

Power supply of industrial enterprises

Laboratory work

Indoor switchgears 6 – 35 kV

The objective of the work is to study principle of construction and operation of indoor switchgears 6 – 35 kV.

After execution of work student should

- know types, functions and construction of equipment of indoor switchgears; advantages and disadvantages of indoor switchgears; main characteristics of switching and protecting devices; measures of life protection used in indoor switchgears.
- read and compose electrical schemes of indoor switchgears.

Definitions and Terms

Switchgear is a general term that covers switching devices and their combination with associated control, measuring, indicating, alarm, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended, in principle, for use in connection with the generation, transmission, distribution and conversion of electric energy.

Switchgear panel (or panel) switchgear of modular design that comprises a mechanical switching device, for example, a circuit breaker, a switch-disconnector, a switch-fuse combination or a switch.

Circuit-breaker a mechanical switching device that is capable of making, carrying and breaking currents under normal circuit conditions, and also of making, carrying for a specified time and breaking currents under specified abnormal conditions, such as those of a short-circuit.

Circuit-breaker panel a switchgear panel complete with a fixed circuit-breaker, switch-disconnector, earthing switch and protection & control equipment.

Fixed circuit-breaker a circuit-breaker which is not a withdrawable part of the panel assembly in which it is mounted.

Metal-clad switchgear metal-enclosed switchgear in which certain components, for example, circuit-breakers, are arranged in separate compartments that have metal partitions and that are intended to be earthed.

Non-withdrawable switchgear switchgear that contains circuit-breaker and switches, which are not a withdrawable part of the panel assembly in which they are mounted.

Rated insulation level the combination of the rated lightning impulse withstand voltage and the rated short duration power frequency withstand voltage specified in AS 2650.

Rated normal current for main circuits and switching devices, the r.m.s. value of the current that they are designed to carry continuously under the specified conditions of use and behavior.

Rated peak withstand current for main and earthing (grounding) circuits, the peak current associated with the first major loop of the short-time withstand current that a mechanical switching device is designed to carry in the closed position under prescribed conditions of use and behavior.

Rated short-time withstand current for main and earthing circuits, the r.m.s. value of current that the switching device is designed to carry in the closed position during a specified short time under prescribed conditions of use and behavior.

Rated voltage the highest r.m.s. phase-to-phase voltage of the supply on which the switchgear is designed to operate.

Switch a mechanical switching device that is capable of making, carrying and breaking currents under normal circuit conditions, which can include specified operating overload conditions, and also capable of carrying for a specified time, currents under specified abnormal circuit conditions such as those of a short-circuit.

Switchboard two or more switchgear panels coupled together in various combinations.

Guidelines

Using test-bench and appendixes student should introduce himself with construction, equipment and characteristics of indoor switchgears.

Student should study purpose and range of application of indoor switchgears, possible components and protections.

Report contents

Title, objective and general characteristics of indoor switchgears, description of components and typical single units.

Quiz

1. Range of application of the indoor switchgears.
2. Typical single units of the indoor switchgears.
3. Construction of the indoor switchgear.
4. Main technical characteristics of the indoor switchgears.
5. Types of circuit breakers used in the indoor switchgears.
6. Measures of life protection used in indoor switchgears.

Further reading

1. Рожкова Л. Д., Козулин В. С. Электрооборудование станций и подстанций. - : М.: Энергоатомиздат, 1987.- 648 с.
2. RailCorp Engineering Standard — Electrical 33kV AC Indoor Switchgear - Non- Withdrawable EP 01 00 00 01 SP. <http://findebookee.com/3/33kv-switchgear>.
3. Методичні вказівки до виконання лабораторної роботи ЕП-3 «Комплектні розподільні пристрої внутрішньої установки» для студентів спеціальності 7.090603 «Електротехнічні системи електроспоживання» / Упорядн.: Ю.В. Степаненко, Л.П. Ворохов. – Дніпропетровськ: НГУ, 2005. – 12 с.