What is Tensile Testing?

WHERE USED

- Base Metals
  - Plate / Sheet / strip
  - Bar
  - Structural Shapes
  - Forgings
  - Castings
  - Pipe / Tubing (full-section or Longitudinal Strip)
- Weld coupons
- Fasteners (*full-size* Axial or Wedge, or *reduced section*)

PURPOSE

- Determines
  - ULTIMATE TENSILE STRENGTH
  - YIELD STRENGTH
  - ELONGATION %
  - REDUCTION OF AREA %
- Measures load applied and resulting elongation of specimen
- Strength is related to the **Direction of Rolling**
- Flat stock originally manufactured over 24” width is tested *transverse* to rolling direction
- *Fasteners*, Structural shapes, other forms are tested *longitudinal*
- Available *length* sometimes determines what diameter tensile specimen
- Welds in thick material may require Tensile Test of *top* and *root* of weld separately due to machine capacity limitations

MATERIAL NEEDED: STANDARD SIZES

Round:

DIAMETER, in.	GAUGE LENGTH, in.	MINIMUM LENGTH, in.
0.500	2	5.5
0.350	1.4	4.5
0.250	1	3.5
0.160	0.64	About 2
0.113	0.45	About 1
Other	4 x diameter	Varies

Flat: minimum width 2”, minimum length: 8”

Threaded Fasteners & *Pipe* have special considerations

HISTORY

- ASTM standard E8 originally approved 1924 for metallic materials
- B557 for Aluminum and Magnesium alloys (1971)
- A370 covers mechanical testing of steels, including tensile testing