

ASTM Standards for Pipe & Fittings

There are many International Standards for stainless and carbon steel pipes and fittings. The list below is a basic overview of some of these. For more in-depth details of these Standards please contact your nearest Euro Steel office.

ASTM Standards for Pipes - Stainless Steel and Carbon Steel

A106	- Seamless Carbon Steel Pipe for high temperature service
A179	- Seamless Cold-Drawn Low-Carbon Steel Heat Exchanger and Condenser Tubes
A213	- Seamless Ferritic and Austenitic Alloy - Steel Boiler, Superheater and Heat Exchanger Tubes
A249	- Welded Austenitic Steel Boiler, Superheater, Heat Exchanger and Condenser Tubes
A268	- Seamless and Welded Ferritic and Martensitic Stainless Steel tubing for general service
A269	- Seamless and Welded Austenitic Stainless Steel Tubing for general service
A270	- Seamless and Welded Austenitic Stainless Steel Sanitary Tube
A312	- Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
A333	- Seamless and Welded Steel Pipe for low temperature service
A335	- Seamless Ferritic Alloy Steel Pipe for high temperature service
A358	- Electric Fusion Welded Austenitic Chromium - Nickel Alloy Steel Pipe for high temperature service
A376	- Seamless Austenitic Steel Pipe for high temperature central station service
A409	- Welded Large Diameter Austenitic Steel Pipe for Corrosive or high temperature service
A450	- General Requirements for Carbon, Ferritic Alloy and Austenitic Alloy Steel Tubes
A530	- General Requirements for Specialized Carbon and Alloy Steel Pipe
A554	- Welded Stainless Steel Mechanical Tubing (also decorative tubing)
A669	- Seamless Ferritic and Austenitic Alloy Steel Tubes for Heat Exchangers
A688	- Welded Austenitic Stainless Steel Feedwater Heater Tubes
A731	- Seamless and Welded Ferritic Stainless Steel Pipe
A778	- Welded, un-annealed Austenitic Stainless Steel Tubular Products
A789	- Seamless and Welded Ferritic / Austenitic Stainless Steel Tubing for general service
A790	- Seamless and Welded Ferritic / Austenitic Stainless Steel Pipe
A928	- Ferritic / Austenitic (Duplex) Stainless Steel Pipe Electric Fusion Welded with addition of filler metal
A999	- General Requirements (dimensional tolerances etc.) for Alloy and Stainless Steel Pipe
A1016	- General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel and Stainless Steel Tubes

Dimensional Standards for Pipes

ASME scheduled pipes have 2 common dimensional standards namely:

ASME B36.10	- Welded and Seamless Wrought Steel Pipes	- Sizes: 1/8" - 80"	Schedules: 10 / 20 / 30 / STD / 40 / 60 / XS / 80 / 100 / 120 / 140 / 160 / XXS
ASME B36.19	- Stainless Steel Pipe	- Sizes: 1/8" - 30"	Schedules: 5S / 10S / 40S / 80S

SCH 40S / SCH 40 / STD and SCH 80S / SCH 80 / XS have the same wall thicknesses of 9.53mm and 12.7mm respectively.

ASTM Standards for Fittings - Stainless Steel

A182	- Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for high temperature service
A240	- Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for general applications
A403	- Wrought Austenitic Stainless Steel Pipe Fittings
A774	- As-Welded Wrought Austenitic Stainless Steel Pipe Fittings for General Corrosive Service at low and moderate temperatures
A815	- Wrought Ferritic, Ferritic / Austenitic (Duplex) and Martensitic Stainless Steel Pipe Fittings

ASTM Standards for Pipe & Fittings(cont.)

ASTM Standards for Fittings - Carbon Steel

- A105 - Standard Specification for Carbon Steel Forgings for pipe applications
- A181 - Standard Specification for Carbon Steel Forgings for general purpose piping
- A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel for moderate and high temperature service
- A350 - Standard Specification for Low-Alloy Steel Forgings requiring Notch Toughness testing for Piping components
- A420 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for low temperature service

Dimensional Standards for Fittings

- ASME B16.3 - BSP Cast Fittings
- ASME B16.9 - Butt Weld Fittings
- ASME B16.11 - Forged Fittings, Socket Weld and Threaded
- ASME B16.25 - Butt Weld Ends
- ASME B16.28 - Wrought Steel Butt Weld Short Radius Elbows and Threaded fittings

ASTM Standards for Flanges - Stainless Steel

- A182 - Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for high temperature service
- A240 - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for general applications

ASTM Standards for Flanges - Carbon Steel

- A105 - Standard Specification for Carbon Steel Forgings for Piping applications
- A181 - Standard Specification for Carbon Steel Forgings for general purpose piping
- A266 - Standard Specification for Carbon Steel Forgings for Pressure Vessel components
- A336 - Standard Specification for Alloy Steel Forgings for Pressure and high temperature Parts
- A350 - Standard Specification for Low-Alloy Steel Forgings Requiring Notch Toughness testing for Piping components

Dimensional Standards for Flanges

- ASME B16.5 - Forged Flanges (150 / 300 / 400 / 600 / 900 / 1500 / 2500 LBS - 24" & UNDER)
- ASME B16.47 - Forged Flanges (150 / 300 / 400 / 600 / 900 / 1500 / 2500 LBS - 26" & OVER)
- BS 10 - Plate Flanges (Table D / E / F / H / J)
- EN1092 - 1 (BS 4504) - Forged and Plate Flanges (PN 6 / 10 / 16 / 25 / 40 / 64)
- SANS 1123 - Forged Flanges (PN 600 / 1000 / 1600 / 2500 / 4000 / 6400)
- ASME B16.11 - Forged Fittings

ASTM Standards for Pipe & Fittings(cont.)

EN - European Norms - Inspection Documents

EN10204 - This Standard specifies different types of inspection documents supplied to the purchaser.

EN10204 3.1- Document supplied by the manufacturer in which he declares that the products supplied are in compliance with the requirements of the order and in which he supplies test results.

EN10204 3.2- Document prepared by both the manufacturer's authorized inspection representative, independent of the manufacturing department, and the purchaser's authorized representative in which they declare that the products supplied are in compliance with the requirements of the order and in which test results are supplied.

A182 - Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, Valves and Parts for high temperature service

This Standard covers forged, low alloy and stainless steel piping components for use in pressure systems. Included are flanges, fittings, valves and similar parts to specified dimensions or dimensional specifications. Products must be individually forged as close to finish shape as possible. They may not be machined from bar, except for small cylindrical parts.

Heat treatment: All forgings must be heat treated after forging. Stainless steel shall be solution annealed.

A213 - Seamless Ferritic and Austenitic Alloy Steel Boiler, Superheater and Heat Exchanger Tubes

This Standard covers minimum wall thickness tubes. Sizes and thicknesses usually are 3.2mm inside diameter to 127mm outside diameter and 0.4mm to 12.7mm inclusive in minimum wall thicknesses.

Mechanical properties are not required for tubes smaller than 3.2mm inside diameter or 0.4mm wall thickness.

General Requirements and Ordering Information: Conformance to A1016

Materials and Manufacture: Tubes shall be made by the seamless process and shall be either hot or cold finished as specified.

All tubes shall be finished in the heat treated condition.

ASTM Standards for Pipe & Fittings(cont.)

A240 - Heat Resisting Chromium Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels

This Standard covers Chrome, Chrome Nickel, Chrome Manganese Nickel Stainless Steel Plate, Sheet and Strip for pressure vessel and general applications.

General Requirements for orders under this Standard shall conform to ASTM A480.

A249 - Welded Austenitic Steel Boiler, Superheater, Heat Exchanger and Condensor Tubes

This Standard covers nominal wall thickness tubes and welded tubes made from austenitic steel. Sizes and thicknesses usually are 3.2mm inside diameter to 127mm outside diameter and 0.4mm to 12.7mm inclusive in minimum wall thickness.

Mechanical properties are not required for tubes smaller than 3.2mm inside diameter or 0.4mm wall thickness.

General Requirements and Ordering Information: Conformance to A450

Materials and Manufacture: Tubes shall be made from flat rolled steel by an automatic welding process with no addition of filler metal. Tubes to be finished in a heat treated condition.

A269 - Seamless and Welded Austenitic Stainless Steel Tubing for general service

This Standard covers grades of nominal wall thickness, stainless steel tubing for general corrosion resisting applications and low or high temperature service. Sizes and thicknesses are usually 6.4mm inside diameter and larger, and 0.51mm in nominal wall thicknesses and heavier. Mechanical properties are not required for tubes smaller than 3.2mm inside diameter or 0.38mm in thickness.

General Requirements and Ordering Information: Conformance to A1016

Materials and Manufacture: Tubes shall be made by seamless or welded process. Pipes can be either cold or hot finished. Tubes to be finished in the heat treated condition.

ASTM Standards for Pipe & Fittings(cont.)

ASTM A312 - Seamless and Welded Austenitic Stainless Steel Pipes

This Standard covers both Seamless and Welded Austenitic Stainless Steel Pipe intended for high temperature and general corrosive service.

General requirements and ordering Information: Shall conform to the requirements of A999.

Manufacture: Pipe shall be seamless or welded. If welded, pipe shall be made by the automatic welding process, with no addition of a filler metal in the welding.

Operation:

- Welded pipes smaller and including NPS 14" shall have a single longitudinal weld. Above NPS 14" can be made from plate with two long welds when approved by the purchaser. Testing, examination and inspection to be done on each weld seam.
- Pipes can be either cold or hot finished.
- Pipes must be free from scale and contaminating iron particles. Pickling, blasting or surface finishing is not mandatory when the pipe is bright annealed.
- Pipes to be finished in the heat treated condition.

A358 - Electric Fusion Welded Austenitic Stainless Steel Pipe with addition of filler metal for high temperature service and general applications

Five classes of pipe are covered by the Standard:

Class 1 - Pipe shall be double welded by processes employing filler metal in all passes and shall be completely radiographed.

Class 2 - Pipe shall be double welded by processes employing filler metal in all passes. No radiography is required.

Class 3 - Pipe shall be single welded by processes employing filler metal in all passes and shall be completely radiographed.

Class 4 - Same as Class 3 except that the weld pass exposed to the inside of the pipe surface may be made without the addition of filler metal.

Class 5 - Pipe shall be double welded by processes employing filler metal in all passes and shall be spot radiographed.

General requirements and ordering Information: Conformance to A999.

Materials and Manufacture: Chemical composition and plate shall conform to A240.

Joints shall be full penetration double welded or single welded butt joints employing fusion welding processes as defined by ASME BPVC code Section IX. The crown or cap of weld not to exceed 3mm.

X-Ray to ASME VIII Para UW-51 or UW52, where applicable.

A376 - Seamless Austenitic Steel Pipe for high temperature central station service

This Standard covers seamless austenitic pipe for high temperature central station service. Grades covered as per Table No.1 of the Specifications. No L grades are covered except for 304LN and 316LN. General

Requirements: Material to conform to the requirements of A999. All pipe to be finished in the heat treated condition.

ASTM Standards for Pipe & Fittings(cont.)

A403 - Wrought Stainless Steel Pipe Fittings

This Standard covers wrought stainless steel fittings for pressure piping applications. Several grades of austenitic stainless steel alloys are included. Wrought Products grades are designated with prefix WP. For each WP stainless grade several classes of fittings are covered to indicate whether seamless or welded construction was utilized. Class designations are also utilized to indicate Non Destructive Test method and extent of NDE (Non Destructive Examination). This Standard does not apply to cast fittings.

Ordering Information: Purchaser to specify quantity, description, dimensions, material grade, class designation, construction method (seamless or welded), supplementary or any additional requirements.

The following are suffixes after the grades: S = Seamless (NDE None). W = Welded.

WX = Welded with X-Rays. WU = Welded with Ultrasonic Testing

Manufacture - WP fittings ordered as Class S shall meet the requirements of ASME B16.9, ASME B16.11, MSS SP-79, MSS SP-83, or MSS SP-95. WP fittings ordered as Class W shall meet requirements of ASME B16.9 and all pipe welds with filler metal shall be radiographically tested over the entire length. Grade WP fittings ordered as Class WX shall meet the requirements of ASME B16.9 and shall have all welds radiographically examined to ASME 8 Div UW 51. Fittings machined from bar shall be limited to max NPS 4".

Elbows, bends and tees shall not be machined from bar.

A409 - Welded Large Diameter Austenitic Steel Pipe for corrosive or high temperature service

This Standard covers straight seam or spiral seam electric fusion welded, light wall, austenitic chromium nickel alloy steel pipe for corrosive or high temperature service. The sizes covered are NPS 14" to 30", light schedules e.g. 5s or 10s. All commonly used grades are covered.

General requirements: Materials furnished in accordance with A999.

Materials and Manufacture: Manual or automatic welding. For manual welding the operator and procedure must be qualified to ASME IX. Pipe may be welded with or without filler metal with the automatic process.

A554 - Welded Stainless Steel Mechanical Tubing

This Standard covers welded stainless steel tubing for mechanical applications where aesthetic appearance, mechanical properties, or corrosion resistance is needed.

Grades covered are most of the standard austenitic grades like 304 and 316 as well as ferritic grades 409, 430 and 430Ti.

Manufacture - Tubes to be made from the automatic welding process - no filler metal.

Condition - Tubes to be furnished in one of the following conditions:

Welded, welded and annealed, cold reduced, cold reduced and annealed.

ASTM Standards for Pipe & Fittings(cont.)

A731 - Seamless and Welded Ferritic Stainless Steel Pipe

This Standard covers seamless and welded ferritic stainless steel pipe intended for high temperature and general corrosive service. The grades are commonly known as the straight chromium type and are characterised as being ferromagnetic. High chromium, ferritic alloys are highly sensitive to notch brittleness on slow cooling to ordinary temperatures. This feature should be recognised in its use if this material is in the as welded condition in sections thicker than 6.4mm. Optional supplementary requirements are provided for pipe where a greater degree of testing is desired. These supplementary requirements call for additional tests to be made and, when desired, one or more of these may be specified in the order.

A774 - As Welded Wrought Austenitic Stainless Steel Pipe Fittings for general corrosive service at low and moderate temperatures

This Standard covers five grades of as welded wrought austenitic SS fittings for low pressure piping, low and moderate temperatures and general corrosive service. This Standard covers 3" to 48" in OD and 1.6mm through 12.7mm in wall thickness. This Standard does not cover cast fittings.

Ordering Information: Dimensions and grade

Manufacture: Fittings are made from A240 plate. Joints shall be full penetration welds.

A778 - Welded, un-annealed Austenitic Stainless Steel Tubular Products

This Standard covers welded un-annealed austenitic stainless steel tubular products intended for low and moderate temperatures and corrosive service where heat treatment is not necessary for corrosive resistance.

TP304L / TP316L / TP317L / TP321 and TP347 are the five grades covered by this specification.

Covers sizes from outside diameter 3" (75mm) to 48" (1200mm)

Wall thicknesses between 1.5mm and 12.5mm

Pipe made from coil, plate or sheet by a shielded arc welding process. Tubular products NPS 14" and smaller shall have a single longitudinal weld. Larger may have a maximum of three longitudinal welds. Circumferential welded joints of the same quality as longitudinal joints shall be permitted by agreement between manufacturer and purchaser. Tubular products to be clean and free from scale. Welds shall be made by the manual or automatic electric welding process. Weld crown or cap to be created no more than 1.6mm either side of the tube. The weld is not to be lower than the maximum wall thickness. The weld bead may be by removed with agreement between manufacturer and purchaser. Injurious weld defects shall be repaired by removal to sound metal and rewelding. Welding consumable to match that of the plate material designation. No heat treatment required.

ASTM Standards for Pipe & Fittings(cont.)

A789 - Seamless and Welded Ferritic / Austenitic / Duplex Stainless Steel Tubing for general service

This Standard covers steel tubing requiring general corrosive resistance, with emphasis on resistance to stress corrosion cracking. These steels are susceptible to embrittlement if used for prolonged periods at elevated temperatures.

Ordering Information as follows: quantity, product name, grade, size, length, optional requirements, e.g. product analysis, hydrostatic or non-destructive electric test, test report, specification designation, special requirements. All products to conform to A1016.

Manufacture: Seamless or welded with no filler metal.

A790 - Seamless and Welded Ferritic, Austenitic and Duplex Stainless Steel Pipe

This Standard covers seamless and straight seam welded ferritic and austenitic stainless steel pipe intended for general corrosive service, with particular emphasis on resistance to stress corrosion cracking. These steels are susceptible to embrittlement if used for prolonged periods at elevated temperatures (Duplex grades)

General requirements and ordering Information: Conformance to A999

Materials and Manufacture:

Seamless pipe shall be made by the seamless process which does not involve welding at any stage of production.

Pipes can be either cold or hot finished.

Pipes to be pickled free from scale. Pickling is not mandatory when pipe is bright annealed.

Pipes to be furnished in the heat treated condition.

A815 - Wrought Ferritic, Ferritic / Austenitic and Duplex and Martensitic Stainless Steel Pipe Fittings

This Standard covers wrought stainless steel fittings of wrought ferritic, ferritic / austenitic and martensitic fittings. Grades are designated with prefix WP. For each WP stainless steel grade several classes of fittings are covered to indicate whether seamless or welded construction was utilized. Class designations are also utilized to indicate the Non Destructive Test method and extent of NDE (Non Destructive Examination). This Standard does not apply to cast fittings.

Ordering Information: Purchaser to specify

The following suffixes after the grade:

S = Seamless (NDE None), **W = Welded** (NDE is Radiography or Ultrasonic), **WX = Welded** (NDE is Radiography)

WU = Welded (NDE is Ultrasonic)

ASTM Standards for Pipe & Fittings(cont.)

Quantity, description, dimensions, grade, class designation, construction method (S or W), specification number (including specification year, date of issue), supplementary or additional requirements.

Manufacture - WP fittings ordered as Class S, shall meet the requirements of ASTM A960. Fittings ordered as Class W, shall meet requirements of ASTM A960 and all pipe welds with filler metal shall be radiographically tested over the entire length, radiographic inspection is not required for seam welds from pipe where filler metal is not utilized. Welds may be ultrasonically examined in place of radiography. Grade WP fittings ordered as Class WX shall meet requirements of ASTM A960 and shall have all welds radiographically examined to ASME 8Div UW 51.

Fittings machined from bar shall be limited to max NPS 4". Elbows, bends and tees shall not be machined from bar. All fittings shall be heat treated.

A928 - Ferritic / Austenitic (Duplex) Stainless Steel Pipe Electric Fusion Welded with addition of filler metal

Five classes of pipe covered by this specification:

Class 1 - Pipe shall be double welded by processes employing filler metal in all passes and shall be completely radiographed.

Class 2 - Pipe shall be double welded by processes employing filler metal in all passes. No radiography is required.

Class 3 - Pipe shall be single welded by processes employing filler metal in all passes and shall be completely radiographed.

Class 4 - Same as Class 3 except that the weld pass exposed to the inside of the pipe surface may be made without the addition of filler metal.

Class 5 - Pipe shall be double welded by processes employing filler metal in all passes and shall be spot radiographed.

General requirements and ordering Information: Conformance to A999.

Materials and Manufacture: Chemical composition and plate shall conform to A240. Joints shall be full penetration double welded or single welded butt joints employing fusion welding processes as defined by ASME BPVC code Section IX. X-Ray to ASME VIII Para UW-51.

Circumferential welded joints of the same quality as longitudinal joints shall be permitted by agreement between manufacturer and purchaser.

ASTM Standards for Pipe & Fittings(cont.)

A999 - General Requirements for Alloy and Stainless Steel Pipe

This specification covers a group of general requirements (dimensional tolerances etc.) that, unless otherwise specified in the individual specification, shall apply to all ASTM specifications for pipe already mentioned.

A1016 - General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel

This specification covers a group of general requirements that, unless otherwise specified in the individual specification, shall apply to all ASTM specifications for tube already mentioned.

There are many international Standards Specifications for stainless steel pipe, tube and fittings. The list above is a basic overview of some of these. For more in-depth details on these Specifications or if you cannot find what you are looking for, please contact your nearest Euro Steel office for assistance. You will be referred to our Quality Assurance Department who keeps an extensive library of all these specifications and more.