

## 1.0 HOW TO SELECT A CABLE

When selecting a cable for your specific application, a number of variables require attention. These are:

- (a) Size and type of load to be supplied
- (b) Permissible voltage drop
- (c) Prospective fault current
- (d) Circuit protection
- (e) Environmental conditions of installation

### 1.1 Load to be supplied

In order to select the appropriate cable, it is necessary to know the voltage and the load current in amps. This information will be available either directly in amps or as kW or kVA.

The following formulae apply:

$$I_{FL} = \frac{kW \times 1000}{\sqrt{3} \times V \times \cos \phi} \quad \text{Amps if we know kW, voltage, as well as power factor}$$

$$I_{FL} = \frac{kVA \times 1000}{\sqrt{3} \times V} \quad \text{Amps if we know the kVA rating as well as the voltage}$$

Use this value of current to determine the cable size by reference to the relevant tables given in Section 4 (Paper insulated), Section 5 (XLPE insulated medium voltage) or Section 6 (PVC and XLPE insulated low voltage) for Copper or Aluminium conductors.

A slightly larger conductor size may be chosen for safety aspects, and to provide for the higher than usual current which may be experienced during starting of electric motors.

### EXAMPLE OF CABLE SELECTION FOR LOW VOLTAGE

Suppose it is required to supply a 3 phase, 400 volt, 100kW motor connected in star/delta, over a distance of 50m buried direct in ground. The motor load is known to have a power factor of 0,9 lagging. The full load line current,  $I_{FL}$ , can be calculated as follows:

$$\begin{aligned} I_{FL} &= \frac{100 \times 1000}{\sqrt{3} \times 400 \times 0,9} \\ &= 161 \text{ Amps} \end{aligned}$$

We now refer to table 6.2 on pg 38 and note that the smallest copper conductor, PVC insulated cable, that can supply a current of 161 amps in the ground, is a 50 mm<sup>2</sup> rated area cable. This cable can carry 169 amps continuously if installed under standard conditions.

### 1.2 Permissible Voltage Drop

Calculate the highest current drawn by the load, by multiplying the current as calculated in 1.1 by an appropriate factor. If a Star/Delta motor starter is used on a motor, this factor is 3. If the motor is started direct on line, then use a factor of 6. Where the load is resistive heating, lighting or a transformer, it is not necessary to increase the current as calculated in 1.1. Calculate the volt drop which will be experienced at the load terminals by reference to table 6.2 or 6.3 on pg 38 or pg 39. The maximum volt drop allowed by SANS 10142-1 during