



**Shop Tech Talk April 2009**

**Q. Explanation of PI (Polarization Index) and DAR (Dielectric Absorption Ratio)**



When testing the Insulation Resistance of an electric motor we usually use a Megger. This tester can perform a single test for approx. 60 secs, called a Short-Time or Spot-Reading Test, giving a reading of so many ohms to ground. Insulation resistance should be approximately one megohm for each 1,000 volts of operating voltage, with a minimum value of one megohm.

**What is a DAR Test**

The ratio of two time-resistance readings (such as a 60-second reading divided by a 30-second reading) is called a dielectric absorption ratio. It is useful in recording information about insulation as part of a predictive maintenance program.

**The PI Test is a 10/1-minute DAR**

If the ratio is a 10-minute reading divided by a 1-minute reading, the value is called the polarization index.



With hand-cranked Megger instruments, it's a lot easier for you to run the test for only 60 seconds, taking your first reading at 30 seconds. If you have a line-operated or a new type electronic Megger instrument (like Megger MIT 420), you'll get best results by running the test 10 minutes, taking readings at 1 and at 10 minutes, to get the polarization index.

**Condition of Insulation Indicated By Dielectric Absorption Ratios \***

Insulation Condition	60/30 –second Ratio (DAR)	10/1– minute Ratio (PI)
Dangerous	-----	Less than 1
Questionable	1.0 to 1.25	1.0 to 2***
Good	1.4 to 1.6	2 to 4
Excellent	Above 1.6**	Above 4**

\* These values must be considered subject to confirmation and relative,subject to experience with the time-resistance method over a period of time

\*\* In some cases,with motors, values approximately 20% higher than shown here indicate a dry brittle winding which will fail under shock conditions or during starts.

\*\*\* These results would be satisfactory for equipment with very low capacitance such as short runs of house wiring.