



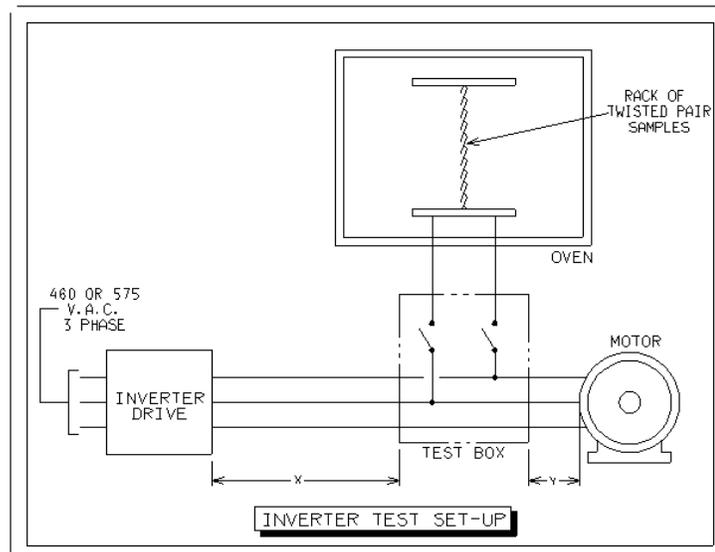
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## Testing Inverter Duty Magnet Wire Insulation

There are no industry recognized standards for testing magnet wire insulation for inverter duty motors. At Essex we use a standard motor/drive/cable combination, and subject standard twisted pairs of magnet wire to these electrical stresses while also being subjected to higher temperatures in thermal aging ovens. These tests compare the longevity of different insulations with each other. This type of testing duplicates the electrical stresses that the motor windings are subjected to, and also includes the traditional thermal aging stresses. In addition to the inverter waveshapes, we also test magnet wire insulation using sinusoidal 60 Hertz for comparisons.

### Inverter Testing

Our testing arrangement consists of a three phase drive (460 or 575 volt), connected through a long cable to a switch box, and then to an integral horsepower motor. The switch box supplies power to the samples in the oven, and allows the power to be disconnected from an individual sample without removing it from the oven. We are using a standard thermal aging rack of twisted pairs connected between two of the phases at the motor end of the cable.



Samples are tested in groups of five or ten until the samples deteriorate to the point that an arc between the legs of the sample occurs, which trips off the drive. The power to the sample is then turned off and testing is resumed in this fashion until all of samples are shorted out. The failure time for each sample is recorded, and the average is calculated for each group to be used for comparison purposes.

### **Voltage Endurance Testing**

Our voltage endurance testing is done in a similar fashion to the inverter testing except that the power source is a 60 Hertz sinusoidal waveshape instead of inverter waveshapes. The twisted pair samples are in an oven and are connected through a switch box to the test set. The fault circuit activates when a failure (arc) occurs, and the time to fail is recorded.

### **Elevated Temperature Testing**

The reason that both inverter testing and voltage endurance testing is done at elevated temperatures is to simulate both the electrical and thermal stresses that the wire will be subjected to in service. It also shortens the testing time.

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