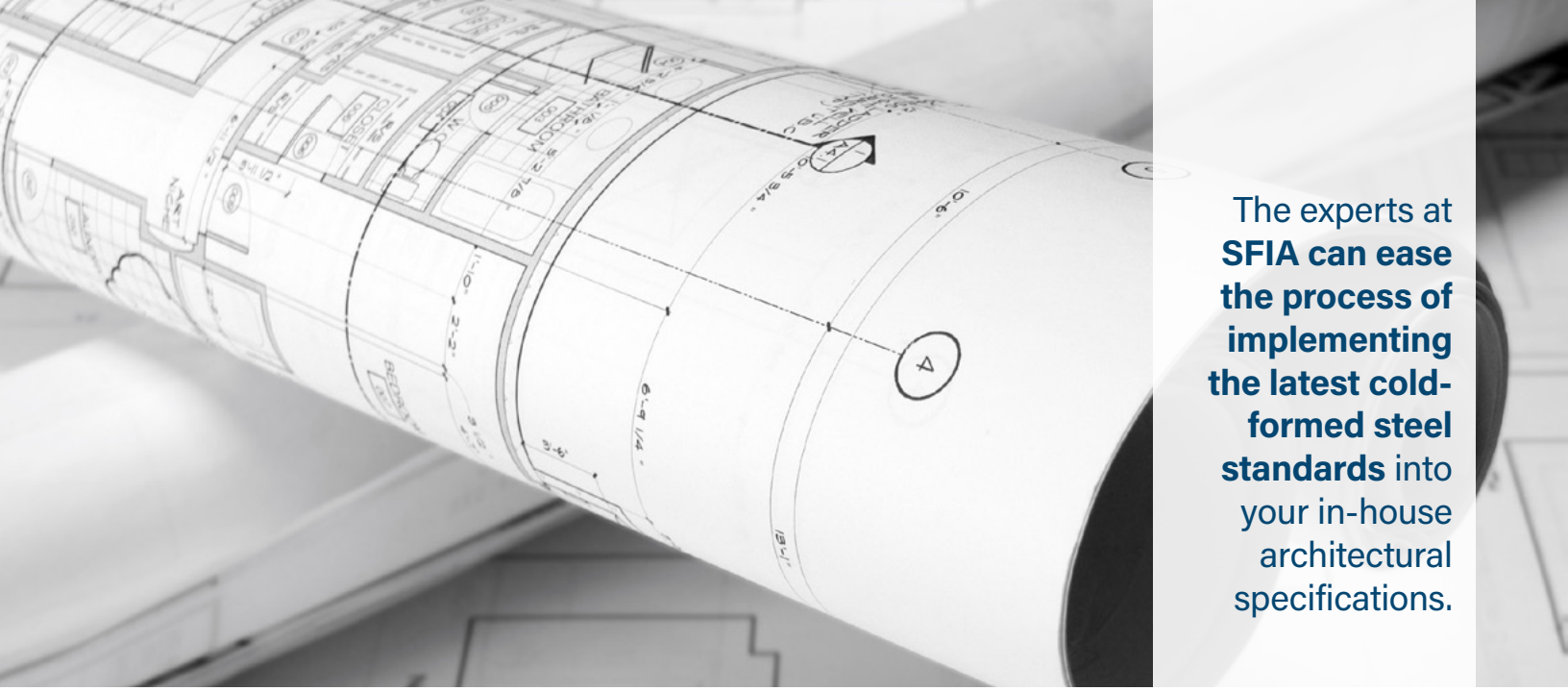
While not an AISI requirement, the advice of a registered design professional can be helpful.

- Significant problems can result if a building official cites the AISI reference in the 2018 IBC, but the project specification only references ASTM standards for CFS framing
- In the worst-case scenario, the building might need to be re-engineered, or installed material may need to be replaced, or both

Note that some AISI standards have been consolidated into AISI S240.

- AISI S240 is now a single comprehensive document that consolidates six standards for wall systems, floor systems, roof systems, lateral load-resisting systems, truss assemblies and header assemblies
- Many states follow older IBCs, which reference multiple AISI standards. The 2015 IBC, for example, references 10 separate AISI standards

Download the free SFIA Guide Specifications, which are in the MasterFormat®, for structural and nonstructural CFS framing.



The experts at **SFIA can ease the process of implementing the latest cold-formed steel standards** into your in-house architectural specifications.

- SFIA Guide Specification Section 054000 Cold-Formed Metal Framing
- SFIA Guide Specification Section 092216 Nonstructural Metal Framing
- Use these guides to update your in-house specifications

Consider specifying CFS products manufactured by a SFIA certified manufacturer. SFIA has two Quality Assurance product certification programs that comply with AISI S240 QA requirements.

- The SFIA Code Compliance Certification Program for Cold-Formed Steel Stud and Track
- The SFIA Connector Manufacturing Compliance Certification Program
- These compliance programs require manufacturers to document their manufacturing controls and procedures, monitor production tolerances, and submit to an independent third-party verifier that makes unannounced visits

Include AISI S220 and AISI S240 standards in your specifications to help your framing contractors have the most flexibility on the job site.

- The AISI S240 standard allows for structural track with a 3/4" flange, whereas the ASTM C955 standard requires a minimum 1-1/4" flange for structural track
- The standard for nonstructural track is a 1" minimum for both ASTM C645 and AISI S220
- The AISI standard sets no minimum thickness for CFS studs, so a framing contractor could use the new "EQ" or equivalent stud products. ASTM C645, however, allows for equivalent thickness with testing

Contact SFIA and request a free specification review

- The SFIA Specifications Review Service is complimentary
- Out-of-date architectural specifications that don't sync up with the local building code can cause delays, result in change orders and create liabilities

While every project is different, CFS framing can offer many benefits to commercial and multi-family residential projects — saving time and expenses for building professionals, and helping building owners fill their units and generate revenue sooner.

Do you need help with an upcoming project? Whether you'd like to learn how different building materials compare — for example, how cold-formed steel framing compares to wood framing — or need ideas on how to reduce costs or speed up your construction timeline, we can help.

BuildSteel's team of experts offers complimentary project assistance for new and existing projects. **Request assistance now**. Request the free **SFIA Specifications Review Service** as well.

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