

BREAKDOWN TIMES

14. Final Comments

The statistical analysis applied to the insulating fluid data was based on simple linear regression and one-way analysis of variance. Other approaches are also possible.

One of them is to assume that the data follows a Weibull distribution. The distribution is specified by two parameters that can be estimated from the data. The Weibull distribution is widely used in engineering as a model for the distribution of time to failure. Engineering experiments confirm that, for a fixed voltage level, time to breakdown has a Weibull distribution.

With this model, it is possible to estimate the mean breakdown time at any given voltage level. For the details, look at the paper "Graphical Analysis of Accelerated Life Test Data", by W.B. Nelson published in *IEEE Transactions in Reliability*, R21, No.1, pages 2-11, 1972.

The experiment described here was run long enough to observe the failure of all the insulation specimens tested. However, sometimes it may take a very long time for all specimens to fail, and it is deemed necessary to terminate the experiment before this can happen. In this case, one does not know the exact lifetimes of certain specimens and a lower bound of the breakdown time is only available (censored data). In this case, special statistical techniques have to be applied to the data. This problem for the insulating fluid data is studied by J.F. Lawless in the monograph *Statistical Models and Methods for Lifetime Data* (Chapter 4).