**Week 5 Lesson 17 SDL Worksheet**

Work through this example of selecting a sub-main cable, completing the boxes as you go.

*A standalone domestic property in New Zealand requires a sub-main cable to connect the main switchboard to a sub-board located 18 metres away. The property has a single-phase 230V supply, and the maximum allowable voltage drop is 3%. The short circuit allowance is twenty times the maximum demand, which has been calculated as 62.5A. The maximum voltage drop per metre of cable is 7 mV/A.m. Determine the appropriate size and type of sub-main cable to use for this installation.*

SOLUTION

To determine the appropriate sub-main cable for this installation, we need to consider the following factors:

* **Maximum Demand**: The maximum demand for the property is 62.5A. We can use this value to determine the current that the cable must be able to carry.
* **Distance**: The distance between the main switchboard and the sub-board is 18 meters. We need to consider the voltage drop along this distance.
* **Maximum Voltage Drop**: The maximum allowable voltage drop for the installation is 3%. We need to ensure that the voltage drop along the cable is less than this value.
* **Short Circuit Allowance**: The short circuit allowance for the installation is twenty times the maximum demand. We need to ensure that the cable can withstand this level of current

Based on these factors, we can use the following steps to determine the appropriate sub-main cable:

**Step 1: Determine the current**

The maximum demand for the property is . This is the current that the sub-main cable must be able to carry.

**Step 2: Determine the maximum voltage drop**

The maximum allowable voltage drop for the installation is

The maximum voltage drop per meter of cable is

We can use these values to determine the maximum voltage drop allowed for the cable.

Maximum voltage drop = Maximum allowable voltage drop x Distance x Current x Voltage drop per metre

Maximum voltage drop =

Maximum voltage drop =

So, the maximum voltage drop allowed for the sub-main cable is

**Step 3: Determine the short circuit allowance**

The short circuit allowance for the installation is twenty times the maximum demand.

Short circuit allowance =

Short circuit allowance =

So, the sub-main cable must be able to withstand a short circuit current of

**Step 4: Determine the cable size and type**

AS/NZS 3008.1.1 provides a table for determining the appropriate cable size for various installation scenarios. Using this table and the calculations from Steps 1 to 3, we can determine the appropriate cable size and type.

The cable should be rated for at least 90°C and should be suitable for conduit or buried installation.

For a 230V single-phase installation, maximum demand of 62.5A and maximum voltage drop of 0.037125V over 18 metres, we can use a copper cable.

According to the AS/NZS 3008.1.1:2017, the current carrying capacity of this size copper cable with PVC insulation, installed in conduit at an ambient temperature of 30°C, is approximately , which is greater than the maximum demand of 62.5A, and will result in a voltage drop of less than 3% over the 18-metre distance.