ENERGY

COURSE SWITCHING IN POWER DISTRIBUTION & TRANSMISSION SYSTEMS
Breaking - switching off - de-energization
In this large section, we deal extensively with the transients that are involved in the interruption of current under various service situations and in various systems. Interruption of terminal faults, transformer secondary faults, short-line faults, capacitive current, out-of-phase faults and inductive load current are discussed in detail. Practical examples are highlighted and several case studies are given to gain understanding of the peculiarities of each situation. The general thought here is the transient recovery voltage, that appears after current interruption. This transient is different for every switching duty, and understanding of this is crucial for specification of circuit breakers for your special application. Also treated here is failure of a breaker to interrupt current, possible reasons and consequences for the system.

Technology
Here, derived from generic interruption principles, we present a vast range of technical solutions that are adopted to cope with the great variety of duties that a single breaker must handle. It is placed in an historic perspective, and ranges from vintage oil technology to modern SF6 and vacuum circuit breakers. Gas insulated switchgear (GIS) is a major keyword here. This section includes strengths and weaknesses of the various technologies. Special switching devices, such as (GIS) disconnectors, generator circuit breakers, bypass switches for series capacitor bank are included, as well as modern switching strategies such as controlled switching. The special features of SF6 gas and vacuum circuit breakers are highlighted.

Standards
Standards for circuit breakers are discussed here. IEC and IEEE standards on circuit breakers are treated, as well as their background and their foundation in the networks. Requirements of circuit breakers, in the context of standardised wave shapes of current and voltage, and their description by parameters are highlighted.

Testing and certification
Here the process of testing and certification is treated. Today’s practice in testing is highlighted, as well as test laboratories, test circuits, including synthetic testing and its secrets. This section includes a tour to KEMA’s laboratories, the largest in the world. An important part is devoted to the understanding of type test certificates and a brief tutorial into critical reviewing such certificates, having in mind your specific application in service.

Operational aspects
Although the course is not primarily focussed on operation, light will be shed on various operational aspects directly related to the breaker. Examples are electrical endurance issues and reliability surveys and their backgrounds.
Practical information

This three-day course will be held in Arnhem, the Netherlands. The training and all material will be in English. To encourage active participation, the number of participants is limited to 25. The minimum number of participants is 10. Places will be allocated according to the date on which the registration is received. The course may be cancelled or rescheduled if the number of participants is insufficient.

A course book, PowerPoint presentations and videos are used during the course.

For the following items, please refer to the registration form:
■ Course dates
■ Venue details
■ Registration fee
■ Payment & cancellation conditions
■ Hotel accommodation

The registration fee includes the full-color course book, three lunches, two dinners (with the instructors) and refreshments during the day. Travel costs and hotel costs are not included. Hotel accommodation can be arranged through DNV GL, but payment has to be made directly to the hotel.

For more information and to register please visit: www.dnvgl.com/energy-academy.

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