SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321, ASTM 321, Grade 321, AFNOR Z 6 CNT 18-10

Introduction :

To provide improved high-temperature strength, grade 321H is a modification of 321 with higher carbon content. 321 it is not recommended as a welding consumable because of its limitation with titanium does not transfer well across a high-temperature arc. In this case grade 347 is most well-liked - the niobium performs a similar carbide stabilization task however can be transferred across a welding arc. Therefore Grade 347 is the standard consumable for welding 321. As parent plate material Grade 347 is only occasionally used. 321 and 347 have excellent forming and welding characteristics like other austenitic grades, it is readily brake or roll-formed and have outstanding welding characteristics. Post-weld annealing is not required. It has excellent toughness, even down to cryogenic temperatures. Grade 321 is not recommended for decorative applications because it does not polish well. If the need is just for resistance to intergranular corrosion after welding. Grade 304L is more readily available in most product forms, and so it is usually used in preference to 321. However, 304L has lower hot strength than 321 and then isn't the simplest alternative is the necessity is resistance to an operating environment over about 500 °C.

Chemical Composition

	SS 321	TYPE 321	WNR 1.4541	UNS S32100	AISI 321	ASTM 321	GRADE 321	AFNOR Z 6 CNT 18-10
Carbon	0.08 max	0.08 max	0.08 max	0.08 max	0.08 max	0.08 max	0.08 max	0.08 max
Manganese	2.00 max	2.00 max	2.00 max	2.00 max	2.00 max	2.00 max	2.00 max	2.00 max
Phosphorus	0.045 max	0.045 max	0.045 max	0.045 max	0.045 max	0.045 max	0.045 max	0.045 max
Sulfur	0.030 max	0.030 max	0.030 max	0.030 max	0.030 max	0.030 max	0.030 max	0.030 max
Silicon	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max
Chromium	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0
Nickel	9.0-12.0	9.0-12.0	9.0-12.0	9.0-12.0	9.0-12.0	9.0-12.0	9.0-12.0	9.0-12.0
Titanium	5X (C+N) 0.70	5X (C+N) 0.70	5X (C+N) 0.70	5X (C+N) 0.70	5X (C+N) 0.70	5X (C+N) 0.70	5X (C+N) 0.70	5X (C+N) 0.70

Mechanical Properties

	SS 321	TYPE 321	WNR 1.4541	UNS S32100	AISI 321	ASTM 321	GRADE 321	AFNOR Z 6 CNT 18-10
Tensile Strength, ksi [Mpa]	85[585]	85[585]	85[585]	85[585]	85[585]	85[585]	85[585]	85[585]
Yield Strength, ksi	35[240]	35[240]	35[240]	35[240]	35[240]	35[240]	35[240]	35[240]
Elongation %	45	45	45	45	45	45	45	45
Reduction in Area, %	55	55	55	55	55	55	55	55
Hardness, HB	150	150	150	150	150	150	150	150

Standard Available in forms :

- ASTM A182/ ASME SA182 Stainlees 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 :

- SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321 Plates
- SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321 Pipes
- SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321 Round Bar
- SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321 Tube
- SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321 Flanges
- SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321 Wire
- SS 321, Type 321, WNR 1.4541, UNS S32100, AISI 321 Fittings

Corrosion Resistance

- Equivalent to Grade 304 in the annealed condition, and superior if a weldment in these grades has not been post-weld annealed or if the application involves service in the 425-900°C range.
- Subject to pitting and crevice corrosion in warm chloride environments, and to stress corrosion cracking above about 60°C.
- Considered resistant to potable water with up to about 200mg/L chlorides at ambient temperatures, reducing to about 150mg/L at 60°C.

Heat Resistance

- Good oxidation resistance in intermittent service to 900°C and in continuous service to 925°C.
- These grades perform well in the 425-900°C range, and particularly where subsequent aqueous corrosive conditions are present.
- 321H has higher hot strength, and is particularly suitable for high temperature structural applications.

Heat Treatment

- Solution Treatment (Annealing) - heat to 950-1120°C and cool rapidly for maximum corrosion resistance.
- Stabilising - heat to 870-900°C for 1 hour per 25mm of thickness and air cool. Stabilisation is recommended for most severe service conditions (above 425°C) and particularly for material annealed at the upper side of the annealing temperature range.
- Stress Relief - Heat to 700°C for 1 to 2 hours and air cool.
- These grades cannot be hardened by thermal treatment.

Welding

- Excellent weldability by all standard fusion methods, both with and without filler metals.
- AS 1554.6 pre-qualifies welding of 321 and 347 with Grade 347 rods or electrodes; high silicon version of 347 is also pre-qualified for welding of 321.

Applications

Typical applications include:

- Aircraft exhaust manifolds
- Expansion joints
- Bellows
- Furnace parts
- Heating element tubing
- Heat Exchangers
- Woven or welded screens for high temperature mineral processing
- Spiral Welded tube for burner pipes and flues

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