Power Cable Manufacturing and Factory Testing Course

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Paris (France)



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Introduction:

Power cable manufacturing and factory testing is the engineering and quality verification discipline of producing insulated electrical conductors and confirming their mechanical and dielectric integrity prior to dispatch. This one-week course prepares engineering, quality assurance, and technical procurement specialists to construct an audit-ready Cable Manufacturing Quality Plan and Factory Acceptance Test Dossier. Delivered at practitioner depth through a structured inspection walkthrough methodology, delegates apply the International Electrotechnical Commission IEC 60502-2 standard for medium-voltage extruded power cable construction and material testing. Professionals master power cable manufacturing and factory testing with Blackbird Training Centre to deliver reliable transmission assets.

Course Objectives:

- Distinguish between copper and aluminium conductor performance by evaluating stranding compaction, direct current resistance, and thermal expansion properties under IEC 60228.
- Compare IEC 60502-1 low-voltage extrusion criteria versus IEC 60502-2 medium-voltage insulation specifications for shielded power cable assemblies.
- Apply IEC 60811 physical test methods to verify hot-set elongation, tensile strength, and thermal ageing limits of extruded cross-linked polyethylene insulation.
- Select continuous catenary vulcanisation or vertical continuous vulcanisation processing parameters to maintain insulation concentricity and eliminate micro-voids.
- Interpret high-voltage alternating current withstand, partial discharge extinction, and tan-delta dissipation factory test results to confirm dielectric integrity.
- Justify witness inspection hold points across manufacturing stages to construct a validated factory acceptance testing quality dossier.

Target Audience:

- Cable production specialists responsible for extrusion line operations who must decide between continuous catenary and vertical vulcanisation cooling profiles.
- Quality assurance inspectors responsible for non-destructive factory testing who must judge partial discharge waveforms against pass-fail thresholds.
- Electrical procurement engineers responsible for manufacturer compliance who must evaluate supplier raw material certificates and extrusion line capabilities.
- Asset integrity technicians responsible for cable pre-commissioning who must determine insulation resistance and sheath integrity before site energisation.



Course Outline:

Day 1: Conductor Metallurgy, Drawing, and Stranding Fundamentals

- IEC 60228 Conductor Classes: Classifying Solid and Stranded Electrical Core Geometries
- Copper vs Aluminium Conductors: Comparing Direct Current Resistance and Mechanical Tensile Capabilities
- Conductor Wire Drawing: Reducing Ingot Diameters Through Successive Tungsten Dies
- Rotary Annealing Processes: Restoring Ductility and Conductivity in Cold Worked Conductors
- Compacted Conductor Stranding: Minimising Interstitial Space to Optimise Subsequent Extrusion Quality

Day 2: Extrusion Technology, Polymer Insulation, and Standard Specifications

- Triple Extrusion Technology: Applying Conductor Screen, Insulation, and Core Screen Simultaneously
- IEC 60502-1 vs IEC 60502-2: Contrasting Low Voltage and Medium Voltage Manufacturing Architectures
- AEIC CS8 Shielding Rules: Establishing Extruded Semi-Conducting Layer Thickness and Adhesion Standards
- Cross-Linked Polyethylene Insulation: Formulating Polymers for Enhanced Thermal and Dielectric Performance
- Extrusion Degassing Protocols: Removing Cross-Linking Peroxide Methane Byproducts Prior to Sheathing

Day 3: Armoring, Sheathing, and Core Assembly Operations

- Metallic Screening Architectures: Applying Helical Copper Tapes or Concentric Wire Screens
- CCV vs VCV Lines: Comparing Catenary and Vertical Extrusion Lines for Heavy Cable Cores
- Multi-Core Cabling Assembly: Laying Up Insulated Cores with Non-Hygroscopic Polypropylene Fillers
- Galvanised Steel Wire Armoring: Providing Mechanical Protection Against Tensile and Crushing Loads
- Outer Sheath Extrusion: Applying Thermoplastic and Halogen-Free Compounds for Barrier Protection

Day 4: Routine, Sample, and Type Factory Acceptance Testing

- IEC 60811 Material Testing: Evaluating Hot-Set Elongation and Permanent Set Characteristics
- Spark Testing Procedures: Verifying Core Insulation Sheath Integrity During Continuous Line Extrusion
- Partial Discharge vs Tan-Delta Testing: Measuring Dielectric Dissipation and Internal Micro-Void Discharges
- High-Voltage AC Withstand Testing: Confirming Insulation Dielectric Strength Against Specified Test Voltages
- Conductor Resistance Measurement: Verifying Direct Current Values Against IEC 60228 Standard Thresholds



Day 5: Practical Inspection Walkthrough and Acceptance Dossier Formulation

- Extrusion Line Inspection Walkthrough: Auditing Curing Tube Temperatures and Line Speed Controls
- CCV Curing vs VCV Curing Inspection: Evaluating Radial Eccentricity and Sag in Thick Insulation
- High-Voltage Test Bay Witnessing: Executing Routine Dielectric Withstand and Partial Discharge Assessments
- Factory Dimensional Audit Walkthrough: Measuring Layer Thicknesses and Armoring Lay Lengths Accurately
- Quality Dossier Compilation: Finalising the Factory Acceptance Test Inspection and Compliance File

Skills You Will Gain:

- Extrusion Line Parameterisation
- Conductor Resistance Measurement
- Dielectric Withstand Testing
- Partial Discharge Analysis
- Hot-Set Elongation Testing
- Cable Armoring Verification
- Factory Acceptance Inspection

Why Attend This Course:

- From relying on unverified supplier quality claims to inspecting extrusion line parameters and continuous vulcanisation curing processes directly.
- From subjective evaluation of dielectric test curves to interpreting quantitative partial discharge and tan-delta dissipation measurements under international standards.
- From treating cable armoring and sheathing as cosmetic coverings to verifying mechanical impact protection and water-blocking barrier specifications.
- From fragmented test reports to compiling an audit-ready Cable Manufacturing Quality Plan and Factory Acceptance Test Dossier.

Conclusion:

Rigorous power cable fabrication and factory evaluation ensure that electrical distribution assets operate reliably under severe continuous operational stress. The curriculum clarifies the technical boundaries between copper and aluminium conductor behavior, low-voltage versus medium-voltage extrusion shielding requirements, and routine dielectric withstand tests versus material type qualifications. Designed for manufacturing engineers, quality assurance personnel, and procurement inspectors seeking practitioner competence, this course provides the technical expertise and structured inspection methodologies necessary to evaluate production lines and verify compliance against established international standards.



Frequently Asked Questions FAQ:

What is power cable manufacturing and factory testing?

Power cable manufacturing and factory testing is the industrial process of drawing conductors, extruding polymeric insulation, applying protective armoring, and conducting dielectric and mechanical tests. It ensures medium- and low-voltage cables satisfy design limits, insulation resistance, and dielectric breakdown thresholds prior to site installation.

What is the difference between routine testing and type testing in power cable manufacturing and factory testing?

Routine testing is conducted on every manufactured cable length to detect manufacturing flaws using spark, conductor resistance, and high-voltage withstand tests. In contrast, type testing involves destructive laboratory procedures on sample specimens to qualify the cable design and raw materials before commercial production commences.

Which international standards govern power cable manufacturing and factory testing?

International Electrotechnical Commission standards govern the process, primarily IEC 60228 for conductors, IEC 60502-1 and IEC 60502-2 for low- and medium-voltage power cable construction, and IEC 60811 for material testing. Industry specifications such as AEIC CS8 establish additional electrical shielding and dimensional criteria.

Is this power cable manufacturing and factory testing course suitable for procurement and quality assurance inspectors?

Yes, this course is designed for quality assurance specialists and technical procurement inspectors who audit cable factories and witness factory acceptance tests. It equips delegates with the criteria needed to review material certifications, evaluate continuous vulcanisation lines, and verify factory acceptance test dossiers.

