

# **MATERIAL CHARACTERISTICS - NON-METALLIC**

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## **Acetal**

### **Transparent White**

- Good Electrical properties (400-465 v/mil)
  - High mechanical properties & rigidity
  - Fatigue, moisture, gasoline & solvent resistant
  - Cannot resist: steam hot water, or strong bases
  - Good cold flow resistance
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## **Fibre**

### **Black & Gray**

- Extensively used for electrical insulation applications where little moisture is present (150-250v/mil)
  - Fair mechanical properties
  - Can be formed
  - Good cold flow resistance
  - Good thermal conductivity for a non-metallic (.25 btu/hr/sq ft/°F/ft)
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## **Fiberglass**

### **Fiberglass**

- Laminate of layers of fibreglass mesh with different impregnated resins for different based properties

### **G-7, Silicone resin**

- Best heat resistance

### **G-9, Heat resistant melamine resin**

- Best mechanical preoperties of non-metallics
- Good electrical insulator, particularly under wet conditions (350 v/mil)
- Good dimensional stability
- Good thermal cundcticity for a non-metallic (.29 btu/hr/sq ft/°F/ft)

### **G-10, Epoxy resin**

- Good demensional stability
- High mechanical strength at room temperature
- Good electrical insulator, even in humid conditions (400 v/mil)

### **G-11, Heat resistant epoxy resin**

- Same properties as G-10 at room temperature
  - Retains 50% of room temperature standard flexural strength when measured at 150°C. After 1 hour at 150°C.
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## **Kapton®**

### **Red brown to yellow orange**

- DuPont® tradename for polyimide plastic film
- Excellent electrical properties (i.e. 7000 v/mil)
- Good tensile strength (25,000 psi)
- Ability to tolerate fairly high temperature (750°F)
- Maximum thickness available - 0.005"
- Flexible, will not chip, flake or disintegrate under compression loads or in vibratory situations as does mica insulator applications

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## **PCTFE**

### **Natural**

- Electrical grade plastic
  - Good insulator
  - Expensive
  - (Due to small sheet size, does not lend itself to automated production methods)
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## **Mica**

### **Clear to light brown**

- Excellent electrical properties (3,000-6,000 v/mil)
  - High heat resistance (1050°F)
  - Insulating material
  - It can chip, flake & disintegrate under compression loads & vibratory situations
  - (Does not lend itself to automated production methods)
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## **Mylar®**

### **Translucent**

- Extremely good electrical properties (4,000 v/mil)
  - Insulating material
  - Maximum thickness - 0.014"
  - Less expensive alternate to Kapton® for lower temperature applications (300°F)
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## **Neoprene**

### **Black synthetic rubber, 60 shore hardness**

- Resilient - tear resistant
  - Cushioning properties - gaskets
  - Aircraft application grade
  - Good oil resistance
  - Excellent abrasion & flame resistance
  - Excellent sealing capabilities
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## **Nylatron®**

### **Charcoal gray**

- Polymer Corp. trade name for molybdenum disulfide filled nylon
  - Electrical properties lessened slightly by the molybdenum disulfide (356 v/mil)
  - Increased resistance to cold flow and greater bearing qualities as compared to nylon
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## **Nylon**

### **Opaque white**

- Good electrical grade material (358 v/mil)
- Good bearing properties
- Good anti-frictional properties
- High strength for a non-metallic
- Self-extinguishing - flammability reading of 94V2
- Fair cold flow properties

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## Phenolics

### XXXXP

- Paper based with phenolformaldehyde resin impregnated
- Best moisture resistance for phenolics (0.8%)
- Low dielectric losses under severe humidity conditions
- Good electrical properties (325 v/mil)
- Less expensive than LE & CE, although more difficult to fabricate

### LE

- Fine weave cotton cloth impregnated with phenolformaldehyde resin
- Good electrical properties (225 v/mil)
- Good moisture resistance (1.3%)
- Better machining properties & appearance than CE
- Easiest phenolic to fabricate
- Not good for primary insulation
- Good mechanical properties

### CE

- Coarser weave cotton cloth impregnated with phenolformaldehyde resin
- Best mechanical properties of phenolics
- Good moisture resistance (1.6%)
- Good electrical properties (225 v/mil)
- Not good for primary insulation

### Nylon, brown

- Nylon fabric impregnated with phenolformaldehyde resin
- All purpose electrical grade
- Good for operating temperature below 160°F

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## Polyethelene

### Translucent white

- Common plastic - quite inexpensive
- Good electrical insulator (460 v/mil)
- Good sealing capabilities
- Low water absorption rate (0.015%)

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## Teflon®

### Translucent white

- Excellent anti-frictional properties
- Good electrical properties (480 v/mil)
- Excellent chemical & corrosion resistance
- High heat resistance (500°F)
- Fair cold flow properties
- Very low water absorption rate (0.005%)
- Excellent for low temperature applications

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