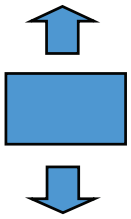
Plastifab

Plastic Properties Understandable

Property	Description	What does it mean?	How to remember…
Specific Gravity	Ratio of the weight of a material compared to the weight of the same volume of water	Refers to the weight of the part. The higher the specific gravity, the heavier the material. If specific gravity is less than 1.00 it will float as it is lighter than water.	
Density	The theoretical weight of the material.	Refers to the weight of the material.	
Tensile Strength	Pulling force required to break a material.	Tensile strength is the amount of force required to pull a material apart.	
Tensile Modulus	A measure of how stiff a material is when pulled in different directions.	Tensile modulus is the ratio of stress being pulled on a specimen to strain within the elastic limit.	
Flammability (UL94…)	A measure of how the material burns under very specific conditions. UL94 is a standard for flame ratings.	Important safety consideration, ratings are listed by thickness and time. The information is generally provided by the resin supplier. After UL has tested the material, they issue a “Yellow Card” for the resin.	
Coefficient of Friction	Measures how well a material slides against another, mostly tested against steel.	Refers to the force that is needed to start a material to slide (static) and to keep it moving (dynamic).	
Dielectric Constant	Describes the rate at which stored energy is released from a material.	Allows to compare materials based on the rate at which the electrical current passes through the materials.	
Dissipation Factor	Measures dielectric loss in an AC current.	Dielectric loss is measured as heat, and since heat is normally NOT wanted, materials with low dissipation factors are preferred for electrical applications of all types	

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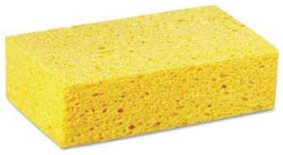
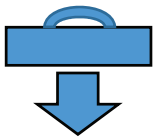
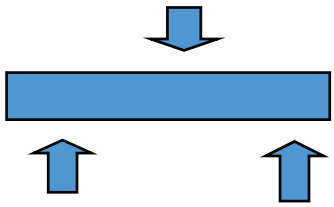
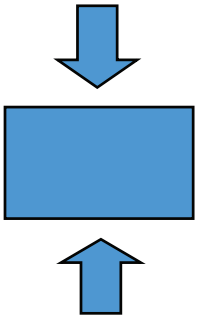
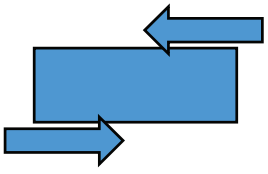
Dielectric Strength	The voltage where a 1mm sample fails as an electrical insulator	A comparison test only between materials, not a design criteria by itself.	
Volume resistivity	Another measure of electrical insulation properties	Provides a means to estimate how many amps go through a material with a given application of volts. Important when considering static dissipative material performance.	
Moisture (Water) Absorption	The percentage increase in weight of a material based on how much water it absorbs, usually measured in saturation or 24 hour period.	Refers to the dimensional stability (the more water it absorbs the more the material enlarges) and changes in properties (the more water it absorbs the softer and less wear resistant it becomes)	
Elongation	The percentage increase in a material length when it breaks.	Used in failure prevention analysis. It is a measure of stiffness more than the actual strength of a material.	
Flexural Strength	A measure of how much bending force a material can take before breaking.	Determines the max bending load a material given cross section can withstand, weather fixed at one end with a load at the other, or suspended at both ends with the load in the middle.	
Compressive strength	A measure of how much weight a material can withstand in compression (being squeezed).	Compressive strength is the amount of stress required to deform a material by 10%.	
Compressive Modulus	A measure (psi) of how stiff a material is when being compressed.	Allows a calculation of how much a material will move (strain) under a given load (stress) when being compressed.	
Shear Strength	A measure of how much shearing force a material can take before breaking.	Shear strength is the amount of stress a material can withstand, when being pulled/loaded in opposite directions.	

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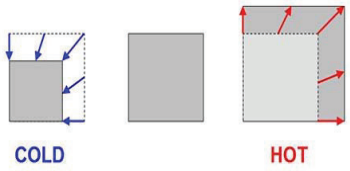
Rockwell Hardness	Determines the resistance to indentation a given material can withstand.	Rockwell hardness is directly related to the indentation hardness of a plastic material. The R scale is typically used for softer materials, while the M scale is used for harder materials.	
IZOD Impact Resistance	A measure of the impact resistance or toughness of material.	Allows a comparison of materials using specific impact criteria, it actually measures notch sensitivity. This is usually used in conjunction with other properties to determine best candidate materials in an impact environment.	Izod impact test consists of striking a clamped, notched sample with a pendulum that has fallen from a specified height. 
Coefficient of Linear Thermal Expansion	(CLTE) Measures how much a material shrinks or grows with changes in temperature.	Indicates how much allowance must be designed to allow for material movement over a given temperature range (The larger the range, the more important it becomes).	
Melt Point	Gives the temperature at which a crystalline/semi-crystalline material melts (Becomes liquid).	Most important for processing of polymeric materials. In service, an engineering material will usually fail long before getting to this temperature.	
Glass Transition Temperature	The “Softening” temperature for amorphous materials	Important to companies doing thermoforming, this is the minimum temperature needed to be able to form the material.	
Continuous Use Temperature (CUT)	The maximum temperature at which a material can withstand in air, for 100,000 hours (11 years) with no load and still retain at least 50% of its physical properties.	This is important for very lightly loaded parts that must withstand long term elevated temperatures. The material oxidizes over time and can become brittle. Few plastic parts see this type of service.	

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Heat Deflection Temperature	The temperature where a ½" thick test bar deflects 0.010".	This is the "working stress" number, a fair indicator of the maximum operating temperature of a material under load, very important design consideration. Usually reported with a load of 264 psi.	
Thermal Conductivity	Gives the rate at which heat is conducted through a material.	Determines the ability of a material to act as thermal insulator. The lower the value, the better the thermal insulation.	High Conductivity