

# ASTM A182 F9 specification

**ASTM A182 / A182M** – Standard Specification for **Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, Valves, and Parts for High-Temperature Service**

## Grade: F9

- **Material Type:** Alloy Steel
- **Designation:** 9Cr-1Mo (Chromium-Molybdenum steel)
- **Common Applications:** High-temperature and high-pressure systems in:
  - Power generation (boiler and steam piping)
  - Oil & gas refineries
  - Petrochemical plants
  - Superheater and reheater piping

- **Chemical Requirements** *max,%*

Elements	A182 F9
Carbon	0.150
Manganese	0.30-0.60
Phosphorus	0.030
Sulfur	0.030
Silicon	0.50-1.00
Nickel	...
Chromium	8.0-10.0
Molybdenum	0.90-1.10

- **Tensile and Hardness Requirements**

Grade	A 182 F9
Tensile Strength,min, ksi [Mpa]	85[585]
Yield Strength, min,ksi [MPa]	55[380]
Elongation in 2 in.[50 mm] or 4D,min, %	20
Reduction of Area, min, %	40
Brinell Hardness	179-217

## Heat Treatment Requirements

All ASTM A182 F9 components **must be heat treated after final forging**:

Typical temperature ranges:

Annealed

Normalized and Tempered (N+T)

- **Normalizing:** 900 – 950° C
- **Tempering:** 650 – 750° C
- **Annealing:** 800 – 850° C

## Testing Requirements

Test Type	Requirement
Chemical Analysis	Required per heat
Tensile Test	Required per heat (ASME SA182)
Hardness Test	NACE MR0175 compliance
NDT (Optional)	UT, MT, or PT as specified
Visual Inspection	Mandatory

## Marking Requirements

Each forging must be marked with:

- ASTM A182
- Grade (F9)
- Size and rating
- Heat number
- Manufacturer's identification

ASTM A182 Grade F9 covers forged or rolled alloy-steel components intended for high-temperature service, such as:

- Flanges
- Forged fittings

## ASTM A182 F9 Product Forms Covered

Product Type	Description
Pipe Flanges	WN, SO, BL, SW, TH, LWN, Orifice, Lap Joint, etc.
Forged Fittings	Socket weld/elbow/tees/reducers, etc.

## Material Specification

- ASTM A182 / A182M – Base forging specification
- ASME SA182 – Boiler and Pressure Vessel Code equivalent

## Dimensional Standards

- ASME B16.5 – Flanges: NPS ½" to 24"
- ASME B16.47 Series A & B – Flanges: NPS 26" to 60"
- MSS-SP-44 – Steel flanges for pipelines
- ASME B16.11 – Forged fittings