MONTACHEM
INTERNATIONAL

Plastic Properties

Mechanical – Tensile Strength and Elongation (psi, %)

- Force and amount of stretch at which break occurs
- Few applications involve this amount of deformation
- Tends to be characteristic of resin families
- Used by manufacturers for specifications
- Can be critical for stretch film application

Often a complex function of resin type and parameters such as Mw, MWD, density

MONTACHEM INTERNATIONAL

Mechanical – Yield Strength

- Force at which permanent deformation occurs, sometimes combined with significant elongation
- Key property for grocery sack applications

Affected by resin family, density, Mw

MONTACHEM INTERNATIONAL

Mechanical – Secant Modulus (stiffness)

- Slope of stress/strain curve prior to yield at a given elongation (1 or 2%)
- Indicator of initial degree of stretch
- Important for garbage bag, grocery sack and heavy duty sacks
- Affects downstream handling (machinability)

Affected by density

MONTACHEM INTERNATIONAL

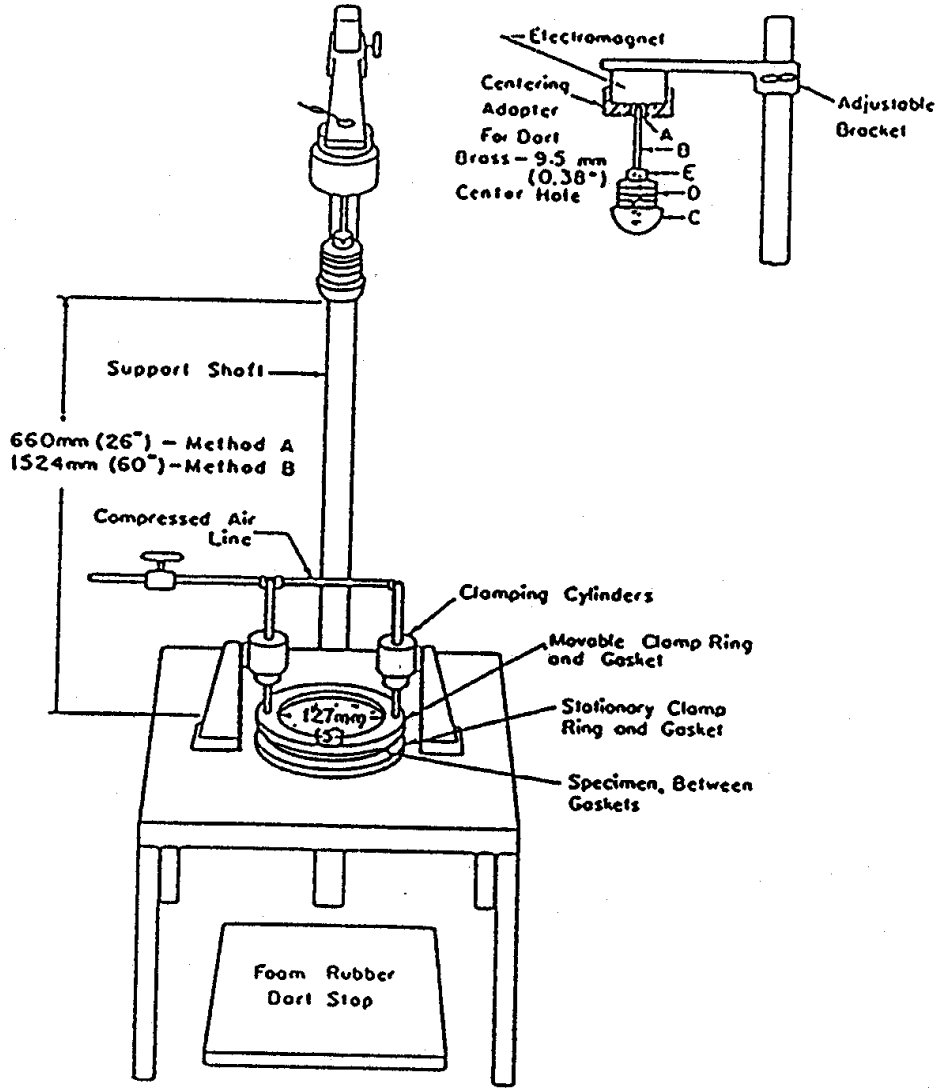
Mechanical – Dart Impact

- Resistance of film to rupture under impact
- Dart impact estimated statistically and represents a 50% failure rate
- Often critical property for garbage bag applications

Affected by resin family, comonomer, density, Mw

MONTACHEM INTERNATIONAL

Mechanical – Dart Impact



MONTACHEM INTERNATIONAL

Mechanical – Puncture Resistance

- Measures the total energy required to push a probe through the film to the break point
- Often a critical property for packaging applications

Affected by resin family, comonomer, density, Mw, surface properties

MONTACHEM INTERNATIONAL

Mechanical – Tear Propagation

- Measures force required to propagate a tear
- Testing reported in MD and TD directions
- Critical property for many applications including garbage bags, grocery sacks, heavy duty sacks

Affected by resin family, comonomer, density, Mw, processing conditions

MONTACHEM INTERNATIONAL

Mechanical – Seal Strength

- Relative seal strength measured as percentage of tensile strength of film
- Critical to all bag-making applications
- Sealability is critical to lamination applications, and where PE is used as a layer of a coextruded structure where it is intended to perform as a sealant

Affected by resin family, comonomer, density, MWD

MONTACHEM INTERNATIONAL

Optical – Haze

- Measure of clarity, i.e. how easy it is to see through the film
- Critical for applications where packaged item must be seen through the packaging, e.g.. bread bags, overwrap

Affected by resin family, density, MW and processing conditions

MONTACHEM INTERNATIONAL

Optical – Gloss

- Measures surface smoothness
- Tends to correlate strongly to haze
- Critical for applications where surface appearance is important such as printed films (sparkle)

Affected by resin family, processing conditions

MONTACHEM INTERNATIONAL

Surface – Blocking

- Measures tendency of film to stick together
- Critical impact on downstream process such as gusseting, slitting, bag making, etc.
- Frequent subject for complaints
- Antiblock (inorganic surface roughener) added to control film blocking

Affected by resin family, processing conditions, but mostly by additives and density

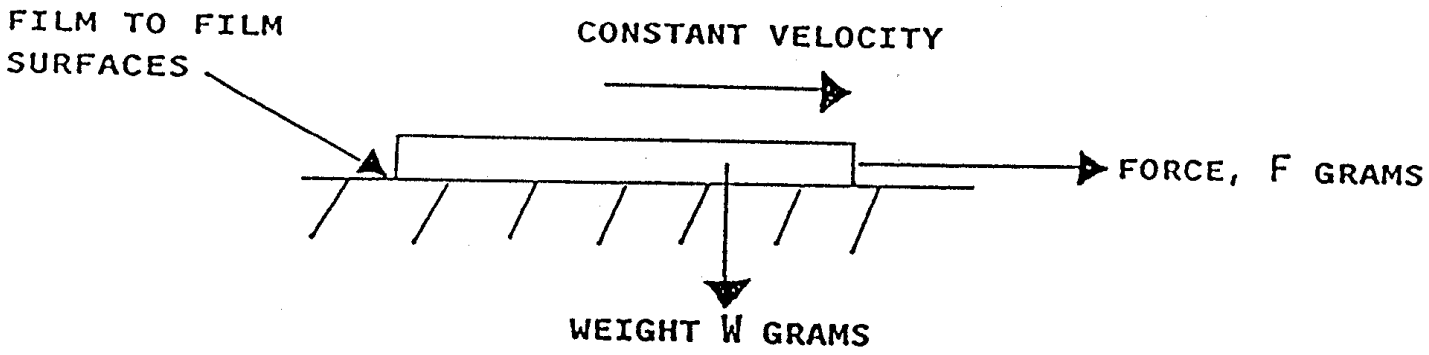
Surface – Coefficient of Friction

- Measures resistance to object drawn across the surface
- Critical for downstream operations (bag making, packaging)
- “Slip” added to reduce COF in films

Affected mainly by density and additives

Surface – Coefficient of Friction

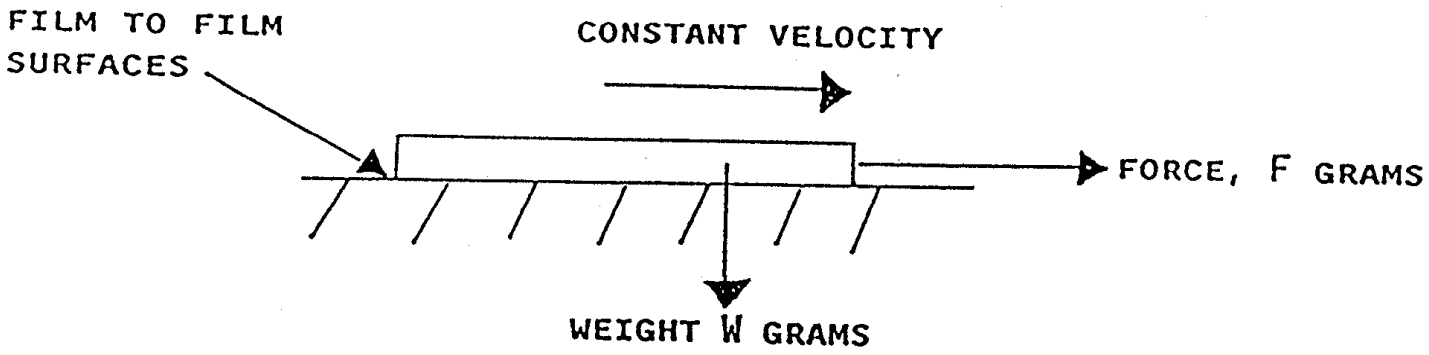
- Coefficient of friction (COF)



$$\text{COEFFICIENT OF FRICTION} = \frac{F}{W}$$

Surface – Coefficient of Friction

- Coefficient of friction (COF)



$$\text{COEFFICIENT OF FRICTION} = \frac{F}{W}$$