

## Specifications (Pipe)

### ASTM A312

#### Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe

This specification covers seamless and straight-seam welded austenitic steel pipe intended for high-temperature and general corrosive service.

Note: when the impact test criterion for a low-temperature service would be 20J energy absorption or 15 mils lateral expansion, some of the austenitic stainless steel grades covered by this specification are accepted by certain pressure vessel or piping codes without the necessity of making the actual test. For example, Grades, 304, 304L, and 347 are accepted by the ASME Pressure Vessel Code, Section VIII Division I, and by the Chemical Plant and Refinery Piping Code, ANSI B31.3, for service at temperatures as low as -254°C without qualification by impact tests. Other AISI stainless steel grades are usually accepted for service temperatures as low as -198°C without impact testing. Impact testing may, under certain circumstances, be required. For example, materials with chromium or nickel content outside the AISI ranges, and for material with carbon content exceeding 0.10%, are required to be impact tested under the rules of ASME Section VIII Division I when service temperatures are lower than -46°C.

Grades TP 304H, TP 304N, TP 316, TP 316N, TP 321H, TP 347H and TP 348H are modifications of Grades TP 304, TP 316, TP 321, TP347, and TP 348, and are intended for high temperature service.

Optional supplementary requirements are provided for pipe where the 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.

### ASTM A358

#### Standard Specification for Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High Temperature Service.

This specification covers electric-fusion-welded austenitic chromium-nickel alloy steel pipe suitable for corrosive or-high temperature service, or both. (Although no restrictions are placed on the sizes of pipe which may be furnished under this specification, commercial practice is commonly limited to sizes not less than NPS 8).

**Note:** The dimensionless designator NPS (Nominal Pipe Size) has been substituted in this standard for such traditional terms as "nominal diameter", "size", and "normal size".

This specification covers 19 grades of alloy steel. The selection of the proper alloy and requirements for heat treatment shall be at the discretion of the purchaser, dependent on the service conditions to be encountered.

Five classes of pipe are as follows:

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 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 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.

Supplementary requirements covering provisions ranging from additional testing to formalized procedures for manufacturing practice are provided.

### ASTM A409

#### Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service

This specification covers straight seam electric fusion 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 with extra light (Schedule 5S) and light (Schedule 10S) wall thicknesses. Pipe having other dimensions may be furnished provided such pipe complies with all other requirements or this specification.

Ten grades of alloy steel are covered. Additional special grades may be specified by the purchaser.

Optional supplementary requirements are provided. These call for additional tests to be made, and when desired shall be stated in the order, together with the number of such tests required.

**Note:** The dimensionless designator NPS (Nominal Pipe Size) has been substituted in this standard for such traditional terms as "nominal diameter", "size", and "nominal size".

### ASTM A731

#### Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe

This specification covers seamless and welded ferritic stainless steel pipe and are characterized as being ferromagnetic.

High-chromium, ferritic alloys are highly sensitive to notch brittleness on slow cooling to ordinary temperatures. This feature should be recognized in the use of this material in the as-welded condition in sections thicker than 6.4mm.

Optional supplementary requirements are provided for pipe where 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.

**Note:** The dimensionless designator NPS (Nominal Pipe Size) has been substituted in this standard for such traditional terms as "nominal diameter", "size", and "normal size".

### ASTM A790

#### Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe

This specification covers seamless and straight-seam welded

## Specifications (Pipe cont.)

ferritic/austenitic 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.

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.

This specification lists the dimensions of welded and seamless stainless steel pipe as shown in ANSI B36. 19. Pipe having other dimensions may be furnished provided such pipe complies with all other requirements of this specification.

**Note:** This dimensionless designator NPS (Nominal Pipe Size) has been substituted in this standard for such traditional terms as "nominal diameter", "size", and "nominal size".

### ASTM A530

#### Standard Specification for General Requirements for Specialised Carbon and Alloy Steel Pipe.

This specification covers a group of requirements which, with the exceptions of Sections 3, 5, 6, and 15, are mandatory requirements to be aforementioned ASTM, pipe product specification unless the product specification specifies different requirements, in which case the requirement of the product specification shall prevail.

Sections 3 and 5 are mandatory if the product specification has a requirement for product analysis or flattening tests.

Section 6 is mandatory if the product specification has a hydrostatic test requirement without defining the test parameters.

Section 15 is for information only.

In case of conflict between a requirement of the product specification and a requirement of this general requirement specification only the requirement of the product specification need to be satisfied.

**NOTE 1:** The dimensionless designator NPS (Nominal Pipe Size) has been substituted in this standard for such traditional terms as "nominal diameter", "size", and "nominal size".

**Note2:** All the "Pipe" Specifications mentioned in this Section must conform to this specification.



## Specifications (Buttweld Fittings, Forged Fittings and Flanges)

### ASTM (American Society for Testing and Materials)

For materials and testing information the ANSI standards contain references to ASTM specifications. The following ASTM standards are used for stainless fittings

#### ASTM Specification

A 403

Wrought austenitic stainless steel piping fittings.

#### Specific stipulations

This specification covers classes WP and CR. Class WP fittings are manufactured to the requirements of ANSI B16.9, 16.11 or 16.28. They shall be capable of withstanding a test pressure prescribed in the specifications for the pipe with which the fitting is recommended to be used.

Class CR fittings are manufactured according to MSS SP-43 and shall be capable of withstanding a test pressure based on the ratings in MSS SP-43. Tees fabricated using intersection welds shall be capable of passing a hydrostatic test based on 70% of the ratings in MSS SP-43.

The fittings shall be heat treated before machining.

Fittings ordered as Class WP-5 shall be of seamless construction.

On fittings conforming to class WP-W, all welds made by the fitting manufacturer must be radiographed. Radiography is not required, however, if the fittings are made of welded pipe produced without the addition of filler material.

**Note:** In practice, fittings that are stocked under the designation ASTM A403 WP-W report checked by means of radiography. The quality of the welds is, however, guaranteed to meet the requirements in ASTM A403.

Extra radiography can be performed at the customer's request at extra charge.

Class WP-WX fittings shall have all the welds radiographed either prior to or after forming, whether the welds are made by the fittings are manufactured from welded pipes with or without the addition of filler metal.

Fittings according to class CR do not require radiography.

Hydrostatic testing is not required.

Each fitting shall be marked with the manufacturer's name or trade-mark, the schedule number of pressure rating, steel grade, class and size. A certificate of compliance to the specification shall be the basis of approval.

#### Specific stipulations

This standard covers tube fittings manufactured according to ANSI B16.5, a dimensional, standard for flanges and flanged fittings, and ANSI B16.11, which covers forged socket welding and threaded fittings.

The material shall be forged as close as practicable to the specified shape and size. Forged and rolled bar may be used for small cylindrically shaped parts.

All austenitic forgings shall be furnished in the heat treated condition. The heat treatment may be performed before machining.

Identification marks consisting of the manufacturer's symbol or name, designation of service rating, specification number, steel grade and size shall be stamped on each forging. The marking confirms that the forging has been delivered in accordance with the specification.

#### ASTM Specification

A 182

Forged and rolled alloy-steel pipe flanges, forged fittings, Valves and parts for high-temperature service.