ANACONDA

Cable Lore

BY POWER CABLE ENGINEERING AND RESEARCH

Issue No. 4

June 25, 1965

THE MAJOR PREREQUISITE OF AN INSULATED CABLE IS THAT IT REMAIN ELECTRICALLY STABLE WITHIN THE LIMITS OF THE INTENDED APPLICATION

The basic function of an insulated cable can be summed up in two words - transmit power. To perform this function effectively, the electrical characteristics of the insulated cable must remain stable and predictable within given limits. This fundamental requirement is the basis for a major share of research and development effort.

In a broad sense, the environments which define the limits of a cable application can be divided into four areas:

(1) Physical Environment

Both cable installation and actual operation must be evaluated. Generally, stationary-type cables are exposed to damage during installation and portable cables during actual service. Severe bending, compression, cutting, abrasion, and excessive tension can all contribute to a mechanical type of damage which reduces the reliability of a cable installation.

(2) Chemical Environment

Cable components are chemical compounds or mixtures of compounds. As such their reactions are predictable and subject to some control. Neoprene and polyethylene, for example, are chemically as different as sugar and salt. Chemical environments, such as free chlorine, oil, ozone, etc., can influence the choice of materials for insulations and jackets.

(3) Thermal Environments

A basic law of chemistry - the speed of a chemical reaction is doubled with a $10^{o}C$ rise in temperature - plays a vital part in cable application. Elevated conductor temperature or high ambients will accelerate the degradation of insulations and jackets.

(4) Electrical Environment

Magnetic and static electrical fields can influence the desired stability of a cable - for example, causing interference of signals in data logging control cables requiring adjustments in cable design.

It is readily apparent that no two applications are exactly alike and that few will operate within the framework of all the limits described. This allows latitude in choice of material and cable design to obtain a balance between economy and sound engineering.

Steve Bunish