

## Architecture, Building & Construction: International Specifications, Guidelines & Industry Associations

Issued May 2017

### Basic Rules for Stainless Steel Specification

1. "Grade" is commonly used by the industry to mean "stainless steel alloy". It does not refer to quality level.
2. Always use an internationally recognized standard (ASTM, EN, JIS, etc.) to specify stainless steel.
3. Use a legally binding alloy designation. UNS (Unified Numbering System) is the international industry accepted means of designating chemistry requirements. They appear in all stainless steel ASTM specifications. Other standards (i.e. EN in Europe, JIS in Japan, etc) also include specific numbers for chemistry designation.
4. No stainless steel AISI numbers (304, 316, etc.) have been issued for about 40 years. More than one UNS alloy can be associated with a common AISI name or Type. Identifiers like "18-8" are even less precise. None of the newer stainless steels alloys have AISI numbers. If AISI numbers are used in project specifications or drawings, an internationally recognized standard, like ASTM, and a UNS number also should be listed.
5. Always specify a minimum, maximum or nominal thickness in inches or mm. Stainless steel "gauges" are not defined by industry standards and, without a specific number, you have no legal protection.
6. "L" after AISI numbers mean lower carbon content. It only needs to be specified when an austenitic stainless steel (i.e. 304L (UNS S30403) or 316L (UNS S31603)) that is 0.125 inch (3.175 mm) or greater in thickness will be welded. The standard production from a modern mill is low carbon unless there is a reason to add it. For that reason, dual certification (i.e. 304/304L or UNS S30400/S30403) is common. Other than welding, carbon has no affect on corrosion performance.
7. Sulfur content affects appearance and corrosion resistance. Surface sulfides can leave behind small pit like indentations when a surface is polished and can make the steel more susceptible to pitting corrosion. Standard production is low sulfur (0.005% or less) unless it is deliberately added for high speed welding or machining. Sheet, strip and plate can be specified as low sulfur. See A240. Bar and welded tube and pipe will have higher sulfur levels. Surface sulfides can be removed and pitting corrosion resistance improved by specifying "chemical passivation in accordance with ASTM A967" after the final fabrication and finishing is complete.
8. Surface roughness can have a significant impact on corrosion performance. There are no requirements within ASTM standards. Rougher surfaces retain more of what is corrosive in the environment (coastal and deicing salts, industrial particulate, chloramines in indoor swimming pools) and the moisture necessary to initiate corrosion. For improved corrosion performance specify "surface roughness not to exceed Ra 20 micro-inches or 0.5 microns". No. 4 and many other finishes can be provided to this specification. See the IMOA publication "Which Stainless Steel Should Be Specified for Exterior Applications?" and the Nickel Institute publication 11 024 "Guidelines for Corrosion Prevention" for more information.
9. Bare metal finishes can never be as consistent as painted surfaces because the polishing belts, wheels, and rolls that apply them wear. Surface finish appearance consistency can be optimized through specification. When you see a finish that you like, ask your supplier for the tightest surface roughness and specular gloss (reflectivity) range that they are willing to certify for their production. The specular gloss range should include the angle of measurement. Require adherence to these ranges in your project specifications.
10. The translucent color obtained by electrochemical (also called interference) and PVD (also called sputtering) surface treatment will never be perfectly consistent because the underlying finish and coloring process variations affect consistency. Several types of instruments can be used to measure color. If you want to limit color variation, ask your supplier(s) for the tightest range(s) that they will certify and test method used. Include both in your specifications.

**American Standards for Testing of Materials (ASTM), Website: <http://www.astm.org>**

**General Standards for Stainless Steel**

For architectural applications of stainless steel using sheet, strip or plate, both ASTM A240 and A480 should be specified. Replace all references to A167 with A240. Do not use A666 unless you need higher structural strength.

A167	Specification for <b>stainless steel and heat-resisting chromium-nickel steel plate, sheet, and strip</b> - <b>Withdrawn – No longer an ASTM specification. Do not reference!</b> <i>Note: This specification is often referenced on older drawings. It should be replaced with A 240.</i>
A240/ A240M	Specification for heat-resisting <b>chromium and chromium-nickel stainless steel plate, sheet, and strip</b> for pressure vessels <i>Note: This is the <b>most widely used specification for stainless steel plate, sheet, and strip</b>, no matter what the end-use application. It covers <b>chemistry and minimum strength requirements</b> for common stainless steel in the annealed condition. A 480 should also be referenced for mill surface finish specification, tolerances including flatness, heat treatment, packaging, marking and other common requirements. <b>For improved finish quality and corrosion resistance for austenitics (i.e. 304, 316), tighten A240 by specifying “Sulfur not to exceed 0.005%” and, for highly polished mirror finishes, specify “Sulfur not to exceed 0.002%”.</b></i>
A480/ A480M	General requirements for flat-rolled stainless and heat-resisting <b>steel plate, sheet, and strip</b> <i>Note: <b>Specify in conjunction with A240. Includes mill and polished surface finishes for sheet, strip, plate; defines edge conditions; provides dimensional and flatness tolerances; describes shipping requirements; and requirements for heat treatment, test specimens, test methods.</b> <b>For the flattest possible panels in thicknesses of 0.187 inches (4.76 mm) or less, specify “Stretcher Leveled Standard of Flatness in accordance with ASTM A480/A480M Table A2.8 and provide copies of certifications showing compliance”.</b> This is an optional requirement within A480 so the specifier must tighten A480 by specifically requiring it.</i>
A478	Chromium-Nickel Stainless Steel Weaving and Knitting Wire <i>Note: Composition and mechanical requirements of common types of stainless steel wire intended for weaving and knitting. There is no specification for woven stainless steel for architectural applications.</i>

**Finishes**

A270	Specification for Seamless and Welded Austenitic Stainless Steel <b>Sanitary Tubing</b> . <i>Note: This specification was developed because of the finish requirements in the food and beverage and pharmaceutical industries. It is the only specification that describes <b>tube finishes</b> and the finish requirements could be applied to pipe as well. Alternatively, suppliers could be asked to match sheet and strip finishes in ASTM A 480.</i>
A480/ A480M	General requirements for flat-rolled stainless and heat-resisting <b>steel plate, sheet, and strip</b> <i>Note: <b>Specify in conjunction with A240. Describes mill and polished surface finishes for sheet, strip, plate as well as other requirements. Typical sheet surface roughness is listed in the “notes” but is not legally binding. Tighten A480 by specifying a maximum surface roughness for improved corrosion resistance or a surface roughness range from improved finish consistency after speaking with your supplier about what they are willing to guarantee.</b></i>
A793	Standard specification for <b>rolled floor plate</b> , stainless steel
A947M	Standard specification for <b>textured</b> stainless steel sheet <i>Note: Coined (one sided light patterns) and embossed (2 sided deep pattern) finishes including coined finishes that simulate abrasive blasting. It covers the patterns and permissible variations in dimensional tolerances. Pattern height variation from roll wear can cause variation in appearance. Speak with the finish supplier about the maximum pattern height variation that they are willing to guarantee and include that requirement in the specification if appearance consistency is important.</i>
B 506	<b>Copper-clad stainless</b> steel sheet/strip in flat lengths/coils/rolls for building construction

**Cleaning, Passivation and Testing**

A262	Standard Practices for Detecting <b>Susceptibility to Intergranular Attack</b> in Austenitic Stainless Steels
A380	Standard Specification for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems <i>Note: This covers various potential <b>treatments required to restore the corrosion resistance of the stainless steel after welding, hot forming, and heat treatment.</b> It also covers inspection after cleaning and tests for free iron, residual oil and other surface contaminants.</i>
A923	Standard Test Methods for <b>Detecting Detrimental Intermetallic Phase in Duplex</b> Austenitic/Ferritic Stainless Steels
A967	Standard Specification for <b>Chemical Passivation</b> for Stainless Steel Parts <i>Note: This specification includes methods for <b>testing for and removing free iron and other foreign</b></i>

	<b><i>matter from the surface that can prevent the formation of a protective passive film on the stainless steel. These treatments do not remove heat tint from welding or heat treatment - Passivation alone is not sufficient to restore corrosion resistance.</i></b>
A1084	Standard Test Method for <b>Detecting Detrimental Phases in Lean Duplex Austenitic/Ferritic Stainless Steels</b>

### Fasteners, Fittings, Anchors

**(There is no ASTM standard for stainless steel washers. Order to the raw material standard A240.)**

A193/A193M	Alloy-steel and stainless steel <b>bolting materials for high temperature or high pressure service and other special purpose applications</b> <b>Note: Includes bolt sizes of 1.5 inch and greater. Does not include duplex SS grades.</b>
A194/A194M	Carbon and alloy steel nuts for bolts for <b>high pressure or high temperature service or both</b> <b>Note: Includes stainless steel and bolt sizes of 1.5 inch and greater)</b>
A774/A774M	Austenitic stainless steel <b>fittings</b> (as-welded) for general corrosive service at low/moderate temperatures
A951/A951M	Standard specification for steel wire for <b>masonry joint reinforcement</b>
A962/A962M	Common requirements for fasteners or fastener materials, or both, intended for use at any temperature from cryogenic to the creep range
A1082/ A1082M	Standard specification for <b>high strength precipitation hardening and duplex stainless steel bolting</b> for special purpose applications, <b>Note: Use for all high strength duplex and PH stainless steel fasteners – any size</b>
C1242	Standard guide for design, selection, and installation of <b>exterior dimension stone anchors and anchoring systems</b> <b>Note: This says that metal in contact with stone should be a 300 series stainless, but other materials can be used if properly protected against moisture and galvanic corrosion. Copper and stainless steel are used for wire ties. Specify 316 instead of 304 if there will be typical coastal or deicing salt exposure. In severe high salt environments, a more corrosion resistant stainless steel is advised.</b>
F593	Stainless steel specification for <b>bolts/hex cap screws/studs</b> <b>Note: Less than 1.5 inch in diameter, for standard – not high strength service</b>
F594	Specification for stainless steel <b>nuts</b> <b>Note: Less than 1.5 inch diameter, standard service – not high strength service</b>
F788/ F788M	Surface discontinuities of bolts, screws, and studs, inch and metric
F836M	Specification for stainless steel <b>metric nuts</b> <b>Note: Less than 1.5 inch, standard service – not high strength service</b>
F837/F837M	Specification for stainless steel <b>socket head cap screws</b>
F879/F879M	Specification for stainless steel <b>metric socket button and flat countersink head cap screws</b>
F880/F880M	Specification for stainless steel <b>socket set screws</b>
Note: A193/A193M and A320/A320M B8 (304) and B8M (316) are the most commonly used specifications for concrete and masonry anchor bolts. Identify the “class” to indicate strength level.	

### Wire

A492	Standard Specification for <b>Stainless Steel Rope Wire</b> <b>Note: Austenitic stainless steel wire intended for stranding into wire rope - chemical composition and tensile requirements.</b>
A555/A555M	General Requirements for Stainless Steel <b>Wire and Wire Rods</b> <b>Note: Terminology and dimensional tolerance requirements intended primarily for cold forming, including coiling, stranding, weaving, heading and machining.</b>

### Concrete Reinforcement

A955/A955M	Stainless steel <b>bars for concrete reinforcement</b>
A1022/A1022M	Standard specification for <b>deformed and plain stainless steel wire and welded wire mesh for concrete reinforcement</b>

## Structural Components

<b>Tubing</b> (Specified based on outside diameter. Available with light to heavy wall thicknesses and in small to very large sizes. <b>Typically these are what should be specified for structural applications – not pipe standards.</b> )	
A269	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service <i>Note: Use for ordering <b>large diameter light and heavy wall tubing – above 16 inch – for Austenitic and Ferritic stainless steels.</b> Duplexes are not covered. To reduce cost for a purely structural application order – “heat treatment not required”. Use A1016 for general requirements.</i>
A511	Standard Specification for <b>Seamless Stainless Steel Mechanical Tubing</b> <i>Note: This is <b>seamless cold or hot finished round, square, rectangular or special tubing for more corrosive (more severe industrial, corrosive water etc.) or high temperature structural applications.</b> It is more expensive than welded A554 tubing. It covers sizes up to 12¾ in. [325 mm] outside nominal diameter</i>
A554	Standard specification for <b>welded stainless steel mechanical tubing (round, square, and rectangular tubing for structural applications)</b> <i>Note: This is the primary structural hollow section specification to use. Welded mechanical tubing is suitable for most common structural applications and less expensive than seamless or pressure rated tubing/pipe. <b>Diameters up to 16 inches. Larger sizes are not currently included in A554 but, upon agreement with the manufacturer, you could specify them produced to A554 requirements.</b> Heavy wall available in larger sizes. Austenitic 300 – series, ferritic 400-series and common duplex stainless steels are included in the new version – late 2014. Use A1016 for general requirements.</i>
A789/A789M	<b>Duplex tube, seamless/welded.</b> <i>Note: This is for pressure rated tubing, which is more expensive. Use A1016 for general requirements.</i>
A1016	Standard Specification for <b>General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel and Stainless Steel Tubes</b> <i>Notes: General requirements include <b>dimensional tolerances, straightness, testing requirements, marking and certification requirements.</b></i>
<b>Pipe</b> (Specified based on inside diameter and used for transporting fluids. Generally not used for structural applications – use mechanical tubing to reduce cost if possible.)	
A312/A312M	Standard Specification for <b>Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes</b> <i>Note: Intended for high temperature and general corrosive service. This standard covers chemical and testing requirements. Please also see the ASME Pressure Vessel Code. Use A999 for general requirements.</i>
A790	Standard Specification for <b>Seamless and Welded Ferritic/Austenitic (Duplex) Stainless Steel Pipe</b> <i>Note: Pipe intended for general corrosion resistant service with particular emphasis on resistance to stress corrosion cracking. This standard covers chemical and testing requirements. The sizes are determined by ANSI B36.19. Please also see the ASME Pressure Vessel Code. Use A999 for general requirements.</i>
A928/A928M	Standard Specification for Ferritic/Austenitic <b>(Duplex) Stainless Steel Pipe Electric Fusion Welded with Addition of Filler Metal</b> <i>Note: Five categories of pipe are included. This is pipe intended to meet the requirements of the ASME Boiler and Pressure Vessel Code. This standard covers chemical and testing requirements. Use A999 for general requirements.</i>
A999	Standard Specification for <b>General Requirements for Alloy and Stainless Pipe</b>
<b>Castings</b> (There are other casting specifications but these are the most common.)	
A351/A351M	Standard Specification for <b>Castings, Austenitic</b> , for Pressure Containing Parts
A890/A890M	Standard Specification for <b>Castings, Iron Chromium Nickel Molybdenum Corrosion Resistant, Duplex (Austenitic/Ferritic)</b> for General Application
<b>Structural Shapes, Bar, and Higher Strength Sheet/Strip</b>	
A276	Specification for stainless and heat-resisting steel <b>bars and shapes</b> <i>Note: This covers the <b>chemistry and mechanical property requirements for hot and cold finished rounds, squares, hexagons, angles, tees, channels and other shapes used for structural applications.</b> Does not include welded structural sections – use A1069 for laser welded or A240 and AWS D1.6 for other types of welding. ASTM A484 may also need to be specified.</i>

A484/A4 84M	General Requirements for Stainless Steel Bars, Billets, and Forgings <i>Note: This provides <b>dimensional tolerance, straightness, and finish descriptions for hot or cold finished bar, squares, angles, channels, tees and other shapes.</b> The finish descriptions are very general. More precise descriptions of finish options should be obtained from the supplier.</i>
A666	<b>Austenitic stainless steel sheet/strip/plate/flat bar</b> for structural/architectural/pressure vessel/magnetic/ cryogenic/heat resisting applications where <b>cold worked material for higher strength is required.</b> <i>Note: This standard is often used inappropriately because "architecture" is mentioned in the scope. It defines the additional strength levels obtainable with cold work of sheet, strip and light gauge plate. The added strength is lost where there is welding. Specify A 240 and A 480 for the standard annealed products used in most architectural and structural applications. Using the A666 higher strength levels makes forming of tight bends for wall panels and roofing more difficult.</i>
A1069/ A1069M	Standard Specification for <b>Laser Fused Stainless Steel Bars, Plates, and Shapes</b> <i>Note: For bolted or welded structural applications. The standard has no size limitations, however heavier sections in some alloys should be heat treated afterward. Contact the stainless steel producer for recommended maximum thickness limitations for ferritics and duplexes.</i>

#### Other Notable ASTM Standards

E 108	<b>Fire tests</b> of roof coverings
E 119	<b>Fire tests</b> of building construction and materials
E 152	<b>Fire testing</b> of door assemblies
E 283	<b>Roof</b> static air infiltration test
E 330	Structural performance of <b>exterior windows/curtain walls/doors</b> by uniform static air pressure difference
E 331	Test method for water penetration of <b>exterior windows, curtain walls, and doors</b> by uniform static air pressure difference
E 529	Flexural tests of <b>beams and girders</b> for building construction
E 754	Test method for pullout resistance of ties and anchors embedded in <b>masonry</b> mortar joints
E 894	Test method for anchorage of permanent <b>metal railing</b> systems and rails for buildings
E 935	Test methods for performance of permanent <b>metal railing</b> systems and rails for buildings
E 985	Specification for permanent <b>metal railing</b> systems and rails for buildings
E 1233	Structural performance of <b>exterior windows/curtain walls/doors</b> by cyclic static air pressure differential
E 1592	Test method for structural performance of sheet metal <b>roof and siding</b> systems by uniform static air pressure difference
F 1072	Specification for <b>expanded metal doors</b>
F 1299	Specification for food service equipment <b>hoods for cooking appliances</b>

**European Specifications** Website: <http://www.cen.eu>

#### General Material Specifications

EN 10028-7	Flat products made of steels for pressure purposes - Part 7: Stainless steels.
EN 10088-1	Stainless steel compositions and physical properties
EN 10088-2	Stainless steel <b>sheet, plate and strip chemical compositions and mechanical properties</b>
EN 10088-3	Stainless steel <b>bar chemical compositions and mechanical properties</b>
EN 10088-4	Stainless steel <b>flat products (sheet, strip, plate) for construction</b> purposes
EN 10088-5	Stainless steel <b>long products for construction</b> purposes
EN 10258	<b>Tolerances for narrow cold rolled stainless steel strip</b> with a rolled width of <600 mm, coils slit from narrow strip, cut lengths from cold rolled narrow strip, and a maximum thickness of 3.0 mm Withdrawn in 2006 and replaced by
EN ISO 9445-1	Continuously cold-rolled stainless steel. Tolerances on dimensions and form. Narrow strip and cut lengths
EN ISO 9445-2	Continuously cold-rolled stainless steel. Tolerances on dimensions and form. Wide strip and plate/sheet
EN 10259	Tolerances for <b>wide cold rolled stainless steel strip/sheet/coil</b> up to 6.5 mm Withdrawn in 2010 and replaced by EN ISO 9445 given above

EN 10058	Tolerances for <b>flat bars</b>
EN 10059	Tolerances for <b>square bars</b>
EN 10060	Tolerances for <b>round bars</b>
EN 10061	Tolerances for <b>hexagon bars</b>
EN 10278	Tolerances for <b>bright drawn, ground, turned and polished stainless steel round, hexagon, square and flat bars.</b>
EN 10017	Tolerances for <b>wire rod</b>
EN 10218-2	Tolerances for <b>wire</b>
EN 10264-4	Stainless steel for <b>wire ropes</b>
EN 10296-2	Chemical compositions and mechanical properties of <b>welded tube</b>
EN 10297-2	Chemical compositions and mechanical properties of <b>seamless tube</b>
PD 6484	Commentary on corrosion at bimetallic contacts and its alleviation Guidance on the avoidance of situations in which corrosion may arise from bimetallic contacts between different metals and alloys. Discusses the environmental conditions which may lead to such corrosion and gives advice on its alleviation. Annotated tables give the likely behaviour of various couples in five different environments.
EN 1011-3	Welding. Recommendations for welding of metallic materials. Arc welding of stainless steels
<b>Fasteners</b>	
EN ISO 7046-2	<b>Countersunk flat head screws</b> (common head style) with type H or type Z cross recess - Product grade A - Part 2: Steel screws of property class 8.8, stainless steel screws and non-ferrous metal screws (ISO 7046-2)
EN 15048-1	<b>Non-preloaded structural bolting assemblies</b> - Part 1: General requirements
EN ISO 3506-1	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: <b>Bolts, screws and studs</b> (ISO 3506-1)
EN ISO 3506-2	Mechanical properties of corrosion-resistant stainless steel fasteners. Nuts
EN ISO 3506-3	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 3: Set <b>screws and similar fasteners not under tensile stress</b> (ISO 3506-3)
EN ISO 3506-4	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 4: <b>Tapping screws</b> (ISO 3506-4:2009) Mechanical properties of corrosion-resistant stainless steel fasteners - Part 4: Tapping screws (ISO 3506-4)
EN ISO 16048	<b>Passivation</b> of corrosion-resistant stainless-steel <b>fasteners</b> (ISO 16048)

**British Standard (BS), Website <http://shop.bsigroup.com/>**

BS 6744	Stainless steel <b>concrete reinforcement</b>
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**American Welding Society (AWS), Website: <http://www.aws.org>**

**Structural Welding:** Carbon steel standards should never be used for stainless steel. The primary structural standard for stainless steel is **AWS D1.6**. Carbon steel standards, such as AWS D1.1 Structural Welding Code – Steel, are not appropriate for welding stainless and could result in corrosion or structural problems. A new version of AWS D1.6 is expected to be published in late 2014 or possibly early in 2015.

**Welding Rebar:** Because of the specialized requirements of the application, two standards should be referenced for stainless steel concrete reinforcing bars (A955/A955M). All welding and metallurgical inspection should be required to conform to AWS D1.6 / D1.6M *Structural Welding Code - Stainless Steel*. AWS D1.4 *Structural Welding Code – Reinforcing Steel* should be referenced for the structural details and joint dimensions required for welder qualification and for mechanical testing of those joints. The welding procedures in AWS D1.4 are only for carbon steel and not appropriate for stainless.

<b>D1.6</b>	<b>Structural Welding Code – Stainless Steel</b> <i>Note: Primary document that should be referenced for any structural welding application. It covers all aspects of welder qualification, joint design, inspection, welding of stainless steel to carbon steel, stud welding and other key topics. Do not use carbon steel structural welding</i>
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	<b>standards!</b> A new version is expected in early 2015.
A4.2	Standard Procedures for <b>Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic and Duplex Austenitic-Ferritic Stainless Steel Weld Metal</b>
A5.4	Specification for <b>Stainless Steel Electrodes for Shielded Metal Arc Welding</b>
A5.11/A5.11M	Specification for <b>Nickel and Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding</b>
A5.9	Specification for <b>Bare Stainless Steel Welding Electrodes and Rods</b>
A5.22	Specification for <b>Stainless Steel Electrodes for Flux Cored Arc Welding</b> and <b>Stainless Steel Flux Cored Rods for Gas Tungsten Arc Welding</b>
B2.1.014	Standard Welding Procedure Specification (WPS) for <b>Shielded Metal Arc Welding of Carbon Steel to Austenitic Stainless Steel</b> , (M-1 to M-8 or P-8), 10 through 18 Gauge, in the As-Welded Condition, With or Without Backing
B2.1.013	Standard Welding Procedure Specification (WPS) for <b>Shielded Metal Arc Welding of Austenitic Stainless Steel</b> , (M-8 / P-8), 10 through 18 Gauge, in the As-Welded Condition, With or Without Backing
B2.1.010	Standard Welding Procedure Specification (WPS) for <b>Gas Tungsten Arc Welding of Carbon Steel to Austenitic Stainless Steel</b> , (M-1 to M-8 or P-8), 10 through 18 Gauge, in the As-Welded Condition, With or Without Backing
B2.1.009	Standard Welding Procedure Specification (WPS) for <b>Gas Tungsten Arc Welding Austenitic Stainless Steel (M-8 / P-8)</b> , 10 through 18 Gauge, in the As-Welded Condition, With or Without Backing
B2.1.006	Standard Welding Procedure Specification (WPS) for <b>Gas Metal Arc Welding of Carbon Steel to Austenitic Stainless Steel</b> , (M-1 to M-8 or P-8), 10 through 18 Gauge, in the As-Welded Condition, With or Without Backing
B2.1.005	Standard Welding Procedure Specification (WPS) for <b>Gas Metal Arc Welding Austenitic Stainless Steel</b> , (M-8 / P-8), 10 through 18 Gauge, in the As-Welded Condition, With or Without Backing
D10.4	Recommended Practices for <b>Welding Austenitic Chromium Nickel Stainless Piping and Tubing</b>

## **Structural Standards and Guidelines for Stainless Steel**

In addition to the standards listed below, a new Chinese stainless steel structural design standard is in the final stages of review and maybe available in late 2014. Also see AWS D1.6 Structural Welding Code: Stainless Steel. Design guidelines, papers, case studies and other resources are available at these two websites: Stainless Construction, <http://stainlessconstruction.com/> and Steel Construction Institute (SCI), <http://www.steel-sci.org>

**American Society of Civil Engineers (ASCE)**, Website: <http://www.asce.org>

**ACI/ASCE: ACI 530.1-88/ASCE 6-88 Section 3.2.1. Specification for masonry structures**

*This covers the requirements for ties and anchors made of Type 304 stainless steel*

**SEI/ASCE-8-02 Specification for the design of cold formed stainless steel structural members.**

*This covers cold formed structural sections less than 0.125 inches (3 mm). It can be obtained here:*

<http://www.asce.org/Product.aspx?ID=2147487569&ProductID=181341642>

**American Institute for Steel Construction (AISC)**

**AISC Steel Design Guide 27: Structural Stainless Steel**

*This document covers hot rolled and welded austenitic, duplex and precipitation hardening alloy structural sections that are 0.125 inch (3 mm) and greater. It also covers tension bars and fasteners. Members can download it free here: <http://www.aisc.org/store/p-2301-design-guide-27-structural-stainless-steel.aspx>*

*A 3 hour, 2-part webinar on DG 27, Designing Structural Stainless Steel, is available on the AISC website. It is free unless you want a CEU/PDH certificate. <https://www.aisc.org/content.aspx?id=38396>*

**CSA Standards (Canada)**, Website: <http://www.csa.ca/cm/ca/en/home>

**A370:Connectors for masonry (not to be confused with ASTM A 370)**

*Intended for use in exterior walls, moist environments, exposed to weather, or in contact with the ground must be corrosion resistant or non-corroding. Non-corroding connectors shall be Type 304 or other material of equivalent durability.*

### **Eurocode (Europe)**

#### **EN 1993-1-4 Eurocode 3: Design of Steel Structures: Part 1-4: Supplementary rules for stainless steels**

*This standard gives supplementary provisions for the design of buildings and civil engineering projects that extend the application of EN 1993-1-1 (hot rolled and welded structural steel sections) and EN 1993-1-3 (cold formed structural steel sections) to austenitic, duplex and ferritic stainless steels.*

#### **EN 1993-1-2 Eurocode 3: Design of Steel Structures: Part 1-2: Structural Fire Design**

*This standard gives rules and accompanying physical and mechanical property data for calculating the resistance of stainless steel sections at elevated temperatures.*

#### **EN 1090-2 Execution of steel structures and aluminium structures. Part 2: Technical requirements for steel structures**

*This specification looks at all the requirements that should be taken into account for the execution (i.e. fabrication and erection) of structural steelwork. It covers structural steel and stainless steel components made by a variety of processing routes. It defines constituent products (steels, welding consumables and mechanical fasteners) and looks at the preparation, welding, testing and erection of structural systems, as well as inspection and correction.*

### **National Building Code (Canada)**

website: <http://www.nrc-cnrc.gc.ca/eng/ibp/irc/codes/2010-national-building-code.html> - cont

*Part 4 Structural Design: Buildings covered by this code must conform to CSA Standard S304.*

*Part 9 Housing & Small Buildings: Above ground **masonry** Section 9.20*

*Requires corrosion resistant ties with the same level of protection as CSA standard A370. The minimum thickness of strip ties for use with masonry veneers is 0.76 mm.*

## **Other North American Standards & Guidelines**

### **American National Standards Institute (ANSI)**

#### **NSF/ANSI 51-2012 Food Equipment Materials**

*This standard is applicable to the materials and finishes used in the manufacture of food equipment.*

### **Construction Specifications Institute (CSI), Website: <http://www.csinet.org>**

*CSI's ManuSpec<sup>®</sup> and Spec-Data<sup>®</sup> manuals contain company specifications for stainless steel products and are available on the web at Architect's First Source*

### **Indiana Limestone Institute of America, Inc., Website: <http://www.iliai.com>**

*The Indiana Limestone Handbook discusses stainless steel stone anchoring and flashing.*

### **National Association of Architectural Metal Manufacturers (NAAMM) Website: <http://www.naamm.org/>**

*They publish manuals on metal finishes, grating, custom hollow doors, metal stairs, and flagpoles.*

### **National Roofing Contractors Association (NRCA) Website: <http://www.nrca.net>**

*This organization publishes technical manuals like the Architectural Sheet Metal and Metal Roofing Manual*

### **Sheet Metal and Air Conditioning Contractors National Assoc. (SMACNA) Website: <http://www.smacna.org/>**

*Architectural **Sheet Metal** Manual,*

*Architectural Sheet Metal Specifications of Custom-Fabricated **Roofing**,*

***HVAC Duct** Construction Standards - Metal and Flexible, covers stainless steel, and **Kitchen Equipment** Fabrication Guidelines.*

**Underwriters Laboratories (UL)**, Website: <http://www.ul.com>

*UL 410: Slip resistance of floor surface materials (Stainless steel floor plate meets the requirements of the Americans with Disabilities Act)*

## **Stainless Steel Industry Association Resource Websites**

All of these organizations offer design guidelines, articles, technical papers and other technical resources. Most also provide free technical assistance. A course on stainless steel is available through many of these websites.

### **Global**

*International Molybdenum Association (IMOA)*, <http://www.imoa.info>

*International Stainless Steel Forum*, <http://www.worldstainless.org/>

*Nickel Institute*, <http://www.stainlessarchitecture.org>

### **Americas**

*Abinox (Brazil)* <http://www.abinox.org.br/index.php>

*Brazilian Stainless Steel Development Association*, <http://www.nucleoinox.org.br/>

*Instituto Mexicano del Inoxidable AC*, <http://www.iminox.org.mx/>

*Specialty Steel Industry of North America*, <http://www.ssina.com>

### **Asia/Oceania**

*Australian Stainless Steel Development Association*, <http://www.assda.asn.au/>

*Indian Stainless Steel Association*, <http://www.stainlessindia.org/>

*Japan Stainless Steel Association*, <http://www.jssa.gr.jp>

*Korea Iron & Steel Association*, <http://www.kosa.or.kr/>

*New Zealand Stainless Steel Development Association*, <http://www.hera.org.nz/nzssda>

*Nickel Institute China*, <http://www.ni-china.org/ni/>

*Stainless Steel Council of China*, <http://www.cssc.org.cn/>

*Taiwan Steel and Iron Industries Association*, <http://www.tsiaa.org.tw/>

*Thai Stainless Steel Development Association*, <http://www.tssda.org/>

### **Africa**

*Southern Africa Stainless Steel Development Association*, <http://www.sassda.co.za>

### **Europe**

*Euro Inox, The European Stainless Steel Development Association* <http://www.euro-inox.org>

*British Stainless Steel Association*, <http://www.bssa.org.uk>

*Cedinox, (Spain)* <http://www.cedinox.es/>

*EUROFER*, <http://www.eurofer.org/>

*Informationstelle Edelstahl Rostfrei, (Germany)* <http://www.edelstahl-rostfrei.de/>

*Italian Stainless Steel Development Association*, <http://www.centroinox.it>

*Jernkontoret, (Sweden)* <http://www.jernkontoret.se/>

*Paslanmaz Çelik Derneği, (Turkey)* <http://www.paslanmaz.org.tr>

*SPETSSTAL Association, (Russia)* <http://eng.ussa.su>

*SWISS INOX*, <http://www.swissinox.ch>

*Union de Empresas Siderúrgicas, (Spain)* <http://www.unesid.org/>