Operation and Maintenance Customer Training

All types Gas-insulated switchgear: 5 days factory

For anyone managing GIS assets, it is essential to have a thorough understanding of its components, modes of operation and maintenance criteria.

Our training concept combines theoretical and practical lessons in the optimal way.

Hitachi Power Grids is a leader in high-voltage GIS technology with a global installed base of more than 30,000 bays.

This training covers the three main know-how fields for Operating and Maintaining a GIS. The following program is used as reference.

The program can be adjusted according to special costumer needs.

Main components:

- Circuit breaker and breaker operating mechanism
- Disconnector, earthing switch, fast acting earthing switch
- Local control modules for apparatus
- Current transformer and voltage transformer
- Static components like connecting elements & busbars
- Interface such as SF_6-gas to-air bushing and connections to HV cables and transformers
- Metal-oxide GIS surge arresters

SF_6-gas:

- Working principle of SF_6-gas density supervision system, incl. lecture about correlation of pressure, temperature, and density
- SF_6-gas properties and environmental aspects when working with SF_6-gas
- SF_6-gas handling equipment and application of Reclaimer (evacuating, filling, reclaiming)
- SF_6-gas measuring instruments

Operation and Maintenance:

- Guide through the switchgear manual
- Maintenance philosophy
- Planning and checkpoints of a maintenance tour
- Troubleshooting on apparatus and operating mechanisms

Detailed course description

Day 1	Welcome and organization	Information about health and safety whilst in training Training schedule
	Factory Tour	Tour around GIS assembly facility, visiting component assembly, components testing and visiting routine high voltage test field
	Circuit Breaker Switching Components	• Bay overview, circuit breaker mechanical design, switching principle • Operating mechanism HMB, functions, hydraulic circuits
	Hands on Circuit Breaker and Operating Mechanism HMB	• Drive assembly, functions, mechanical interlocking device, hydraulic system, solenoid valves • Electrical charging, manual discharging of springs • Contacts and functions for charging status indication • Check motor brushes, oil level, troubleshooting according to O&M manual • HMB modules such as motor, pump, and coil, detect sources of defect and initiate remedial actions (troubleshooting) according to HMB operation and maintenance manual
Day 2	Disconnectors / Earthing Switches	Design and function
	Hands on Disconnector, Earthing Switch, Fast-acting Earthing Switch (incl. Operating Drive Mechanism)	• 3-pol assembly of switches and drive as well as gear box assembly • Practice electrical operation with simulator • Main contacts & gear functions, adjustments to synchronize drive mechanism and adjustments at drive gear incl. drive rods • Practice manual operation of switch and electrical and mechanical safety locking mechanism with simulator • Check all functions and LED status display inside drive
	Static elements	• Current and voltage transformers • Connecting bus and elbows, lateral dismantling devices and compensators • Gas partition insulators and drying filters • Bushings, cable and transformer connections, surge arresters
Day 3	SF_6-gas monitoring system	• Working principle of gas monitoring and tools • Co-relations of pressure, temperature and density (Mollier diagram) • Testing steps to inspect density monitors
	SF_6-gas properties	• Properties of SF_6-gas and its environmental aspects • SF_6-gas measurements, instruments and values according standards • Rated density and pressure for compartment for filling • Limits for decomposition products
Day 4	Operation and maintenance	• Guide through the switchgear manual and highlight the most important subjects • Time-based maintenance, condition-based maintenance and corresponding maintenance intervals • Trouble shooting on apparatus • Visualization of maintenance and repair procedures (guided by the manual) for circuit breakers dis-connector / earthing switches and SF_6-gas monitoring system
	Hands on Operation and maintenance	
Day 5	Conclusions, final discussion and hand-over of confirma-tion of attendance	• Round-up sessions to clarify last questions • Hand-over of training confirmations

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