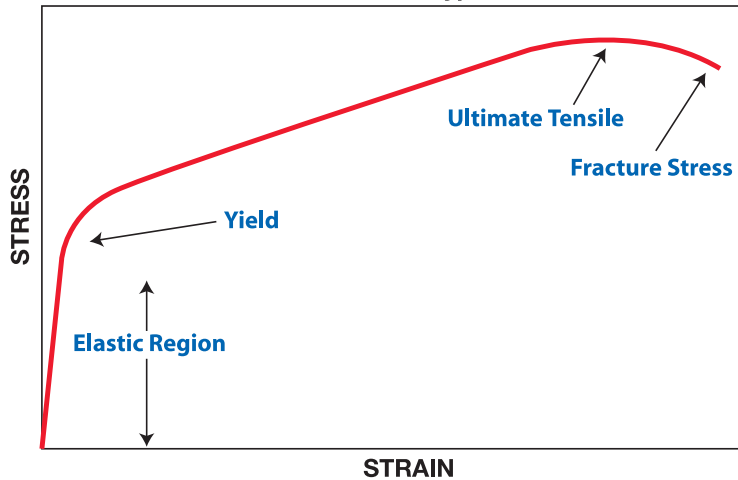


Stress - Strain Curve for Typical Tensile Test



## Definitions

**Breaking Strength/Tensile Strength** - The strength of a material when subjected to a stretching (tensile) force usually measured by placing a standard test piece in the jaws of a tensile machine, gradually separating the jaws, and measuring the force necessary to break the test piece. (This strength is expressed as pounds per square inch or PSI.)

**Clamping Force** - (Also, Retained Force) The amount of force applied to an object by an installed clamp or tie. The clamping force maintains the assembly integrity and hardware placement.

**Cold Flow Properties of Flexible Hose Materials** - The continued deformation or movement of hose wall material as a result of clamp tension.

**Corrosion Resistance** - The ability of a material to withstand degradation in specific environments.

**Decorative Coating** - A coating for matching pre-existing hardware or decorative traffic poles. These coatings are often an applied and baked, powder polyester finish.

**Elongation** - The amount of stretch that occurs prior to the band/clamp material breaking. This is typically expressed as a percentage of original length and is a measure of the ductility of the metal.

**Loop Tensile Strength** - The max amount of force, applied radially, an installed clamp/tie will withstand prior to failure.

**Nylon 11** - Non-toxic polymer cable tie coating resistant to stress cracking, abrasion, impact, salt spray and typical airborne pollutants. When subjected to fire, this coating is halogen-free and produces low amounts of smoke.

**Powder Polyester** - A coating available in colors applied to products and baked on for a durable finish. Polyester coatings are resistant to fading, stress cracking, abrasion, impact, salt spray and typical airborne pollutants.

**PPA** - (Performance Polymer Alloy) Non-toxic polymer coating for rolled band resistant to stress cracking, abrasion, impact, salt spray and typical airborne pollutants. When subject to fire, this coating is halogen free and produces low amounts of smoke.

**Production Tool** - Power tools to install band clamps and tie products consistently.

**Ultimate Strength** - The maximum tensile or clamping force that a band clamp or tie will withstand prior to breaking.

**Yield Strength** - The point at which the material begins to stretch as a result of stress being applied. Loading beyond this point will result in deformation.

## Abbreviations

cm- Centimeter

GCS - Galvanized Carbon Steel

ID - Inside Diameter

Kg - Kilogram

Lb - Pound

M - Meter

mm- Millimeter

NPSC - National Pipe Straight Coupling

NPSM - American Standard Straight

Pipe Thread for Mechanical Joints

NPT - National Pipe Thread

OD - Outside Diameter

SS - Stainless Steel

UIC - Uniform Industrial Code

# Metals Data

AISI TYPE NUMBER OR NAME	200/300	201	201 1/4 Hard	301	304	316
<b>SPECIFICATION</b> UNS Designation	-	S20100	S20100	S30100	S30400	S31600
ASTM	-	A-666	A-666	A-666	A-666	A-666
<b>Principal Alloying Elements, %</b>	-	C 0.15 Max.	C 0.03 Max.	C 0.15 Max.	C 0.08 Max.	C 0.08 Max.
	-	Mn 5.50 - 7.50	Mn 5.50 - 7.50	Mn 2.00 Max.	Mn 2.00 Max.	Mn 2.00 Max.
	-	Si .75 Max.	Si 1.00 Max.	Si 1.00 Max.	Si 1.00 Max.	Si .75 Max.
	-	Cr 16.00 -18.00	Cr 16.00 -18.00	Cr 16.00 -18.00	Cr 18.00 -20.00	Cr 16.00 -18.00
	-	Ni 3.50 - 5.50	Ni 3.50 - 5.50	Ni 6.00 - 8.00	Ni 8.00 - 10.50	Ni 10.00 -14.00
	-	N 0.25 Max	N 0.25 Max			Mo 2.00 - 3.00
<b>PHYSICAL PROPERTIES</b>						
Density, Lb/Cu. In.	0.28	0.28	0.28	0.29	0.29	0.29
Mod. of Elasticity in Tension x 10 <sup>6</sup> PSI	28.0	28.6	28.6	28.0	29.0	28.0
Structure	Austenitic	Austenitic	Austenitic	Austenitic	Austenitic	Austenitic
Mean Coefficient of Thermal Expansion per °F. x 10 <sup>6</sup>	32 - 212°F: 9.0 32 - 600°F: 9.70 32 - 1000°F: 10.20 32 - 1200°F: 10.40	8.7 9.70 10.20 10.50	9.0 10.00 10.50 -	9.4 9.50 10.10 10.40	9.4 9.6 10.20 10.40	8.9 9.00 9.70 10.30
Melting Range	2550 - 2650°F	2550 - 2650°F	2550 - 2650°F	2550 - 2590°F	2550 - 2590°F	2540 - 2630°F
<b>ELECTRICAL PROPERTIES</b>	Non-Magnetic	Non-Magnetic	Non-Magnetic	Non-Magnetic	Non-Magnetic	Non-Magnetic
Magnetic Permeability, Annealed	μ = 1.02	μ = 1.02	μ = 1.02	μ = 1.02	μ = 1.008	μ = 1.008
Elec. Resistivity, Microhm-cm, 70°F	70.00	69.00	69.00	72.00	70.00	74.00
<b>MECHANICAL PROPERTIES</b>						
Rockwell Hardness	70 - 95R <sub>B</sub>	90 - 95R <sub>B</sub>	20 - 30R <sub>C</sub>	75 - 95R <sub>B</sub>	70 - 90R <sub>B</sub>	70 - 85 <sub>B</sub>
Ultimate Tensile Strength, BAND-IT Min. Spec. (PSI), Typical (PSI)	75,000 80,000	100,000 115,000	120,000 135,000	100,000 105,000	75,000 80,000	80,000 90,000
Yield Strength, BAND-IT Min. Spec. (PSI) Typical (PSI)	30,000 45,000	45,000 60,000	85,000 90,000	45,000 55,000	30,000 45,000	35,000 50,000
% of Elongation in 2 inches, BAND-IT Min. Spec., Typical (%)	30 45	40 55	40 45	40 50	30 45	35 45
Tensile Strength at Elevated Temps., Short Time Tests, (PSI)	1300°F: 36,000 1500°F: 22,000 1700°F: 11,000	37,500 23,000 11,000	37,500 23,000 11,000	35,500 22,500 11,000	36,000 22,000 13,500	48,000 28,000 18,000
<b>CORROSION RESISTANCE</b>						
Mild Atmospheric and Fresh Water	Good	Good	Good	Good	Very Good	Excellent
Industrial Atmosphere	Good	Good	Good	Good	Very Good	Very Good
Marine Atmosphere	Fair	Fair	Fair	Fair	Good	Very Good
Salt Water	No	No	No	No	No	Good
Mild Chemical	Fair	Fair	Fair	Fair	Good	Good
Oxidizing Chemical	Fair	Fair	Fair	Fair	Good	Good
Reducing Chemical	No	No	No	No	No	Good
<b>USE</b>	General  BAND-IT®	Municipal, Strapping, Construction  Municipal, Construction, Automotive  Center Punch Clamps, Jr.® Smooth ID Clamps, Band, Buckle, BAND-FAST™, Tie Strips, Band-Lok® Tie 1/4" Ultra-Lok® Ties	Construction, Automotive, Municipal  Ultra-Lok® Band and Clamps	Construction, Automotive  Scru-Seal Housing & Base, Worm Gear, Clamps, Buckles	Chemical, Food, Dairy, Hospitals, Electrical Power Transmission  304 Strap, Tie-Dex® Band, Tie-Lok® Ties, Ball-Lok Ties, Self-Lok Ties,	Marine, Chemical, Food, Petroleum, Paper, Textile, Medical  Multi-Lok, Tie-Lok®, Ball-Lok, Self-Lok® Ties, Junior® SID Clamps, Nipples, Tri-Lokts®, 316 Band/Buckle, All Purpose Band, Easy Read

All values in table are reference only.



# Metals Data

AIISI TYPE NUMBER OR NAME	317L 1/4 Hard	409	430	Monel® 400	Inconel® 625	AL6XN®	Titanium GR1	GCS	
<b>SPECIFICATION</b> UNS Designation	S31703	S40900	S43000	N04400	N06625	N08367	R50250	-	
ASTM	A-240	A-240	A-240	B127	B443	B688	B265	-	
<b>Principal Alloying Elements, %</b>	C 0.030 Max. Mn 2.00 Max. Si .75 Max. Cr 18.00 - 20.00 Ni 11.00 - 15.00 P 0.045 Max. S 0.03 Max. Mo 3.00-4.00	C 0.08 Max. Mn 1.00 Max. Si 1.00 Max. Cr 10.50 - 11.75 Ni 0.050 P 0.045 Max. S 0.03 Max.	C 0.12 Max. Mn 1.00 Max. Si 1.00 Max. Cr 16.00 -18.00 P 0.04 Max. S 0.03 Max.	C .3 Max. Mn 2.0 Max. Si 0.50 Max. Ni 63.00 -70.00 Cu 28-34 Fe 2.5 Max S 0.024 Max.	C 0.10 Max. Mn .5 Max. Cr 20.0-23.0 Ni Balance Mo 8.0 - 10.0 Ti 0.4 Max. Fe 2.5 Max. Al 0.4 Max.	C .030 Max. N 2.0 Max. P .040 Max. S .030 Max. Si 1.0 Max. Ni 23.5 - 25.5 Cr 20.0 - 22.0 Mo 6.0 -7.0 Cu .75 Max. N .18 -.25	C 0.08 Max. N 0.03 Max. H 0.015 Max. O 0.18 Max. Fe 0.2 Max. Ti Balance		
<b>PHYSICAL PROPERTIES</b>									
Density, Lb/Cu. In.	0.29	0.28	0.278	0.319	0.305	0.291	0.163	0.283	
Mod. of Elasticity in Tension x 10 <sup>4</sup> PSI	29.0	30.2	29.0	26.0	30.0	28.3	15.0	30.0	
Structure	Austenitic	Ferritic	Ferritic	-	-	Austenitic	Alpha	Ferritic	
Mean Coefficient of Thermal Expansion per °F. x 10 <sup>-6</sup>	32 - 212°F: 8.9 32 - 600°F: 9.0 32 - 1000°F: 9.70 32 - 1200°F: 10.30	5.8 6.12 6.60 6.86	5.8 6.10 6.30 6.60	7.7 8.80 9.10 9.30	7.4 - - -	8.5 8.8 9.1 9.5	4.6 5.30 5.50 5.70	6.3 7.30 7.90 8.20	
Melting Range	2500 - 2550°F	2500 - 2550°F	2500 - 2550°F	2500 - 2550°F	2500 - 2550°F	2500 - 2550°F	2500 - 2550°F	-	
<b>ELECTRICAL PROPERTIES</b>	Non-Magnetic	-	Magnetic	-	Non-Magnetic	-	Non-Magnetic	Magnetic	
Magnetic Permeability, Annealed	μ = 1.008	-	μ = 600-1100	-	μ = 1.006	μ = 1.0028	μ = 1.00005	1500-2000	
Elec. Resistivity, Microhm-cm, 70°F	74.00	60.00	60.00	5.10	12.90	89.0	4.20	17.20	
<b>MECHANICAL PROPERTIES</b>									
Rockwell Hardness	70 - 85R <sub>B</sub>	88R <sub>B</sub> Max	75 - 90R <sub>B</sub>	60 - 80R <sub>B</sub>	88 - 94R <sub>B</sub>	80 - 95R <sub>B</sub>	64 - 70R <sub>B</sub>	80 - 95R <sub>B</sub>	
Ultimate, Tensile Strength	115,000	55,000	55,000	70,000	120,000	95,000	-	84,000	
BAND-IT Min. Spec. (PSI), Typical (PSI)	120,000	68,000	75,000	75,000	130,000	110,000	46,000	90,000	
Yield Strength,	75,000	25,000	40,000	32,000	60,000	45,000	25,000	80,000	
BAND-IT® Min. Spec. (PSI), Typical (PSI)	80,000	35,000	55,000	40,000	75,000	55,000	31,000	85,000	
% of Elongation in 2 inches,	10	20	20	30	30	30	24	5	
BAND-IT® Min. Spec., Typical (%)	15	33	25	40	40	45	30	8	
Tensile Strength at Elevated Temps., Short Time Tests, (PSI)	1300°F: 48,000 1500°F: 28,000 1700°F: 18,000	5,000 1,500 -	15,000 8,000 5,000	- - -	- - -	- - -	- - -	- - -	
<b>CORROSION RESISTANCE</b>									
Mild Atmospheric and Fresh Water	Excellent	Good	Good	Good	Good	Good	Good	Good/Fair	
Industrial Atmosphere	Very Good	Good	Good	Good	Good	Good	Good	Fair	
Marine Atmosphere	Very Good	Poor	Poor	Excellent	Excellent	Excellent	Good	Poor	
Salt Water	Good	No	No	Excellent	Excellent	Excellent	Good	No	
Mild Chemical	Very Good	Fair	Fair	Good	Good	Good	Good	No	
Oxidizing Chemical	Good	Fair	Fair	Good	Good	Good	*	No	
Reducing Chemical	Good	Good	No	Good	Good	Good		No	
<b>USE</b>	General  BAND-IT®	Auto Agriculture  Special	Interior Architecture, Automotive Trim  Automotive, Universal Clamp	Electronics, Marine, Chemical, Petroleum  Band/Buckle	Chemical, Nuclear, Aerospace, Marine  Band/Buckle, Preformed Clamps	Chemical, Nuclear, Aerospace, Marine  Special	Corrosive Service Good for Machinery Weldable  Band/Buckle	Indoor, Mild Atmosphere  Band/Buckle Preformed Clamps	

All values in table are reference only.