CONCEPT

Power Cable Engineering: MV and HV Cable Rating, Jointing, Testing and Fault Location

7 – 11 November 2027
Riyadh - KAFD district five-star



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Ref: 256_15400 **Date:** 7 – 11 November 2027 **Location:** Riyadh - KAFD district five-star **Fees:** 20000 SAR

Introduction:

Power cable failures on medium and high voltage networks are expensive to find, slow to repair and often traced to a rating assumption, a poorly bonded screen or a badly made joint. Many utilities and industrial sites also carry ageing paper and early XLPE circuits with no clear condition evidence. This Core Concept course equips engineers and supervisors to rate power cable circuits, plan installation and screen bonding, control jointing quality, interpret diagnostic tests, locate faults and rank circuits for replacement. Participants build a Cable Circuit Rating and Condition Assessment File for one of their own circuits.

Course Objectives:

- Select conductor material, insulation type and screen design for a medium or high voltage cable circuit from its duty and route conditions
- Calculate continuous current rating with derating for burial depth, soil thermal resistivity, ducts and grouping, and check short-circuit and voltage drop limits
- Choose solid, single-point or cross-bonded screen arrangements and estimate standing sheath voltages and circulating current losses
- Plan cable pulls and supervise jointing and termination work against pulling tension, sidewall pressure, bending radius and accessory installation limits
- Interpret VLF withstand, tan delta, partial discharge and sheath integrity results and locate cable faults with pre-location and pinpointing methods
- Rank cable circuits by condition, failure history and consequence to support repair, refurbishment or replacement decisions

Target Audience:

- Engineers responsible for specifying and rating medium and high voltage cable circuits on utility and industrial networks
- Supervisors who direct cable laying, pulling, jointing and termination crews
- Testing and diagnostics staff who carry out withstand, tan delta, partial discharge and sheath tests on installed cables
- Maintenance engineers who respond to cable faults and restore supply after failures
- Asset and network planning engineers who keep cable records and prepare replacement programmes

Course Outline:

Day 1: Power Cable Construction, Insulation Systems and Network Baseline

- Copper and Aluminium Conductor Forms: Stranded, Compacted and Segmental Designs
- XLPE, EPR and Paper-Insulated Lead-Covered Insulation Compared by Voltage Class
- Semiconducting Screens, Metallic Screen Types and Polymeric Oversheath Functions
- Cable Datasheet and Type Designation Reading for Medium and High Voltage Circuits
- Cable Network Baseline Register: Age, Insulation Type, Route Length and Failure Records

Day 2: Current Rating, Derating Factors and Screen Bonding Design

- Continuous Current Rating Method: Conductor Losses, Dielectric Losses and Thermal Resistance Chain
- Derating Factors for Burial Depth, Soil Thermal Resistivity, Ducts and Circuit Grouping
- Short-Circuit Thermal Withstand Check for Conductor and Metallic Screen
- Voltage Drop Calculation for Long Feeders at Full Load and Emergency Load
- Solid, Single-Point and Cross-Bonding Schemes with Sheath Voltage Limiters and Link Boxes

Day 3: Cable Route Installation, Pulling and Jointing Practice

- Route Survey, Trench Profile, Duct Bank Layout and Thermal Backfill Selection
- Pulling Tension and Sidewall Pressure Calculation for Duct and Trench Routes
- Minimum Bending Radius, Drum Handling and Cable Laying Sequence Control
- Heat-Shrink, Cold-Shrink and Premoulded Joint Installation Steps and Hold Points
- Indoor, Outdoor and Separable Termination Selection and Stress Control Methods

Day 4: Cable Diagnostics, Fault Location and Failure Modes

- VLF Withstand Testing: Test Voltage Selection, Duration and Pass Criteria
- Tan Delta Measurement and Water Tree Ageing Assessment in Polymeric Cables
- Partial Discharge Testing Offline and Online with Defect Location Mapping
- Oversheath Integrity Testing and Sheath Fault Location on Bonded Circuits
- Fault Pre-Location by Time Domain Reflectometry and Arc Reflection with Acoustic Pinpointing

Day 5: Cable Circuit Rating and Condition Assessment Build

- Case Circuit Data Assembly: Route Drawing, Bonding Diagram and Test History
- Case Circuit Rating Calculation Sheet with Derating and Emergency Load Scenarios
- Joint Failure Case Review: Workmanship Defects Found by Partial Discharge Mapping
- Condition and Consequence Scoring Matrix for Repair, Refurbish or Replace Decisions
- Cable Circuit Rating and Condition Assessment File Drafting and Peer Review

Skills You Will Gain:

- Cable Insulation Selection
- Current Rating Calculation
- Screen Bonding Design
- Cable Pull Planning
- Joint and Termination Quality Control
- Cable Diagnostic Test Interpretation
- Cable Fault Location
- Cable Replacement Prioritisation

Why Attend This Course:

- Return with a Cable Circuit Rating and Condition Assessment File covering the rating, bonding, test results and replacement ranking of one of your own circuits
- Recognise rating shortfalls, bonding errors and jointing defects before they turn into outages
- Shorten fault restoration time by choosing the right pre-location and pinpointing method for the cable type
- Compare cable practice with engineers from utilities, oil and gas, petrochemicals, renewables and large industrial sites

Conclusion:

A power cable circuit stays in service when its rating, bonding, installation, accessories and test evidence are managed as one system over its life. The course moves from cable construction and insulation types, through current rating, derating, short-circuit and voltage drop checks and screen bonding, to route installation, pulling and jointing. It then covers VLF, tan delta, partial discharge and sheath testing and fault location, before the final day produces a Cable Circuit Rating and Condition Assessment File ready for the next network decision.