



Medium Voltage

Medium Voltage Power Systems

The backbone of many electric power systems is the medium voltage distribution system. Typically operating at voltages ranging from 2,400 to 34,500 Volts, voltage stress, corona, surges and protection of equipment all create unique challenges in design, equipment selection, operation and engineering. This 2 day class takes you through the basics of medium voltage power systems including components, equipment, design and operation problems as well as protection of medium voltage systems.



Course Credit: 2 Days - 1.6 CEUs or 16 PDHs

Course Agenda

DAY ONE

MEDIUM VOLTAGE SAFETY

Electrocution at Low vs. Medium Voltage, Arc Flash, Qualified Person, Approach Boundaries

TYPES OF MEDIUM VOLTAGE SYSTEMS

Utility and Industrial One lines, Reliability Requirements, Overhead and Underground Systems, Regulated Systems

MEDIUM VOLTAGE CABLE

Copper vs. Aluminum Design, Voltage Ratings
Insulation Ratings, 100%, 133%, 173% Insulation Levels,
Shielding Requirements, Electric Fields, Terminating MV
Conductors, Orientation of Overhead Lines

MEDIUM VOLTAGE SUBSTATION TRANSFORMERS

Core and Coil Design, Aluminum and Copper Windings
Tank Construction, Loss Evaluation, Efficiency, Regulation

SPOT NETWORKS

Spot Network Design, Network Protectors, Network Protector
Relay Operation, Directional Protection Requirements

PARTIAL DISCHARGE

Corona, Surface Tracking, Voltage Stress, Sensing Partial
Discharge, Component Failure

GROUNDING MEDIUM VOLTAGE SYSTEMS

Resistance Grounding, Solid Grounding, Ungrounded Delta
Charging Current, Effect of Ground Faults on Delta Voltage

SURGE PROTECTION

Lightning and Switching Surges, Classes of Surge Arresters
MCOV Ratings - (Maximum Continuous Operating Voltage)
TOV - (Maximum Temporary Over Voltage Capability),
Protective Characteristics, Surge Arrester Selection, Energy
Capability, Effect of Grounding on Arrester Selection,
Insulation Coordination,

DAY TWO

CURRENT TRANSFORMER APPLICATIONS

Ratings, Selection Process, Accuracy, Saturation, Excitation
Curves, Burden Calculation, Momentary Ratings

MEDIUM VOLTAGE CIRCUIT BREAKERS

Vacuum, Air, Oil, SF₆ Designs, Symmetrical Interrupting
Rating, K-Rated Voltage Factor, Close and Latch Capability

RECLOSERS

Application on Feeder Circuits, Recloser Settings
Continuous Current and Interrupting Ratings

MEDIUM VOLTAGE FUSES

Medium Voltage Switches, Load Rating, Close and Latch
Rating, Short Time Rating, Expulsion vs. Current Limiting
Fuse Characteristics, E and R Rated Fuses, Fuse Cutouts

MEDIUM VOLTAGE PROTECTION CONCEPTS

Medium Voltage Protection, Relays, Circuit Breakers, R and
E rated Fuses, Short Circuit vs. Overcurrent Protection

DISTRIBUTION FEEDER PROTECTION

Protection with Fuses - 300%, Overcurrent Protection with
Relays - 600%, Short Circuit Damage Characteristics, Relay
"Reach" for End of Line Faults

ROTATING MACHINERY PROTECTION

Requirements, Decrement Curves, Thermal Damage Curves,
Reactive, Capability Curves, Differential Protection

MEDIUM VOLTAGE MOTOR CONTROLLERS

Protection Requirements, Motor Management Relays, Circuit
Breaker Protection, Relaying, Class R Rated Fuses

TRANSFORMER PROTECTION

ANSI C57 Thru Fault Curves, Impact of Transformer Winding
Configuration, Overview of Differential Protection, Inrush and
Harmonic Restraint

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For more information contact:

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See sample videos of Jim's teaching style at:

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