

TYPES OF TESTS

OSHA requires a 75,000 volt test under wet conditions for fiberglass. The details of how to perform the test and the pass/fail criteria are not contained in the OSHA wording but must be taken from the IEEE 978 guide. This guide gives the requirements for the conductivity of the water, how it is to be applied, and a recommended acceptance criteria of a steady or decreasing leakage current.

In order to develop a portable tester that operated at a voltage and distance other than the OSHA recommended 75,000 per foot, we had to determine how the stick would actually fail under the OSHA setup. The two possibilities were if the tool flashed over prior to 1 minute or if the leakage reading were increasing. After reviewing test data collected over many years of full scale testing, it was observed that flashovers were nearly always preceded by unstable leakage readings, and that these readings occurred with regularity at levels above 200 micro amperes. It is conceivable that problems would result at, or slightly below, 200 micro amperes, however we feel that 200 micro amperes is as close to an exact match for the OSHA requirement (based on leakage current) as one could choose. Since the possibility for error does exist a safety factor should be used, as such we currently recommend that 75 micro amperes be used as the cutoff point for wet test acceptance. This was taken into account in our design and can be seen on the upper scale labeled “wet test” where the red range starts.

Once the acceptance value, based on leakage current, has been established, all that was left to do was to design a tester that will measure leakage current at a reduced voltage and then amplify the current reading to correlate with the full scale voltage values. In other words, the reading the operator receives will be representative of the reading he would have received at 75,000 volts per foot. To provide the capability of a dry test, to check for defects not measurable with the wet test, the tester was equipped with a more sensitive scale, which is selectable from the front panel. While the dry scale appears to be five times more sensitive from the fact that the full scale reading is 40 micro amperes instead of 200 micro amperes, it is actually more than six times more sensitive. This is because the dry readings on the dry scale are referenced to 100KV per foot instead of 75KV per foot. This is the most typical voltage used for dry stick testing by OSHA, ASTM, and IEC to name a few.

One factor that does make portable testers more critical than a full scale test is that the electrode spacing is usually less than one foot. This will enable the tester to detect a smaller defect as it will be a larger portion of the stick being tested. Here we have a 3 inch defect on a 4 foot tool. If we space our electrodes at 12 inches, we will have 9 inches of good pole insulating the 3 inch defect. If we reduce the electrode spacing, the defect becomes a larger percentage of the tool being tested resulting in an increased leakage reading and a more sensitive test. Internal defects can also be detected as they are capacitively coupled with the electrodes. This enables the tester to “see inside” the tool. While some have a hard time accepting that current will flow through good dielectric material to detect the internal defect, it is really no different than what happens on the outside of the tool. There will almost always be sections of good fiberglass surrounding the defects. The capacitive coupling allows these defects to be detected.