

DESIGN, INSTALLATION, AND OPERATION OF PIPE-TYPE CABLE SYSTEMS

29 Sep. – 1 Oct. 2008 (\$1495)

St. Pete, Florida

Pipe-type cable systems may be buried, but they are not dead! They have a long, reliable history and continue to be installed today even as XLPE cables gain popularity. The unique aspects of pipe-type cable systems require special considerations, and many utilities have lost the senior level experience necessary to design, operate and maintain these systems. This 3-day course focuses on the design, ampacity, specifications, installation, uprating, maintenance practices, dielectric fluid-handling systems, and life evaluations of both high-pressure gas-filled (HPGF) cables and high-pressure fluid-filled (HPFF) cables.



Overview: The course will explain the unique aspects of pipe-type cables as compared to other cable types and then discuss various topics regarding the reliable operation of these systems including cathodic protection systems, pumping plant requirements, dissolved gas analysis (DGA), cable ampacity, uprating methods using fluid circulation and forced-cooling, and numerous other topics relevant to pipe-type cables. [1.8 CEUs]

UNDERGROUND T&D CABLE AMPACITY: PRINCIPLES, SOIL EFFECTS, PRACTICAL CONSIDERATIONS

6-8 October 2008 (\$1495)

St. Pete, Florida

Presented jointly by Geotherm, Inc. and PDC

Underground cables generally have lower ratings than the utility's overhead lines - and the dollars per ampere are much higher. Both over-designing and under-designing are very costly. Therefore, it

is desirable to confidently rate the cables near their ultimate limit. Important issues include:

- ◆ Reducing cost now vs. uprating in the future
- ◆ Operation above standard temperature levels
- ◆ Extruded-dielectric cables in steel pipe
- ◆ Ampacity audits and uprating
- ◆ Soil dry-out - is it really an issue?
- ◆ Shield/sheath bonding on XLPE cables
- ◆ Fluidized Thermal Backfill™, other fills
- ◆ Temperature monitoring; dynamic rating

The course has been taught to more than 200 engineers and provides good analytical background, plus important hands-on experience in mixing controlled backfills and performing soil thermal property measurements.



Overview: The course will focus on discussing important topics regarding ampacity and the effects of soil – the most significant variable and often the least understood – on ampacity, installation design and operation. Thermal measurement instruments and techniques, coupled with a better understanding of soil properties and backfill materials, permit optimized ampacity results. While PC-based ampacity programs exist, a good understanding of the basic principles and numerical techniques (e.g., Neher-McGrath, IEC-287/853) is extremely important. Discussion topics will include trench optimization and suggested approaches for proper modeling of daily, weekly, and even monthly load shapes to take into account “cool-down” periods during load cycling, which permit higher loading during peak periods. [1.8 CEUs]

EXTRUDED UNDERGROUND TRANSMISSION: DESIGN, INSTALLATION & OPERATION

20-22 October 2008 (\$1495)

St. Pete, Florida

Much of the world is moving towards extruded underground transmission cables because of increasing successful applications at voltages up to 500kV and low maintenance as compared to pipe-type and self-contained alternatives. We will discuss the unique aspects of HV and EHV extruded cable systems.



Overview: During this course, we will discuss the design aspects, including many of the analytical studies, installation considerations, factory and commissioning tests, general operation considerations, utility power system effects, and maintenance practices, focusing on XLPE-insulated cables along with other extruded insulation types. [1.8 CEUs]

UPGRADING, UPRATING & RECONDUCTORING TRANSMISSION LINES

27-29 October 2008 (\$1495)

St. Pete, Florida

Power transmission owners and operators need to develop new line designs and to find ways of increasing the capacity of existing lines that are acceptable to the public, reliable, and which require only modest capital investment. Long lead times for new lines, limited availability of right-of-way, and increasingly complex procedures for applications and permits justify increased sophistication in making lines that are more compact yet capable of higher power flow levels.

Overview: This course addresses traditional and novel methods and materials for maximizing power flow on new and existing transmission lines. It explores the tradeoffs between reducing visual

impact and operational reliability, between capital investment and increased power flow.

Both electrical and mechanical aspects of line design and modification are covered within a framework of making smart economic choices. Both experienced designers and beginning engineers can profit from the presentations. Some topics related to underground cables are included.

[1.8 CEUs]

UNDERGROUND CABLE SYSTEMS: PRINCIPLES AND PRACTICES

10-12 November 2008 (\$1495)

St. Pete, Florida

Presented jointly by

Power Cable Consultants, Inc. and PDC

Utilities increasingly need to evaluate underground cable alternatives, as overhead rights-of-way become more difficult to locate, and as regulatory agencies require increasing detail on the technical issues and costs associated with underground cables. When a cable is going to be installed, proper design engineering and construction methods can provide a reliable system at a substantially lower cost.

Overview: Cable utilization practices are changing rapidly, as regards system types, design tools, suppliers, installers, installation methods, accessories, configurations, etc. This course is intended to provide the engineer with up-to-date information on all aspects of underground transmission systems, from initial planning through design optimization, to final operation and maintenance, including failure repair. [1.8 CEUs]

TRENCHLESS TECHNOLOGY: APPLICATIONS FOR UNDERGROUND CABLE SYSTEMS

13-14 November 2008 (\$1295)

St. Pete, Florida

Presented jointly by

Jacobs Civil, Inc. and PDC

This course is directed toward those who need to evaluate, design, and install underground T&D cable systems, and construction and utility contractors who install and supervise the cable systems. The course addresses cable design and selection, problems encountered on trenchless projects and gives hints on how to avoid them

on your installation. This course is taught by both trenchless technology and cable experts.



Overview: This course presents detailed information on planning, designing, preparing specifications, selecting contractors, and installation techniques using trenchless technologies. Soil, slurry, grout thermal analysis and modification are addressed. Cable design considerations are discussed in detail, including the effects of steel and plastic casings on cable ampacity.

[1.2 CEUs]

Participants: PDC courses are intended for engineers and field personnel concerned with the planning, design, installation, operation and maintenance of underground cables, overhead lines and power transformers. Any of these courses can be presented on-site at utilities and elsewhere. Please give us a call to discuss your interests and so we can recommend the best courses for you to attend.

General Course Considerations: Each course includes a comprehensive course notebook, coffee breaks, and lunch. The courses are scheduled so that there is adequate time to ask questions during the formal presentation, during breaks, or after class. Students are responsible for travel and living expenses. Based on favorable comments from past students, most of our scheduled courses are held in the St. Pete/Tampa, FL area where we have arranged reduced rate hotel room blocks at The Alden.



Continuing Education: PDC is a Continuing Education Provider in the State of Florida (#CEP0003531) and is an

Approved Provider of quality training by the International Association of Continuing Education and Training (IACET). IACET is recognized by many professional engineering licensing organizations in the United States and in other parts of the world. **Learning outcomes** for our courses are available on our web site or by request.

We will issue students a course completion certificate indicating the number of Professional Development Hours (PDHs) and Continuing Education Units (CEUs) based on national guidelines and the number of classroom hours for courses that are satisfactorily completed.



T&D ENGINEERING SERVICES

In addition to courses, PDC offers engineering services in a variety of areas including:

- Rating/uprating of overhead and underground lines and power transformers
- Initial planning studies to compare the suitability – both technical and economic – of various cable & conductor options
- Environmental impact reviews, including support in permit applications and hearings
- Purchase and installation specifications
- Bid preparation and proposal evaluation
- Review of vendor's drawings and calculations
- Client representative for factory inspection and acceptance tests
- Preparation of operation & maintenance manuals, and on-site training
- Evaluating novel materials and installation techniques
- Equipment life evaluation and extension
- Assessment and replacement of aging conductors

Power Delivery Consultants, Inc.
28 Lundy Lane - Suite 102 Ballston Lake, NY 12019
Telephone: 518-384-1300 Fax: 866 667-1725
info@pdc-cables.com

Find more details and registration information at our web site
<http://www.pdc-engineering.com>

Or give us a call and we will mail registration material

PDC Power Delivery Consultants, Inc. 2008 *Educational Program*



Our courses are presented by practicing engineers with extensive analytical and field experience.

Design, Installation & Operation of Pipe-Type Cable Systems (29 Sep.-1 Oct.)
Robert O. Wilkinson; J.A. Williams

Underground T&D Cable Ampacity (6-8 Oct.)
D. Parmar (Geotherm); E.C. Bascom III

Extruded Underground Transmission: Design, Installation & Operation (20-22 Oct.)
E.C. Bascom III, J.H. Cooper

Upgrading, Uprating & Reconductoring Transmission Lines (27-29 Oct.)
J.R. Stewart (Consultant); D.A. Douglass

Underground Cable Systems: Principles and Practices (10-12 Nov.)
T. Aabo (Power Cable Consultants); J.A. Williams
Trenchless Technology Applications For Underground Cable Systems (13-14 Nov.)
S.R. Kramer (Jacobs Civil, Inc.); J.A. Williams

We are an IACET-approved continuing education provider of quality training.

