Cable Lore

The Historical Basis For Judgment

Number 60

Date: December 8, 1978

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ANACONDA

In the past, we answered questions concerning cable longevity with data gathered through experience and observation. Our answers relied heavily on engineering judgments which were based on laboratory tests and the field performance of various cables.

The obvious major shortcoming of this procedure was the lack of long-range data to substantiate the soundness of our judgments.

Historically, power cable evaluations and judgments were based on a procedure much like the following.

The physical, chemical and electrical properties of cables and materials were measured and quantified. This information was classified as original properties and formed the data base for comparison after accelerated testing.

Following this classification, realistic and accelerated environmental testing of the cables was performed to determine the maximum resistance to the simultaneous effects of the total applications environments. For example, the EMA test was administered for below grade applications, cyclic aging tests for above grade, and LOCA tests for nuclear applications.

Test Results Point to Areas of Improvement

Favorable results in the complete test program provided a basis for making an engineering judgment. Data from these tests were compared to specification requirements of stock competitive cables. Improvement in key properties was usually sufficient to consider the cable or material appropriate for commercial production.

The conversion from butyl rubber insulated power cables to EP insulated power cables is a good example of this procedure. In authorizing the changeover, we exercised engineering judgments based on 18 years of laboratory tests and field experience with butyl rubber in a broad range of environments. As of the moment, we can say butyl cables should last more than 25 years based on actual performance records.

Comparative laboratory tests showed EP to be not only the equal to butyl rubber, but superior in most properties. It was the judgment of our cable engineers that EP insulated power cables could be rated higher than butyl rubber in both temperature and voltage with at least as high a probability of survival.

To date, our engineering judgment has been excellent, as evidenced by our more than 100-year power cable service record. And in general, our customers have been satisfied with our performance forecasts.

But in recent years, increasing numbers of customers want to see the data on which we base these forecasts. They want assurances that new types of extruded dielectric power cables will provide safe, reliable and reasonably priced transfer of power; and of course, they also want information on the remaining life of in-service cables.

Testing Under Simulated Conditions Provides Needed Information

At this time, we cannot (nor can anyone else) provide completely satisfactory data to justify an estimate of cable life. Quite simply, the basic problem is to find some way to obtain estimates of longevity without waiting the necessary 40-year test period to obtain the data.

To simulate this time period, test procedures must be accelerated, and the key questions become whether the right factors are being accelerated and whether the correct relationship between life time and the accelerating factor have been established.

IPEC uses the traditional methods for cable and material evaluation and the newer statistical methods of evaluation. These new methods, which will be discussed in subsequent editions of *Cable Lore*, combined with a better understanding of the degradation mechanisms, show considerable promise for helping us estimate cable longevity more accurately.

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