

# **Shielding Systems**

## **Power Cable Shielding Systems**

No conductor or insulation shields are required for cables rated up to 2 kV.

At 2 kV and higher a conductor shield is required (by CSA, UL, etc.) A conductor shield controls the electrical stress at the conductor/insulation interface. This increases cable life and allows for a thinner insulation.

At 5 kV an insulation shield may be required depending on cable type and its application (see Rule 36-104 in the Canadian Electrical Code). Above 5 kV an insulation shield is required. When supplied an insulation shield always consists of a non-metallic (semi-conducting) and a metallic component.

The insulation shield controls stress at the insulation surface and within the insulation wall.

The insulation shield protects personnel from shock hazard by accidental contact with the cable.

The metallic component carries leakage current, short circuit current and in some cases neutral current to ground.

The metallic component **must** be grounded at least at one location in the cable run.

If a cable has insulation shield stress cones or some form of stress relief must be used at splices and terminations.

## **Metallic Shield Types:**

### **1. Copper Tape**

- helically applied copper tape(s)
- used mainly on industrial power cables
- may be overlapped or lapped
- low short circuit current level
- provides good electro static shield
- if grounded both ends conductor current derating is small

### **2. Wire Shield**

- helically applied small (#22-#18) wires
- same application as copper tape
- same short circuit and ampacity derating as copper tape
- very uncommon construction

### 3. **Concentric Neutral**

- helically applied wires (#16-#9)
- used on utility underground distribution systems
- two sizes of neutral supplied
- 1/3 or 33% conductance which is used on three phase systems
- full or 100% conductance which is used on a single phase systems
- high short circuit current levels
- conductor current derating can be high if grounded both ends
- carries neutral current of distribution system

#### 4. **L.C. Shield**

- longitudinally applied corrugated copper tape
- large conductor size cables for utility and industrial cables
- provides good electrostatic shield
- short circuit current level and conductor current derating between helically applied copper tape and concentric neutral

#### 5. **Metal Sheaths**

- lead or aluminum sheath
- mainly for industrial power cables
- good electrostatic shield and moisture/chemical barrier
- high short circuit level and high derating if grounded both ends
- sometimes difficult to terminate

