

Transmission & distribution training courses

KEMA Academy



Energy sources are becoming increasingly diverse and geographically distributed. Thus, in the future, energy generation will take place in many more locations, often driven by market mechanisms. Both new and existing networks will transmit and distribute this energy to customers.

To accommodate this increased diversity, electricity networks worldwide are constantly being expanded and reinforced to provide businesses and consumers with access to sufficient energy, and thus prosperity. The future quality of supply, performance, risks and costs are all key factors in this undertaking.

KEMA understands these developments and is actively participating in creating this future. We already perform projects focused on creating flexibility in networks using innovative tools and techniques. KEMA guides network owners to improve their performance and standardize for improved reliability and lower costs. This experience is translated to you in our training courses.

For a current overview of our training program and to register, please visit www.kema.com/academy.



In-company & customized training courses

At the client's request KEMA can also provide in-company and customized training courses. The course can then, for example, deal with actual cases from your business operations, or future scenarios sketched out by you. We are flexible in this.

Overview of transmission & distribution training courses

Course	Description	Subjects	Result	Target Group
Asset management one-day training course English language	The actual development of asset management is a gradual and step-by-step process. Each step in the development chain can only be successful once the preceding steps are in place. Introducing any new process represents a change, and calls for employees to let go of old habits and embrace new ones. People need to be trained and coached in such a way that continuous improvement is established, and goals are reached.	<ul style="list-style-type: none"> • Introduction & context • Process & organization • Risk based asset management • Certification & PAS55 • Maintenance improvement • Replacement strategies • Condition & remaining lifetime assessment 	<ul style="list-style-type: none"> • Understanding of modern asset management practice • Knowledge of the conditions and methods needed for risk and asset management • Insight in how to develop your own asset management process 	Asset managers, technical managers, maintenance managers, senior consultants and policymakers.
Condition assessment two-day training course Dutch language	Assessing the condition of electric infrastructure components is increasingly important. Knowledge about component condition is used for the optimization of maintenance, overhaul, replacement, life cycle cost management, risk management, etc.	<ul style="list-style-type: none"> • Condition assessment approach • Effects of ageing on components • Life cycle costing 	<ul style="list-style-type: none"> • Understanding of the difference between status determination and condition assessment • Knowledge of how to use various measurement techniques and interpret the results • Recognition of defects, indicators and trends • Knowledge of defects, ageing and failure risks 	Operational managers, engineers, maintenance planners.
Condition & remaining lifetime assessment two-day training course English language	Substation equipment, such as transformers, reactors, circuit breakers and cables, represent a major capital investment in power stations and grids. Although subject to increased aging and wear, many components perform well even after their economic lifetime has expired. Extension of service life is therefore a serious option for the purpose of reducing investment costs. On the other hand, it may also increase the probability of failure. This course gives you an insight into modern assessment methods and techniques.	<ul style="list-style-type: none"> • Introduction • Methods & techniques • Risk based asset management • Condition assessment of transformers • Condition assessment of switchgear • Condition assessment of cables • Power failure investigation • Cases 	<ul style="list-style-type: none"> • Understanding of component degradation and failure • Knowledge of the methods for assessing condition and remaining life • Insight in how to develop your own set of methods and techniques 	Asset managers, operational managers, maintenance managers and engineers working at transmission or distribution network operator companies, contractors, service providers or in large industries.
Decision making under uncertainty English or Dutch language	Network planners and asset engineers have to make a lot of decisions in an uncertain world. KEMA has developed a structured method for tackling all types of decisions and incorporating the uncertainty into the decision. Practical examples for grid owners are included in the training sessions.	<ul style="list-style-type: none"> • Objective and well-founded decision-making • Problem definition • Dealing with uncertainty • Bayes' method, least regret • Working with scenarios • Portfolio management • Risk management 	Decisions will become more objective and transparent. Every participant will know how to deal with uncertainty and will speak the same language. Decisions are made more efficient and the budget is spent on the most urgent risks.	Network planners and asset engineers.
Earthing and interference of power system distribution and transmission lines English or Dutch language	An adequate level of electromagnetic interference protection can make the difference between operational continuity and failure. The best way to realize an efficient and cost-effective set of protection measures is an integrated or systemic approach. KEMA has a great deal of experience with lightning protection, earthing and EMC. Theory and practical examples are included in the training sessions.	<ul style="list-style-type: none"> • Earthing, lightning protection and electromagnetic compatibility for substations, plants and overhead lines • Interference protection • Safety of installations • Checking earthing systems 	<ul style="list-style-type: none"> • Basic knowledge of electromagnetic interference and measures for preventing disturbances • Understanding of integrated earthing • Skills to recognize EMC issues in installations • Knowledge to support the design of new or reconstructed installations 	T&D engineers and plant managers.
Electric power quality English or Dutch language	All fundamental aspects of power quality are covered. The focus of this course is on detection, simulation and the mitigation of power quality problems in existing and future distribution networks.	<ul style="list-style-type: none"> • Harmonics • Voltage dips • Reliability • Causes • Mitigation techniques 	Understanding the various aspects of power quality and related standards. Ability to anticipate and mitigate future power quality problems.	T&D engineers, operation and maintenance planners.

Overview of transmission & distribution training courses (continuation)

Course	Description	Subjects	Result	Target Group
Power failure investigations in T&D systems English or Dutch language	On the power failure investigation course, the participants are guided through the principles of the power failure investigation methodology. As well as theory, the course provides hands-on experience by examining two specimen cases.	<ul style="list-style-type: none"> • Introduction to component reliability • Fault tree analysis • Ageing • Event trees and reliability block diagram analysis • Spare parts simulation • Failure data collection • Common cause and human reliability analysis • Root cause analysis 	Ability to perform failure investigations and determine the root cause in a structured and uniform way. Enabling also failure portfolio analysis of trends and developments.	Engineers, specialists and managers in the field of T&D operations, planning, maintenance and asset management.
Power networks introduction course one-day training course English or Dutch language	On this introduction course, the basics of electric power transmission and distribution are explained. The layout and operation of the power grid will be discussed. Grid structures and grid components are dealt with in more detail.	<ul style="list-style-type: none"> • Basics • Direct current versus alternating current, 3 phase systems • Load and generation • Grid structure • Grid components 	After the course your knowledge of power networks will be improved. You will know how the power network works, what power quality is, coincident load, frequency control, power flow and more.	Anyone whose work involves dealing directly or indirectly with power grids and who wants to increase his/her understanding of the related issues.
Power system protection two- and three-day training courses English or Dutch language	Series of courses that address all the main topics related to protection engineering and study the practical application of that knowledge. The series consist of: > a two-day session Introduction to power system protection > a three-day session Overcurrent & earth fault protection > a three-day session Differential and impedance protection	<ul style="list-style-type: none"> • Protection philosophy • Relay basics • Fault calculations • (Inter)tripping • Communication technology • Overcurrent & earth fault protection • Auto reclose - Part 1 & 2 • Differential & impedance protection • Feeder protection • Busbar protection • Circuit breaker protection 	After attending the course, you will have gained both practical and theoretical knowledge of the various topics. You will understand the principle of operation and obtained basic knowledge of how to determine appropriate settings.	Technical professionals involved in design, engineering, commissioning or maintenance or protection systems.
Power system reliability English or Dutch language	This customized training course covers all aspects of reliability calculations for transmission and/or distribution networks.	<ul style="list-style-type: none"> • Basic definitions • Calculation methods • Stochastic analysis • Use of software tools • Regulation • Economics and value of reliability • Outage statistics 	<ul style="list-style-type: none"> • Knowledge of basics and techniques • Insight into applications • Skills to analyze reliability • Knowledge for use in combination with general decision models 	T&D engineers, planners, innovators.
Power transformers three-day training course English or Dutch language	Power transformers are vital components of the power supply infrastructure. Their reliability, availability, life cycle cost and residual life expectancy depend to a significant extent on how they are designed, built, operated and maintained. This course will help participants understand the basic principles of power transformers and the associated utilization issues.	<ul style="list-style-type: none"> • Basic transformer theory • Design and construction • Specification and quality assurance • Protection • HV and short-circuit testing • Oil • Condition assessment and diagnosis • Maintenance and asset management 	<ul style="list-style-type: none"> • Understanding of how transformers are designed, constructed, protected and operated • Knowledge of how to specify and assure the quality of transformers • Insight into transformer maintenance, condition assessment and lifetime estimation 	Asset engineers, asset managers, technical consultants and anyone else dealing with the design, specification, operation, maintenance and protection of power transformers.
Protection of medium-voltage transmission networks English or Dutch language	This comprehensive course covers all aspects relevant to the protection of medium-voltage transmission networks.	<ul style="list-style-type: none"> • Behavior of power systems under abnormal conditions • Protection technologies • Application of protection equipment • Development of protection philosophies • Setting of protection relays 	<ul style="list-style-type: none"> • Good understanding of all important aspects of power system protection • Tools for setting up protection philosophies and defining plans 	Protection engineers and technicians at utilities and industrial plants.
Smart grids two-day training course English language	Training course designed to provide a sound grounding in the regulatory, economic and technical context of smart grids, both in theory and practice.	<ul style="list-style-type: none"> • Electricity grids • Economics & regulatory issues • Role of energy service companies • Smart metering & client requirements • PowerMatching City • Power quality and network components • Electrical transportation • Local storage technologies 	You will be acquainted with the latest national and international developments in smart grids and related topics.	Policy makers, financiers, engineers, and anyone working on related products and/or services, e.g. subsidy providers, banks and governmental organizations.

Overview of transmission & distribution training courses (continuation)

Course	Description	Subjects	Result	Target Group
<p>Switching in power distribution and transmission systems</p> <p>three-day training course</p> <p>English language</p>	<p>Understanding how breakers operate as they perform their switching duties in medium and high-voltage networks. Application of power circuit breakers to meet power system requirements, not only in fault situations, but also during normal operation. How the breaker deals with network transients and how it generates transients itself.</p>	<ul style="list-style-type: none"> • Overview of all relevant aspects related to circuit breaking • Making – switching in, short-circuit currents • Breaking – switching off, de-energization • Technology of breakers • Circuit breaker standards • Testing & certification • Operational aspects • Future developments 	<p>Emphasis now on the process of switching in medium and high-voltage networks. Switchgear is still highlighted, but is no longer the main focus. Updated with the latest information regarding standards for switching and switchgear.</p>	<p>Electrical engineers and managers involved in the specification and application of power circuit breakers. The participants must have, at least, a basic knowledge of electrical power engineering.</p>

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