

## FOREWORD

Electrical cable can be considered as just a conductor with an overlying insulation or an exterior shield or jacket. Perhaps with this naive, simplistic concept is part of the reason that cable engineering, especially for power cable, has been largely neglected in current electrical engineering education in the United States with its emphasis on computers, electronics, and communication. But power cable does electrically connect the world! The history, so interestingly presented in Chapter 1 of this book, shows how the subject evolved with both great success and sometimes unexpected failure.

As this book emphasizes, cable engineering is technically very complex. Certainly electrical, mechanical, and even to some extent civil engineering are involved in interrelated ways. Many other disciplines—physics, inorganic chemistry, organic (primarily polymer) chemistry, physical chemistry, metallurgy, corrosion and with tests and standards in all of these areas—are concerns. Of course, it is impossible in one book to deal with all of these aspects in a completely comprehensive way. However, the various components of power cables are discussed here with sufficient detail to provide an understanding of the basic considerations in each area. Reference to detailed sources provides a means for those with greater interest to pursue specific subjects.

The importance of factors involved in different types of cable installation is stressed. Long vertical cable runs have special problems. Installation in ducts may lead to problems with joints, terminations, elbows, and pulling stresses. At first, cable with extruded insulation was buried directly in trenches without recognition of the then unknown problem of “water treeing” in polyethylene, which was originally thought to be unaffected by moisture. After massive field failures, well over a thousand papers have been written on water treeing! Field failures can involve many factors, e.g., lightning, switching surges, repeated mechanical stressing, and swelling of voltage grading shields in contact with organic solvents such as oil and gasoline. It is important to recognize how such

diverse factors can affect the performance of cable in the field.

*Electrical Power Cable Engineering* meets a need to consider its complex subject in a readable fashion, especially for those with limited background and experience. Yet sufficient detail is provided for those with greater need in evaluating different cables for specific applications. Most of all, the supplier of materials for cables can obtain a better understanding of overall problems. Also, the experienced cable engineer may come to recognize some of the parameters of materials with which he or she has not worked previously.

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