

## Fiber Properties Definitions:

### Physical Properties:

- Color
- Shape (luster, hand/feel, surface view)
- Crimp (warmth, cohesiveness, resiliency)
- Length (staples <2in. short, filament yds/m long)
- Weight (density, specific gravity
  - o Density – ratio of mass ( $\text{g/cm}^3$ ) to unit volume
  - o Specific gravity – density of the fiber to density of water ( $\text{g/cm}^3$ )
- Diameter/fineness (direct measurement in microns, weight per unit length, count, micronaire)
  - o Diameter – distance across cross section
  - o Fineness – softness, pliability, and hand characteristics

### Mechanical Properties:

- Strength – behavior of fibers under applicable force
  - o Tensile strength – stretching, force/unit area ( $\text{lb/in}^2$ )
  - o Tenacity – strength relative to linear density, grams per denier ( $\text{g/d}$ )
- Modulus – initial resistance to tensile force; measure of fibers stiffness
  - o Low resistance – stretch or bend considerably with little force (rubberband/spandex)
  - o High resistance – low stretch under force (steel wire)
- Flexibility – bend or fold ability
- Elongation – amount of stretch; percent
- Elastic recovery – recovery of some applied stretch (%)
  - o Elastic recovery – instantaneously returns after stretched
  - o Creep recovery – slow return to original length
- Resiliency – ability to spring back to natural position; twisted, bent, compressed

### Chemical Properties:

- Absorbency – ability to absorb water
  - o Moisture regain – dry fiber placed in humid atmosphere absorbs moisture
  - o Standard regain – amount of moisture taken by sample
  - o Saturation regain – measured at 95 to 100 percent relative humidity
  - o Hydrophilic – high regain; water loving; accept waterborne dye and finishes readily; shed oily dirt, dry slowly, stain by soils
  - o Hydrophobic – do not absorb moisture readily; water hating
  - o Adsorb – held on surface
  - o Wicking – liquid moisture travel along surface
  - o Heat of sorption – low regain
- Electrical conductivity – ability to carry/transfer electrical charges

- Effects of heat – flammability
  - o Flame resistance – ignite but do not burn
  - o Thermal stability – do not shrink or burn readily
- Chemical reactivity and resistance
  - o Effects of acids
  - o Effects of bases
  - o Oxidation
  - o Effects of chemical solvents

Other Properties:

- Dimensional stability
- Abrasion resistance