

### CHEMICAL REQUIREMENTS (%)

| ELEMENT         | GRADE F304      | GRADE F304L     | GRADE F316      | GRADE F316L     |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| UNS DESIGNATION | S30400          | S30403          | S31600          | S31603          |
| Carbon (C)      | 0.08% max       | 0.030% max      | 0.08% max       | 0.030% max      |
| Chromium (Cr)   | 18.00% – 20.00% | 18.00% – 20.00% | 16.00% – 18.00% | 16.00% – 18.00% |
| Nickel (Ni)     | 8.00% – 11.00%  | 8.00% – 12.00%  | 10.00% – 14.00% | 10.00% – 14.00% |
| Molybdenum (Mo) | —               | —               | 2.00% – 3.00%   | 2.00% – 3.00%   |
| Manganese (Mn)  | 2.00% max       | 2.00% max       | 2.00% max       | 2.00% max       |
| Silicon (Si)    | 1.00% max       | 1.00% max       | 1.00% max       | 1.00% max       |
| Phosphorus (P)  | 0.045% max      | 0.045% max      | 0.045% max      | 0.045% max      |
| Sulfur (S)      | 0.030% max      | 0.030% max      | 0.030% max      | 0.030% max      |
| Nitrogen (N)    | 0.10% max       | 0.10% max       | 0.10% max       | 0.10% max       |

### MECHANICAL REQUIREMENTS

| PROPERTY                          | GRADE F304       | GRADE F304L      | GRADE F316       | GRADE F316L      |
|-----------------------------------|------------------|------------------|------------------|------------------|
| Tensile Strength (Min)            | 515 MPa (75 ksi) | 485 MPa (70 ksi) | 515 MPa (75 ksi) | 485 MPa (70 ksi) |
| Yield Strength (0.2% Offset, Min) | 205 MPa (30 ksi) | 170 MPa (25 ksi) | 205 MPa (30 ksi) | 170 MPa (25 ksi) |
| Elongation in 2 in. (50 mm, Min)  | 30%              | 30%              | 30%              | 30%              |
| Reduction of Area (Min)           | 50%              | 50%              | 50%              | 50%              |
| Brinell Hardness (HBW, Max)       | 201 HBW          | 201 HBW          | 201 HBW          | 201 HBW          |

#### SCOPE

This standard covers forged or rolled stainless steel piping components (flanges, forged fittings, valves, and parts) for high-temperature and corrosive service in pressure systems. Flanges are ordered either to dimensions specified by the purchaser or to dimensional specifications such as ASME B16.5 and ASME B16.47.

#### MATERIALS

Alloy Piping Products flanges are made by hammering, pressing, rolling, and/or machining cast or forged bars, billets, or slabs. These adhere to the extent described in the following sections and conform to the chemical and mechanical property requirements for austenitic stainless steel grades F304, F304L, F316, and F316L.

#### MANUFACTURE

ASTM A182 covers the requirements for forged or rolled stainless steel components as finished products. Material shall be hot-worked and forged as close as practicable to the specified shape and size to ensure grain structure refinement throughout the section. The requirements for raw materials are covered by the standards specified in Section 2 (Referenced Documents) of ASTM A182 and ASTM A961.

#### HEAT TREATMENT

Heat treatment is a mandatory requirement for all austenitic stainless steel grades under ASTM A182:

- Components shall be furnished in the solution-annealed condition.
- Material shall be heated to a minimum temperature of 1900°F (1040°C) and rapidly cooled by liquid quenching or forced air to below 500°F (260°C) to prevent chromium carbide precipitation and preserve maximum corrosion resistance.

#### DIMENSIONS

Alloy Piping Products flanges are manufactured in accordance with ASME B16.5 (24" NPS and smaller) and ASME B16.47 (26" NPS and larger), or to custom dimensional requirements specified by the purchaser.

#### CERTIFICATION

For forgings made to specified dimensions agreed upon by the purchaser, and for forgings made to dimensional standards, the application of identification marks, as required by ASTM A 961, shall be the certification that the forgings have been furnished in accordance with the requirements of this standard. The specification designation included on test reports shall include the year of issue and revision letter, if any.

**TEST REPORTS:** When test reports are required, Alloy Piping Products will also provide the following, if applicable:

- Type of heat treatment;
- Tensile property results, i.e., yield strength and ultimate strength in ksi, elongation and reduction in area, in percent;
- Chemical analysis results;
- Hardness results;
- Any supplementary testing required by the purchase order.

#### PRODUCT MARKING

All flanges shall have the prescribed information stamped or otherwise suitable marked on each flange in accordance with the Standard/MSS SP-25. Alloy Piping Products flanges are marked as follows:

APP Name • A182/SA182 • Heat Identification Number • Nominal Pipe Size  
• Pressure Class • ASTM Specification