SPEC F125
January, 2010

Short Circuit Current Calculation Overview

The maximum short circuit current which is permitted to flow in the insulated conductor, or the metallic shielding and bonding (grounding) components, is dependent on the duration of the short circuit and the material used in the cable.

Insulated Conductors Formula

The graphs on the following pages show the short circuit capability of 10 AWG to 1000 kcmil, copper and aluminum, XLPE and EPR insulated conductors for various periods of time. These graphs are in accordance with ICEA publication P-32-382. The equations are based on the assumption that the duration of the short circuit is so short that the heat generated is contained within the conductor, taking into consideration the temperature limit of the insulation.

The graphs are derived from the following formula:

$$\text{Copper Conductor} \quad \left[\frac{I}{A}\right]^2 t = 0.0297 \log_{10} \left[\frac{T_2 + 234}{T_1 + 234}\right]$$

$$\text{Aluminum Conductor} \quad \left[\frac{I}{A}\right]^2 t = 0.0125 \log_{10} \left[\frac{T_2 + 228}{T_1 + 228}\right]$$

Which simplify to:

$$\text{Copper Conductor } I = \frac{0.07195\ A}{\sqrt{t}} \quad \text{amperes for MV-90}$$

$$\text{Copper Conductor } I = \frac{0.06773\ A}{\sqrt{t}} \quad \text{amperes for MV-105}$$

$$\text{Aluminum Conductor } I = \frac{0.0470\ A}{\sqrt{t}} \quad \text{amperes for MV-90}$$

$$\text{Aluminum Conductor } I = \frac{0.044\ A}{\sqrt{t}} \quad \text{amperes for MV-105}$$

Where: I = Short circuit current (amperes)
A = Conductor cross-sectional area (circular mils)
t = Short circuit duration (seconds)
T_1 = Maximum normal operating temperature, 90°C for MV-90 or 105°C for MV-105
T_2 = Maximum short circuit temperature, 250°C

General Cable
Phone: 855-720-2792
www.generalcable.com