

## Special Interest Articles:

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1106 Kansas Street, Memphis Tennessee  
Phone: (270) 331-0578  
Fax: (901) 774-1308

## How to Measure Tensile Strength, Elastic Modulus, and Ductility

### Tensile Strength:

Tensile strength, or ultimate tensile strength, measures a metal's resistance to breaking or pulling apart in two pieces. To find out how strong a wire is, one could just hang heavier and heavier weights on it until it breaks. The weight of the load, or number of pounds, it finally took to break that wire is its breaking strength, in pounds.

Obviously, a bigger wire takes more pounds to break than does a smaller one. If we want to know about the metal itself, we measure stress. Stress is simply the number of pounds pulling on that wire, divided by the cross sectional area, in square inches. The result is "psi", or pounds per square inch. (*Stress is the amount of pounds pulling on the specimen, divided by the cross sectional area in square inches. So the result is PSI, pounds per square inch.*)

### Elastic Modulus:

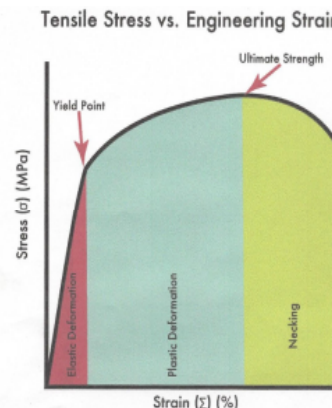
This is a basic measure of how stiff the metal is, NOT something you will find on an MTR. When you start pulling on the tensile test specimen, it begins to stretching like a rubber band. If you stopped the test, when the load was removed the specimen would spring back to its original length, this is the "elastic" portion of the tensile test.

If those of you who are mathematically inclined would graph the stress on one axis, versus strain (how much it stretched), you would get a straight line. The slope of that straight line is called the Elastic Modulus.

### Yield Strength:

At some point during the tensile test, usually well before the specimen breaks, it takes a set, or a permanent stretch. This is called the "Yield Strength". For austenitic Alloys this point is a little vague, the curve just slowly bends over.

Therefore, engineers have made a definition of yield strength by drawing a line parallel to the elastic part, just offset a bit. This is usually recorded on the mill test report as the 0.2% Offset Yield Strength.



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[nlockard@trumboinc.com](mailto:nlockard@trumboinc.com)

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### Ductility:

Before the specimen breaks it has stretched out a great deal, and has necked down in the area where it breaks. The amount it had stretched when it broke is the "% Elongation", and the amount it necked down is the "% reduction of Area". Both are measures of ductility. The fabricator needs ductility so he can form the metal, in service the metal needs ductility so that it will bend a little, if something goes wrong, rather than shatter.

## NON FERROUS SURCHARGE CHART

Stainless prices mixed(↑↓) and Nickel prices are up (↑) for July deliveries. Nickel prices are estimated to rise for August. Remember, this chart is for surcharge only, it does not include the base price for materials.

Alloy	Jan	Feb	March	Arpil	May	June	July	Aug	Sept
2205	0.3715	0.385	0.3714	0.3787	0.3964	0.4615	0.5033		
304 CLAD	0.1723	0.1752	0.1689	0.1771	0.3367	0.3603	0.2057		
304/304L	0.3352	0.3321	0.3195	0.3315	0.3433	0.3668	0.3536		
304H	0.3352	0.3321	0.3195	0.3315	0.3433	33668	0.3536		
304LN	0.3352	0.3321	0.3195	0.3315	0.3343	0.3668	0.3536		
304N	0.3352	0.3321	0.3195	0.3315	0.3343	0.3668	0.3536		
309/309S/309H	0.4592	0.451	0.4334	0.4518	0.4596	0.4891	0.4308		
310/310S	0.6373	0.6208	0.5963	0.6278	0.6303	0.6712	0.6398		
316/316L	0.4112	0.4155	0.4003	0.419	0.4333	0.4918	0.509		
316LN	0.4112	0.4155	0.4003	0.419	0.4333	0.4918	0.509		
316Ti	0.4267	0.4303	0.4146	0.4341	0.4477	0.5069	0.5233		
317/317L	0.4724	0.4801	0.4628	0.4834	0.4982	0.5737	0.606		
347	0.6186	0.6145	0.6012	0.6157	0.6269	0.6521	0.6372		
AL-6XN Plus	0.9877	0.9569	0.7962	0.7521	0.7456	0.7111	0.8028		
alloy 20	1.2687	1.3089	1.0928	0.9979	0.9648	0.9287	1.001		
AL-200 TM	2.5184	2.7585	2.1593	1.8684	1.7556	1.6621	1.8748		
Al-400 TM	1.8595	2.014	1.5694	1.357	1.2601	1.2208	1.4099		
Al-600 Tm	2.0577	2.2246	1.7855	1.5694	1.4859	1.4144	1.5626		
Altemp 625	3.733	3.7687	3.4028	3.2682	3.2249	3.155	3.2796		
Alloy 276	2.9592	2.9126	2.5444	2.4467	2.4246	2.3485	2.4842		



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