



MOTORS AND ELECTRICAL POWER SUPPLIES

The motors supplied as original equipment on Elevator Concepts LTD single phase units requiring 2 horsepower or less are dual voltage rated for 115/208-230 volts at 60 Hertz. Single phase motors above 2 horsepower are usually rated for 230 volts at 60 Hertz. Power supply deviations of plus or minus 10% are considered as acceptable by industry standards, but are not specifically incorporated in the manufacturer's specification. This would equal a low voltage range of 104 - 126 volts, and a high voltage range of 198 - 242 volts, as 220 volts is typically used as median high voltage. These voltage ranges are typical of most primary power sources.

Motors can fail in two ways, mechanically and electrically. Mechanical failures are not common, and are generally limited to bearing failure. Single phase motors usually have a mechanical starting switch which can also fail. Electrical failures make up the vast majority of motor problems.

A motor has very few electrical components - lead wires, windings, and capacitors in some cases. Winding failure is by far the most common cause of all motor failures. Windings fail when the insulation fails. Insulation failures occur from either mechanical damage (which is rare) or from heat, which occurs when the power conducted through the winding is outside of design parameters. The design horsepower and voltage of a motor basically determines the design of the windings. A combination of wire size and insulation type will be determined from these factors.

Heat occurs from copper loss in the windings, which occurs when either high voltage causes current to flow at an excessive rate, or high current flows in the wire. This excites the copper molecules to the point where the friction created between molecules creates sufficient heat to warm the area surrounding the copper, which includes the insulation.

High voltage occurs by connecting the motor to an incorrect power supply. High current can be due to one of two causes - low voltage or excessive loading. A motor will always attempt to drive the load connected to it. If the voltage is too low, or the load is greater than design parameters, the motor will draw extra current to "compensate". If the extra current is excessive, the resulting heat may cause premature degradation of the insulation.

The insulation used in motor windings is a thin film of varnish. Heat degrades the bond of the varnish to the wire. All windings will eventually fail, depending on the amount of heat and time. The varnish bond in a winding that heats up very little may not fail for over 100 years; the bond in a winding that gets very hot will fail almost instantly. When the bond fails, the bare wire will short circuit within itself or to ground. If the motor has proper protection, the failure will be limited to the insulation. If the protection is not correct, excessive current will flow due to the short circuit, causing a catastrophic failure and possible fire.

The most effective means for insuring long motor life is to maintain proper electrical current, and not exceeding the design load. Elevator Concepts LTD provides various means to protect against catastrophic failure due to overloads; however, the rated capacity of any given unit should not be exceeded to insure maximum motor life.

Elevator Concepts LTD has no control over the current supplied to the unit once it is installed. Low voltage is the most typical electrical supply problem, due usually to line loss from undersize conductors or too much current demand on a given circuit. Line loss problems should be corrected by installing the proper size conductor. Current demand problems should be corrected by either reducing demand or increasing capacity of the service. High or low voltage can occasionally be attributed to the primary power source. In these cases, the power provider should be consulted for appropriate remedial measures, which may include the installation of a buck-boost transformer. In all cases, qualified personnel should check the final electrical installation to insure the safe and dependable operation of the equipment.