

# FRANKLIN AID



**Franklin Electric**

The Company You Trust Deep Down



Franklin Application/Installation Data (AID)... For The Professional Pump Installer and Driller

Issue 5 AU-NZ January/February 2011

## ELECTRICAL DROP CABLE

This edition of Franklin AID is to highlight the common trade practices within the pump industry, in regards to pump installations utilizing non submersible rated electrical drop cable. Franklin Electric would like to address the potential issue and shortcomings this presents to our products longevity.

Not all electrical cables are rated for use in submersible applications for extended periods of time, some commonly used cables will allow the ingress of water into the inner conductors and splice joint, this condition can result in premature failure or damage to both the cable, motor and control circuit. Points to take into consideration when selecting cables are;

- Cable selected is suitable for the environment it is to be used in, and
- Adequate in size to operate within the rated temperature of the cable, and
- Adequate in size to ensure the voltage drop is within 5% from the point of supply to the motor terminals, and
- Cable manufacturer rating is specifically specified for continuous use within a submerged state.

Although widely used in the industry, PVC sheathed cables are NOT Submersible rated, and should not be used in submersible applications. All major cable manufacturers have a range of cables specially designed for use in submersible applications. Cable ratings for submergence can be extremely different depending on the cables material properties and construction methods, below are examples of cable ratings.

- Submersible to 100 metres
- Submersible to 100 metres plus
- Submersible to 10 metres in waste water, up to 500 metres in all other types.
- Franklin Electric motor cables are rated to 2000 metres.

One common industry practice used within the pump industry is orange circular electrical cable; orange circular is not a submersible rated cable. Orange circular cable is classed as hydroscopic and will allow water to ingress into conductors over a period of time. Franklin Electric strongly advises that a submersible rated cable be used with all submerged pump installations.

Franklin Electric has discussed this topic with two of Australia's largest cable suppliers. The feedback about PVC – XLPE cables is these are not classed as suitable for submergence and that any warranty claims they receive would not be covered or compensation provided. They impose strict guidelines for the use of cables in this environment.

By using Non-rated submersible cables you fail to provide a duty of care to your employees and end user, this also increases your risk and liability as the installer, insurance claims may not be warranted by your insurer.

The following information was provided by two major Electrical cable suppliers Senior Cable Design Engineers on the subject of using Non submersible rated cables.

PVC materials inherently absorb water. The rate of water absorption (i.e. time for the water to fully pass through the outer sheath) depends on type of water, water pressure, the type of insulation, the thickness of insulation extrusion etc. but can reasonably be expected to be in the order of days/months.

The cable construction incorporates a tubed outer sheath over the laid up assembly (which is filled with non-hygroscopic fillers), and hence once the water has penetrated the outer sheath.

It can travel along the cable. This will especially occur if the cable is installed vertically. With continuing immersion, water will also eventually penetrate the insulation and enter the conductor. The insulation resistance will be diminished leading to additional electrical losses and an increase in cable temperature.

Water will now be in direct contact with the conductor and this is expected to feed the copper corrosion process. The PVC materials and the copper conductor will age more quickly due to the water and the presence of contaminants, chemicals and pollutants in the water may speed up the ageing. The cable life is expected to still be long with eventual failure, due to the water, taking many years.

Once water has entered the cable it can be expected to exit at the motor terminations at the bottom of the bore hole, potentially causing damage or failure of the pump and other associated equipment.

Please note that while suppliers are aware that non rated cables are being used in bore pump applications, they do not recommend the selection of non-submersible rated cable for these applications. Recommendation is to install cables which are resistant to moisture and water and can be permanently installed in water.

Franklin Electric has communicated with regulation body (ERAC) Electrical Regulatory Authorities Council. They have outlined the following conditions required to comply with electrical standards. ERAC is the council responsible for the liaison between the technical and safety electrical regulatory authorities of eight Australian States/Territories and New Zealand.

All eight States/Territories and New Zealand must abide by AS/NZS 3000, the Electrical Safety Regulation 2002 requires that electrical work is installed in accordance with AS/NZS 3000 - Wiring Rules. Reference within this standard is AS/NZS 3008.

AS/NZS 3008 is referenced in determining the correct cable size in regard to current carrying capacity, voltage drop and derating factors for typical Australian installation conditions.

Relevant clauses of AS/NZS 3000 which apply to the selection and installation of electrical equipment and installations are:

#### 1.7.1 Essential requirement

Electrical equipment, forming part of an electrical installation, shall be selected and installed to—

- (a) operate in a safe and reliable manner in the course of normal operating conditions; and
- (b) not cause a danger from electric shock, fire, high temperature or physical injury in the event of reasonably expected conditions of abnormal operation, overload, fault or external influences that may apply in the electrical installation; and
- (c) be installed in accordance with the manufacturer's instructions.

#### 3.3.1 General

Wiring systems shall be able to operate safely and shall function properly in the conditions to which they are likely to be exposed at the point of installation.

#### 4.1.3 External Influences

All electrical equipment shall have characteristics appropriate to the conditions to which it is likely to be exposed, to ensure that the electrical equipment is able to function properly at the intended point of installation.

***The use of non-submersible rated cable voids motor warranty.***

Electrical Drop Cables available within Franklin Electric Water Systems Price List are rated for submergence up to 1000 metres in borehole application (potable water).

**Should you require any further information about Franklin Electric submersible electric motors for application, installation or maintenance, please contact Franklin Electric (Australia) or visit our website at [www.franklin-electric.com.au](http://www.franklin-electric.com.au)**

---

## TOLL FREE HELP FROM A FRIEND

Phone Franklin toll-free on **1300 FRANKLIN** for answers to your installation questions on submersible pumps and motors.

When you call, we will offer assistance in troubleshooting submersible systems and provide answers to your pump and motor application questions.

**[www.franklin-electric.com.au](http://www.franklin-electric.com.au)**



**Franklin Electric**

**Toll Free: 1300 FRANKLIN  
[franklin-electric.com.au](http://franklin-electric.com.au)**