

## A-286 Stainless Steel, UNS S66286, WNR 1.4944, ALLOY A-286, Grade A-286, AISI 660

### Introduction :

Alloy A286 is an iron based superalloy which is used for applications that requires corrosion resistance up to 1300°F and high strength. It is an iron based heat and corrosion resistant austenitic material due to which, it can be age hardened to a high strength level. This alloy is helpful for low temperature applications wherever ductile is needed, non-magnetic high strength material at temperature starting from above room temperature down to at least -320°F. In aqueous solutions this alloy may be used for moderate corrosion application. To some of the austenitic stainless steel WNR 1.4944 content is similar in nickel, chromium and molybdenum. Compared to that of the austenitic stainless steels, A286 material possesses a level of aqueous corrosion resistance. The level of corrosion resistance to atmospheres like those encountered in jet engine applications is excellent to a minimum of 1300°F, in elevated temperature service.

### Chemical Composition

	A-286 Stainless Steel	WNR 1.4944	UNS S66286	ALLOY A-286	GRADE A-286	AISI 660
Carbon	0.080max	0.080max	0.080max	0.080max	0.080max	0.080max
Manganese	2.00max	2.00max	2.00max	2.00max	2.00max	2.00max
Silicon	1.00max	1.00max	1.00max	1.00max	1.00max	1.00max
Chromium	13.50-16.0	13.50-16.0	13.50-16.0	13.50-16.0	13.50-16.0	13.50-16.0
Nickel	24.0-27.0	24.0-27.0	24.0-27.0	24.0-27.0	24.0-27.0	24.0-27.0
Titanium	1.90-2.35	1.90-2.35	1.90-2.35	1.90-2.35	1.90-2.35	1.90-2.35
Molybdenum	1.00-1.50	1.00-1.50	1.00-1.50	1.00-1.50	1.00-1.50	1.00-1.50
Vanadium	0.10-0.50	0.10-0.50	0.10-0.50	0.10-0.50	0.10-0.50	0.10-0.50
Boron	0.003-0.010	0.003-0.010	0.003-0.010	0.003-0.010	0.003-0.010	0.003-0.010
Cobalt	1.00max	1.00max	1.00max	1.00max	1.00max	1.00max
Aluminum	0.35max	0.35max	0.35max	0.35max	0.35max	0.35max
Phosphorus	0.02max	0.02max	0.02max	0.02max	0.02max	0.02max
Sulfur	0.025max	0.025max	0.025max	0.025max	0.025max	0.025max
Iron	Bal	Bal	Bal	Bal	Bal	Bal

### Mechanical Properties

	A-286 Stainless Steel	WNR 1.4944	UNS S66286	ALLOY A-286	GRADE A-286	AISI 660
Tensile Strength, Mpa[psi]	620 (90000)	620 (90000)	620 (90000)	620 (90000)	620 (90000)	620 (90000)
Yield Strength, Mpa[ksi]	275 (40000)	275 (40000)	275 (40000)	275 (40000)	275 (40000)	275 (40000)
Elongation %	40	40	40	40	40	40

### Standard Available in forms :

- ASTM A182/ ASME SA182 Stainless Steel Pipe Fittings
- ASTM A213 / ASME SA213 Seamless Stainless Steel Pipes
- ASTM A240/ ASME SA240 Stainless Steels Sheets / Plates
- ASTM A249/ ASME SA249 Stainless Steel Welded Tubes
- ASTM A269/ ASME SA269 Stainless Steel Tubes
- ASTM A270/ ASME SA270 Stainless Steel Sanitary Tubes
- ASTM A312/ ASME SA312 Stainless Steel Pipes
- ASTM A403/ ASME SA403 Stainless Steel Pipe Fittings
- ASTM A554/ ASME SA554 Stainless Steel Welded Tubes
- ASTM A731/ ASME SA731 Stainless Steel Pipes
- ASTM A789/ ASME SA789 Stainless Steel Tubes
- ASTM A790/ ASME SA790 Stainless Steel Pipes
- ASTM A791/ ASME SA791 Stainless Steel Tubes

### Products Available in forms :

- A-286 Stainless Steel , UNS S66286, WNR 1.4944 Plates
- A-286 Stainless Steel , UNS S66286, WNR 1.4944 Pipes
- A-286 Stainless Steel , UNS S66286, WNR 1.4944 Round Bar
- A-286 Stainless Steel , UNS S66286, WNR 1.4944 Tube
- A-286 Stainless Steel , UNS S66286, WNR 1.4944 Flanges
- A-286 Stainless Steel , UNS S66286, WNR 1.4944 Wire
- A-286 Stainless Steel , UNS S66286, WNR 1.4944 Fittings

## Fabrication and Heat Treatment

### Cold Working

- Super alloy A-286 is capable of being readily cold worked and a solution anneal heat treatment is recommended when this alloy is work hardened due to severe cold forming.
- This solution anneal heat treatment will thus enable softening of super alloy A-286.

### Welding

- Welding methods used for stainless steels are also recommended for super alloy A-286.
- The area to be welded should be clean.
- Post welding heat treatment or preheating is not recommended for this alloy.
- Better welding results can be obtained when this alloy is solution annealed.

### Forging

- Heavy forging and light forging are suitable for super alloy A-286.
- Heavy forging is carried out between 1010-1204°C [1850-2200°F] and light forging between 871-1010°C [1600-1850°F].

### Forming

- Conventional forming methods are used to readily hot or cold form super alloy A-286.

### Machinability

- Conventional machining techniques are used to readily machine super alloy A-286.
- This machining process involves turning, drilling and milling.
- In the turning operations, the usage of cemented carbide tools is recommended for high cutting rates.

## Aging

- Super alloy A-286 is first solution heat treated at 982°C [1800°F] before the aging process. Aging takes place for 16 h at 718°C [1325°F] after which this alloy is cooled in air.

## Hardening

- Super alloy A-286 is hardened by the cold working process and is also capable of being age hardened due to the presence of titanium in this alloy.

## Heat Treatment

- Super alloy A-286 is solution annealed at 982°C [1800°F], oil quenched, held for 16 h at 718°C [1325°F] and finally cooled in air. This heat treatment improves the strength of super alloy A-286.

## Applications

- Super alloy A-286 is used in gas turbine forgings, fasteners, superchargers, cryogenic equipment, missile components, corrosive deep well hardware and jet engines.



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