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TECHNICAL NOTE

On Cold-Formed Steel Construction

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ASTM A1003 - NO CAUSE FOR REJECTION

Summary: Building codes and design standards that reference ASTM International (ASTM) A1003 standard for cold-formed steel framing products have the potential to cause confusion and project delays for those who are unfamiliar with the requirements of this relatively new material standard. This Technical Note, first published in 2008, provides a comparison of the requirements of A1003 with the more familiar standards traditionally used for cold-formed steel framing products, and demonstrates that steel ordered or furnished to the old standards should be no cause for rejection. The 2013 revision references a change to the requirements of ASTM A1003 regarding material thickness when ordering or supplying steel sheet.
Disclaimer: Designs cited herein are 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; CFSEI documents are not intended to exclude the use and implementation of any other.

INTRODUCTION

Starting in 2003, the International Code Council (ICC) International Building Code requires that the design, installation and construction of cold-formed steel framing be in accordance with the American Iron and Steel Institute (AISI) Standard for Cold-Formed Steel Framing - General Provisions. This General Provisions standard, developed by the ANSI-accredited AISI Committee on Framing Standards, requires that framing members be cold-formed to shape from metallic-coated sheet steel complying with the requirements of ASTM A1003.

Cold-formed steel framing has traditionally been manufactured from galvanized, Galvalume® or Galfan® sheet steel complying with the requirements of ASTM A653, A792 or A875, respectively. One of the purposes of the new ASTM A1003 standard was to provide a common standard for these various materials as a means to simplify the process for the specifier and supplier. However, during the transition from the old standards to the new standard, there may be inconsistencies between code regulations, design standards, project specifications and delivered materials.

ASTM A1003, the Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members, covers coated steel sheet used in the manufacture of cold-formed framing members, such as, but not limited to, studs, joists and track. As with the former standards, this new standard defines ordering practices, grades; i.e., mechanical and chemical requirements, and coating requirements. ASTM A1003 was developed to be inclusive of the former ASTM A653, A792 and A875 standards, provide additional options for suppliers, and be consistent with the material requirements of the AISI North American Specification for the Design of Cold-Formed Steel Structural Members. Therefore, materials furnished to the old standards were intended to meet the requirements of the new standard.

COMPARISON OF THE REQUIREMENTS

Material thickness is of primary importance and has a direct impact on the structural performance of a cold-formed steel product. Prior to 2013, ASTM A1003 required that the ordered thickness be the base metal thickness. This requirement differs from the normal ordering practice for hot dip metallic-coated products where the ordered thickness includes the base metal and the coating. In 2013, ASTM A1003 allowed steel sheet in coil or cut lengths to be supplied to coated steel thickness requirements if specified on the purchase order or upon agreement between producer and user. In either case, the base metal thickness of materials furnished to ASTM A653, A792 and A875 standards can usually be verified simply by checking the mill test report.

Mechanical properties also determine the structural performance of the cold-formed steel product. Table 1 demonstrates that the former ASTM A653, A792 and A875 standards prescribe mechanical properties that exceed those of the new ASTM A1003 standard. Therefore, the mechanical properties of steel furnished to the former standards would meet or exceed the requirements of the new standard.

Chemical composition determines the weldability of the cold-formed steel product. A side-by-side comparison of the limitations on chemical composition would show that the former ASTM A653, A792 and A875 standards are generally more restrictive than the new ASTM A1003 standard; however, this is not always the case (e.g., titanium). In either case, these materials can be successfully welded following the provisions of American Welding Society (AWS), D1.3, Structural Welding Code-Sheet Steel.

Coating properties determine the durability of the cold-formed steel product. ASTM A1003 references ASTM A653, A792 and A875 directly, as each represents a unique coating. Therefore, there is no change in the requirements and steel furnished to the former standards will meet the requirements of the new standard.

	Former Provisions	New Provisions
GRADE 33		
Standard	ASTM A653, A792 or A875	ASTM A1003
Grade	Structural Steel (SS) 33	Structural Grade 33 Type H
Minimum Yield Strength	33 ksi	33 ksi
Minimum Tensile Strength	45 ksi	45 ksi
Minimum Elongation in 2 in.	20%	10%
GRADE 50		
Standard	ASTM A653, A792 or A875	ASTM A1003
Grade	Structural Steel (SS) 50 Class 1	Structural Grade 50 Type H
Minimum Yield Strength	50 ksi	50 ksi
Minimum Tensile Strength	65 ksi	65 ksi
Minimum Elongation in 2 in.	12%	10%

TABLE 1: MECHANICAL PROPERTIES

Note: CFSEI Technical Note G800, entitled *ASTM Standards for Cold-Formed Steel*, provides a broader overview of many different ASTM standards that are referenced for the manufacture, installation, and testing of CFS framing materials and accessories. It includes a paragraph about each of the ASTM standards referenced herein.

References

1. North American Specification for the Design of Cold-Formed Steel Structural Members (AISI S100) , American Iron and Steel Institute, Washington, DC.
2. *Standard for Cold-Formed Steel Framing - General Provisions* (AISI S200), American Iron and Steel Institute, Washington, DC.
3. ASTM A653/A653M, *Standard Specification for Sheet Steel, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by* the Hot Dip Process, American Society for Testing and Materials, West Conshohocken, PA.
4. ASTM A792/A792M, *Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot Dip Process*, American Society for Testing and Materials, West Conshohocken, PA.
5. ASTM A875/A875M, *Standard Specification for Steel Sheet, 5% Aluminum-Zinc Alloy Coated by the Hot Dip Process*, American Society for Testing and Materials, West Conshohocken, PA.
6. ASTM A1003/1003M, *Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members*, ASTM International, West Conshohocken, PA.
7. AWS*, D1.3, Structural Welding Code-Sheet Steel, American Welding Society, Miami, FL.*
8. ICC, International Building Code, International Code Council, Washington, DC

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