

SUBMERSIBLE MOTORS

ISSUES with STRAY DC VOLTAGE and ELECTROLYSIS

We have been notified of motor failures within 3-6 months of installation, with the initial analysis being caused by 'corrosion'. This perceived corrosion could be induced by water composition (electrolysis) and/or stray DC voltage. In some cases, both affects are in play simultaneously.

In some instances the water quality may have contributed to the corrosion failure through the many possible combinations of the compounds within the bore water acting on the surfaces of the motor. High polar compounds, (salts) when acting in conjunction with other acidic or alkaline compounds suspended in water, can behave differently around a charged electrical device, initiating and causing small pitting holes leading to water ingress into the motor causing it to go down to earth.

However, the water composition may have no visible effect on water quality for stock or crop watering, eg; green grass and healthy livestock. Similarly, over time the water composition of the bore may change. These changes can relate to weather patterns, water levels, neighbour water usages and nearby property runoffs to highlight a few. Minor water composition changes need to be considered should rapid corrosion be noticed in an upgraded bore. A motor that failed after 15 years may have only had aggressive actions against it for a few recent months, yet its replacement fails too after a short period. Time does not necessarily indicate the full story.

In these types of conditions we would recommend the use of a sacrificial anode or upgrading to a 316SS construction to minimize the effects. Ultimately, the life of the motor may be determined by the water composition.

The other site induced affect that causes premature motor failure is Stray DC voltage.

Stray DC voltage is induced by a minor voltage leak into and through the electrical earth system. This stray voltage can flow through the motor using it as an anode, further energizing it and aggressively attracting damaging water compounds, attacking the motor, leading to corrosion type affects and possible failure. Due to the continual externally produced current being sent down to the motor (whether the motor is on or off) via the ground/earth cable, the failure of the motor can be rapid, from as quickly as a few weeks to a few months.

Stray DC voltage is initiated from, yet not limited to such things as: electric fences, battery chargers, telephone and communication lines, tram or train lines, over head power lines and other farm and industrial equipment.

Usually the stray DC voltage is caused when the above systems are inadvertently or wrongly connected (a gal pipe, steel fence post,) to the ground/earth system used for the submersible motor.

Eliminating stray DC voltage is difficult and the source needs to be identified and isolated. The aim is to minimize the affect or to completely stop it. Stray DC voltage has been known to cause damaging affects over a 5-kilometre radius!

To test if you have a DC source, you should measure with a DC voltmeter between the motor ground and the power supply ground. If you read 4 millivolts or higher, the site has a stray DC voltage condition that is very likely the cause of rapid electrolysis affecting the motor. You will need to isolate and/or remove this source to ensure prolonged motor reliability and longevity.

Failure from corrosion, whether water compound or stray DC voltage related are not warrantable conditions, as they are site induced.