

**AVAILABILITY**

Seamless Pipe 1/2"-16"  
Weld Pipe 6"-12"  
Butt-Weld Flanges 1/2"-8"  
Flanges 1/2"-8"  
Bar 1"-12"

**SPECIFICATIONS**

ASTM A312, A403, A182,  
A479, A276  
ASME SA312, SA403, SA182,  
SA479, SA276

**CHEMICAL COMPOSITION %**

C	Cr	Mn	Ni	P	S	Si	Ti
Max		Max		Max	Max	Max	
0.08	17.0-20.0	2.0	9.0-13.0	0.04	0.30	0.75	Trace*

\* The titanium content shall not be less than 5 times the carbon content and not more than 0.06%

Note: 321H requires the titanium content to be not less than 4 times the carbon content and not more than 0.06%

**DESCRIPTION**

These titanium bearing stainless steels are stabilized against carbide precipitation and designed for operation within the damaging temperature range where carbide precipitation develops. In this type of steel, the carbon combines preferentially with titanium to form a harmless titanium carbide, leaving the chromium in solution to maintain full corrosion resistance.

Type 321 is basic type 304 modified by adding titanium in an amount at least 5 times the carbon plus nitrogen contents.

**DESIGN FEATURES**

- Immune to intergranular corrosion when heated within the carbide precipitation range.
- Titanium addition eliminates the formation of chromium carbides at the grain boundaries by tying up the carbon and nitrogen as titanium carbides or nitrides.
- Better high temperature properties than 304 or 304L. Generally used for parts which are intermittently heated up to 1500° F. For continuous service the alloy is good to 1650° F.

- May be susceptible to chloride stress cracking.
- Excellent weldability in field.
- Type 321H has high carbon (.04-.10) for better high temperature creep properties.

**TYPICAL APPLICATIONS**

High temperature chemical process heat exchanger tubes  
Refineries  
High temperature steam service

**TENSILE REQUIREMENTS**

Tensile Strength (KSI)	Yield Strength (KSI)
75	30

KSI can be converted to MPA (Megapascals) by multiplying by 6.895

**James Duva Inc. stocks 321 with high carbon to meet 321/321H specifications**