

General Motor Knowledge
Part 12

Insulation System

by
Lynn R. Dutro
August 12, 1993
GMK12.wp5

The system of insulating materials used in a Morrill motor is thoroughly documented in our UL and CSA reports. This is one of the first systems that an inspector will want to see. It is the electrical foundation upon which the motor is built.

The insulation system contains "MAJOR insulation components" and "MINOR insulation components". Major insulation components include the GROUND insulation, TURN insulation and VARNISHES. Minor components include crossover insulation, splice insulation, leadwire insulation, tapes, tubing and sleeving. The insulation system used at Morrill has been carefully selected and tested to provide acceptable life at motor winding temperatures up to 130°C (266°F).

Ground insulation separates the magnet wire from the bare steel of the stator laminations. This is the insulation that prevents the electricity necessary to operate the motor from flowing out of the windings into the motor frame, then through the appliance and finally into our most important customer, you. The epoxy powder coating applied in our "Possis" operation is our ground insulation. The epoxy coating is tested to insure that it covers all areas of the stator that are to be wound. The thickness of this coating must be routinely measured and maintained above a minimum thickness. The coating itself must be checked for hardness and adherence to the stator steel.

The turn insulation is the thin insulating coating applied to the magnet wire by the manufacturer. This coating insulates each turn of magnet wire from the others. It prevents the current from being shorted from one turn to another.

No insulating material or process is perfect. The magnet wire coating has microscopic "pin-holes" and there are places where we have cut or scraped the coating. The epoxy coating may also have pin-holes. After being wound, our stators are dipped in varnish. This varnish coating has several purposes. It fills any "pin-holes" in the magnet wire coating or epoxy. This varnish "seals" the windings from moisture. It binds the wires together to make the winding stronger and more resistant to damage. It also improves heat transfer.

This has been a brief discussion of the "major" components of our insulation system. Next month we will look at the "minor" components and review our insulation system.