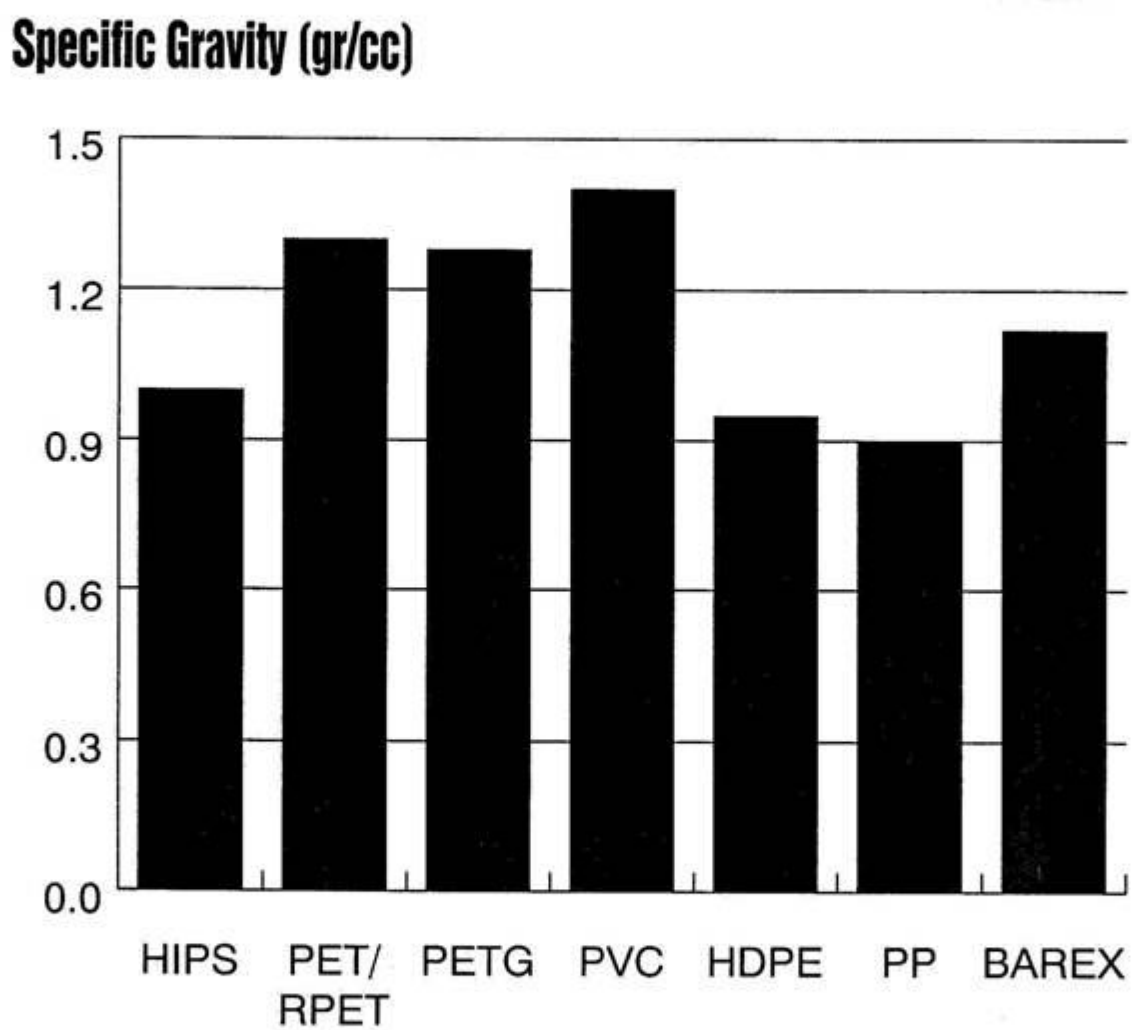
Physical Properties Comparison

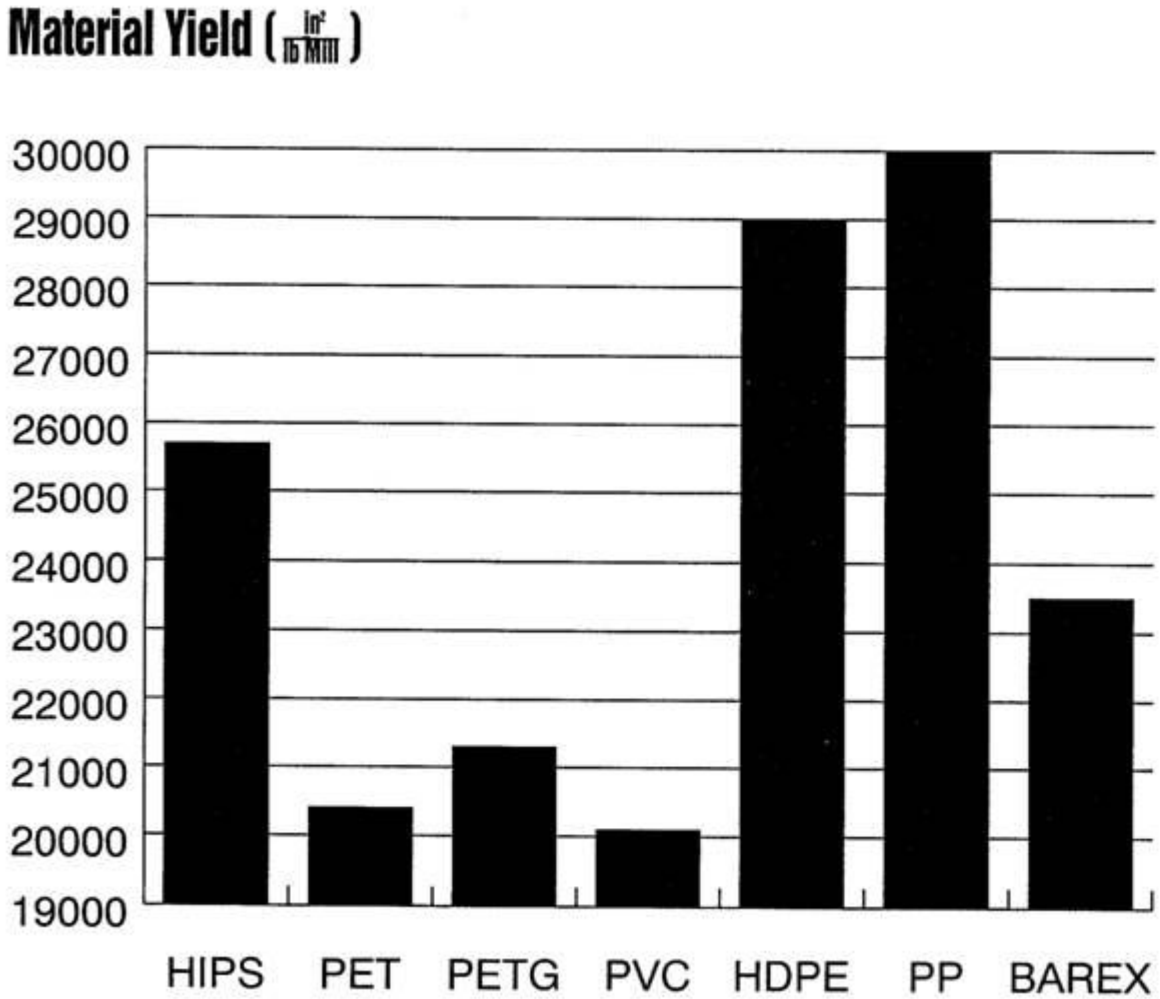
The following is a comparison of PET with several other plastic resins commonly used for packaging. The intent of this document is to provide a perspective on why PET has become popular in many packaging markets.

This data also illustrates that there are potential process efficiencies that are attributable to the physical properties inherent in the plastic selected for the application.

Specific gravity is the ratio of the density of a material as compared to water. Water has a specific gravity of 1.0. Any material with a value lower will float in water, and any material with a value above it will sink.

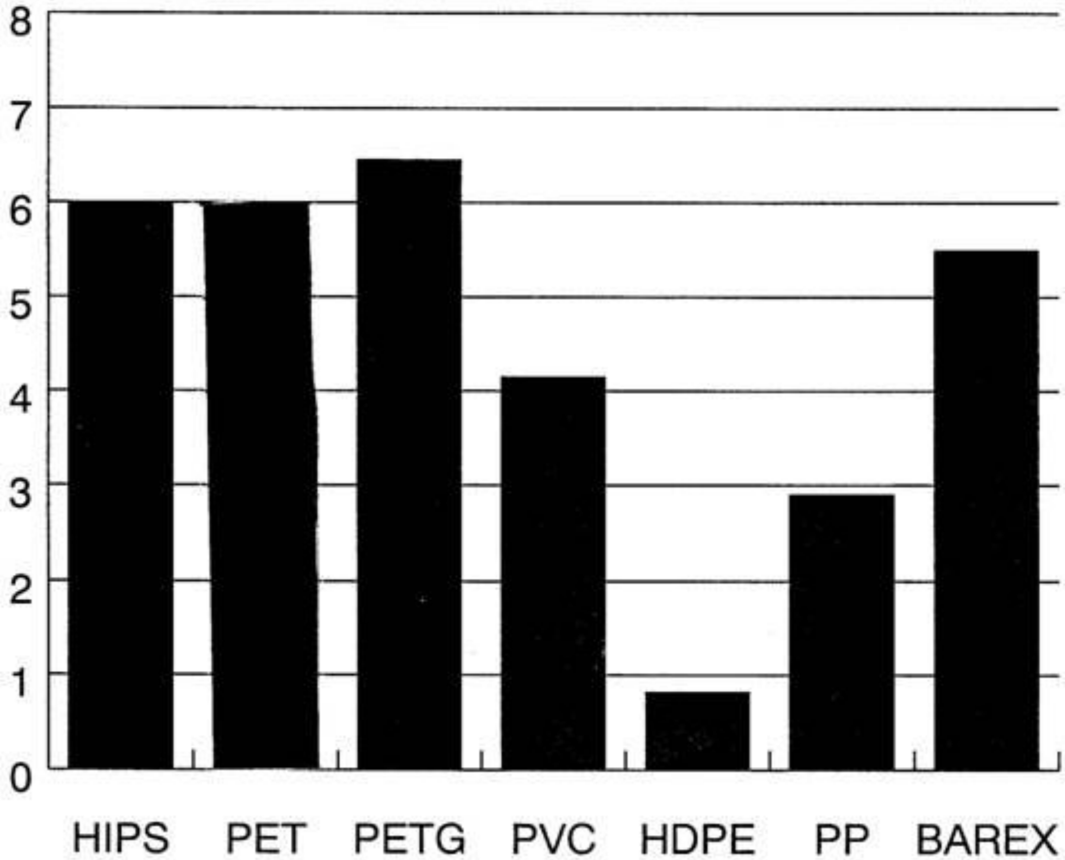


Material yield expresses the amount of surface area one pound of material will cover at a specific thickness, usually one thousandths of an inch. This value is directly proportional to the materials density, but makes it easier to calculate the economy of any given material.



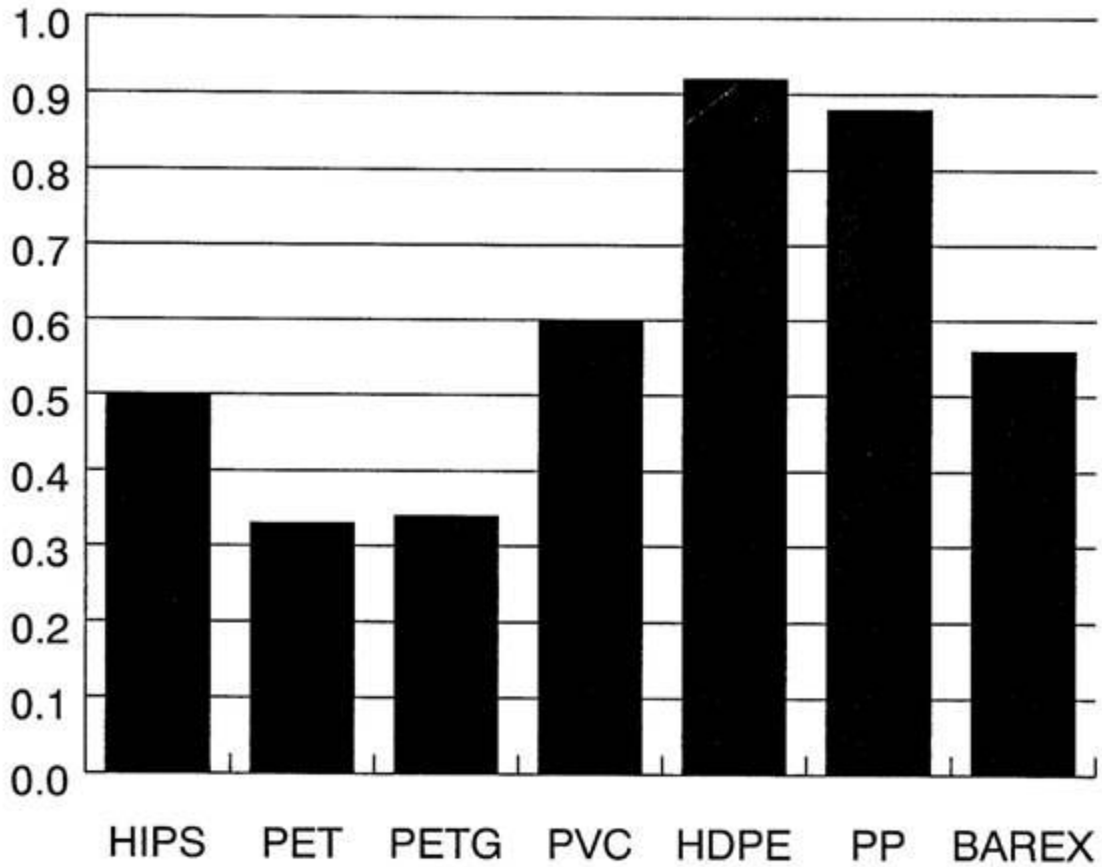
Thermal conductivity is the rate of transmission of energy through molecular motion. This value expresses how quickly a material will transfer heat out of itself. A high value indicates that material will rapidly give up the heat it contains.

Thermal Conductivity $\left(\frac{10^{-4}\ \text{cal cm}}{\text{sec cm}^2\ \text{C}^\circ}\right)$

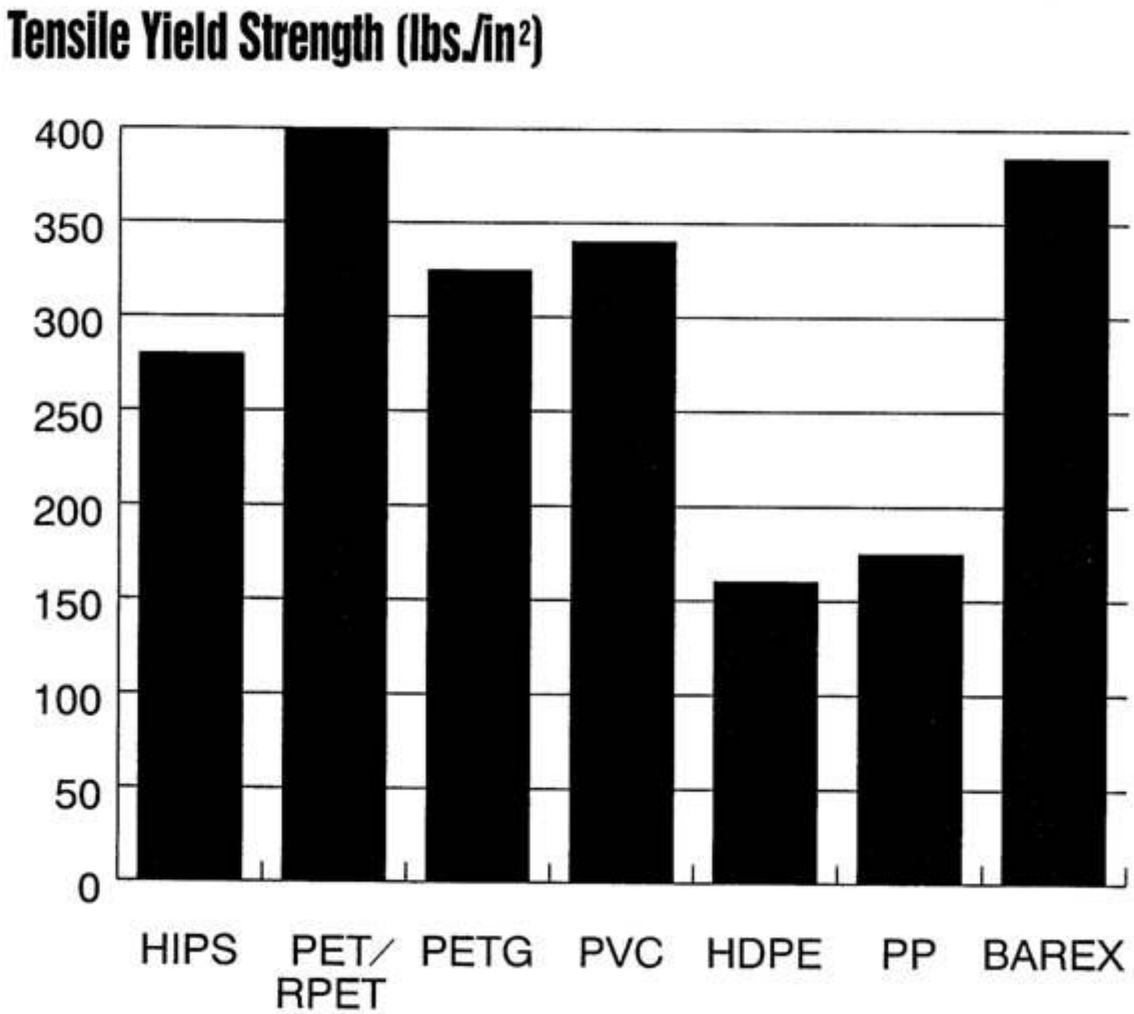


Specific heat is use to determine how easily a material absorbs heat. The basis of comparison for the value is water. The value reflects the delta between the quantity of heat, expressed in calories, it takes to raise the temperature of a given material 1 degree, as compared to the amount of heat needed to raise the an equal quantity of water one degree. A low value means the material absorbs heat more readily, and will require less time to get to its thermoforming processing temperature.

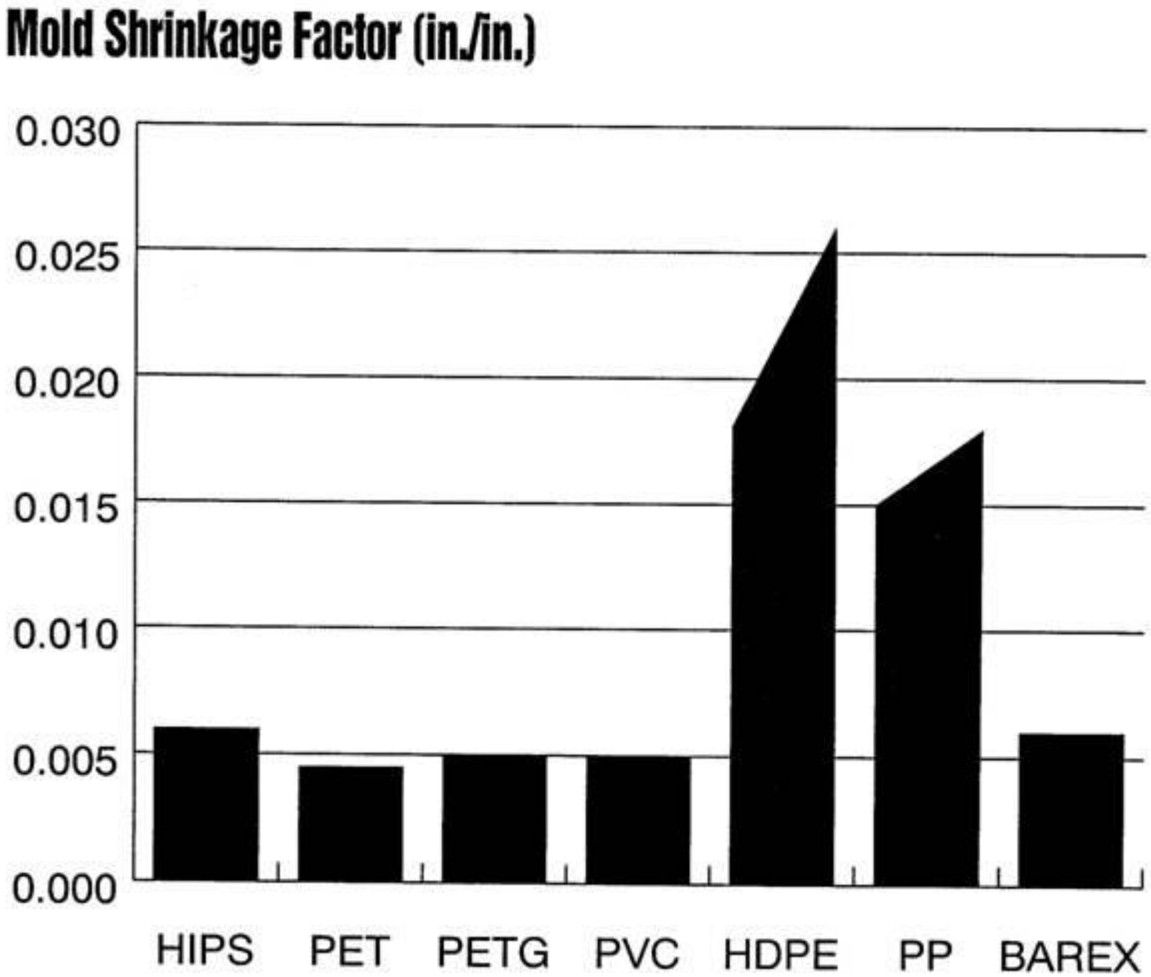
Specific Heat At Processing Temperature ($\frac{cal}{gr\ C°}$)



Tensile yield is a measurement of the amount of tension stress a material will withstand before it starts to stretch.

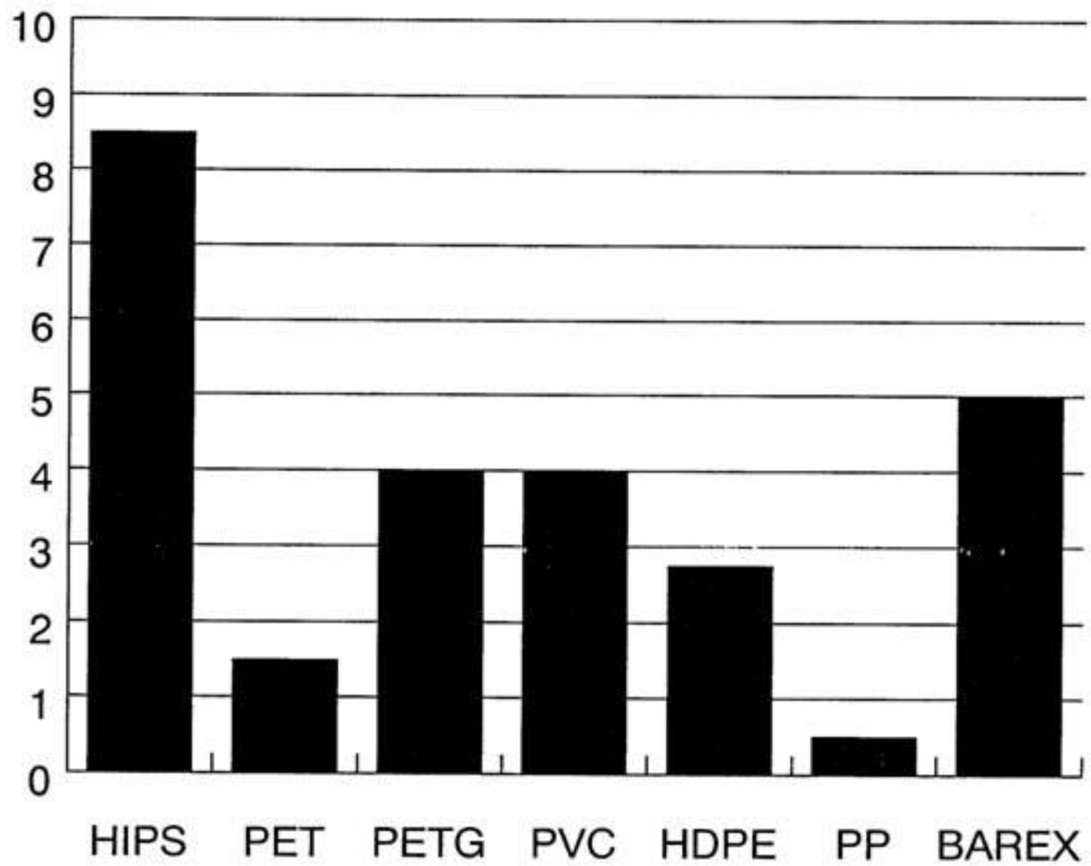


The designer uses mold shrinkage factor to predict how much the plastic will shrink after being formed into the desired geometry.



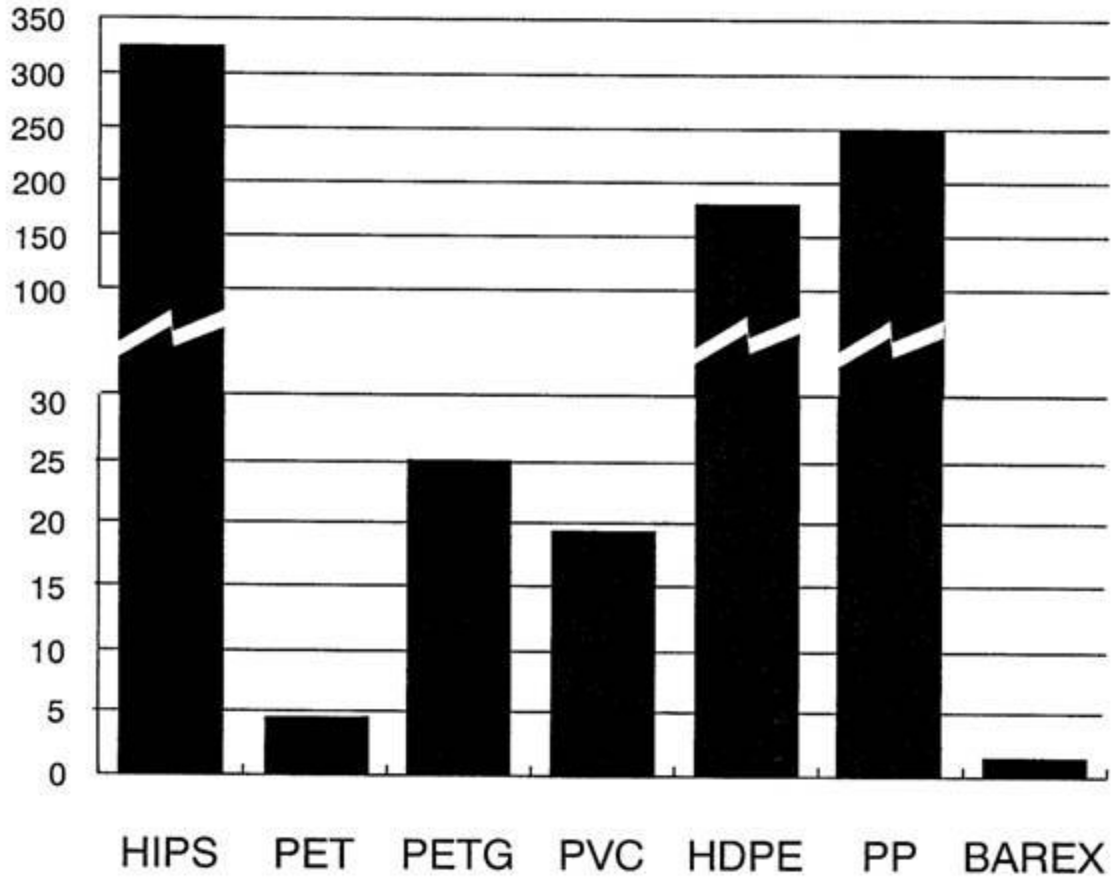
MVTR is a measurement of the resistance of the material to moisture trying to move through it. A low value indicates the material provides a barrier against moisture migration.

Moisture Vapor Transmission Rate-MVTR (g•mill/24 hr•100 in²)

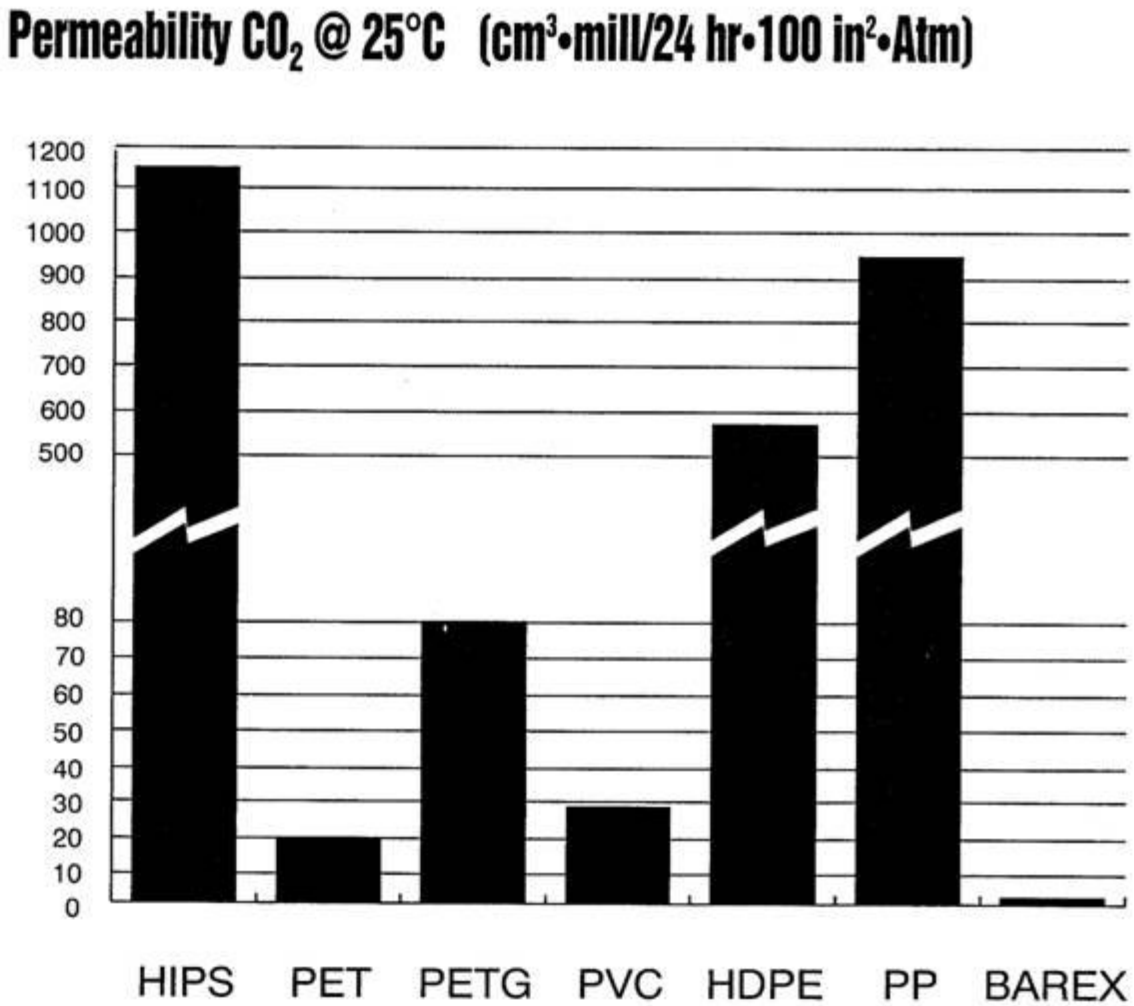


This chart shows the resistance of the material to oxygen trying to move through it. A low value indicates the material provide a barrier against oxygen migration.

Permeability O_2 @ 25°C (cm³•mill/24 hrs•100 in²•Atm)



This chart shows the resistance of the material to carbon dioxide trying to move through it. A low value indicates the material provide a barrier against carbon dioxide migration.



This chart compares the average surface temperature that would need to be achieved just prior to thermoforming. A higher surface temperature indicates the plastic is resistant to absorbing calories, so the surface must be heated excessively to push the heat into the core of the sheet.

Thermoforming Processing Temperature (°F)