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COURSE BROCHURE

# Power Transformer Specification and Selection Training Course

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**jupiterprime.uk**

info@jupiterprime.uk

Registered in the United Kingdom and Saudi Arabia

# Power Transformer Specification and Selection Training Course

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Power Transformer Specification and Selection is a 1-week training course for electrical engineers, asset managers and maintenance engineers, built around a transformer purchase specification that each participant drafts for a real substation or plant need. Organisations are buying units with longer lead times, tighter loss targets and heavier loading from new generation and electrified demand, so a weak specification now locks in cost and risk for decades. Jupiter Prime Training delivers this course on power transformer specification.

## Why Power Transformer Specification and Selection Matters Now

Three forces are reshaping how transformers are bought. Manufacturing slots are scarce. Owners now weigh no-load and load losses over the whole service life rather than purchase cost alone. Network planners, plant operators and finance teams all feed requirements into one document. An organisation that specifies well gets units that fit the network, run cool under real load profiles and are easy to maintain; poor specification brings overheating and retrofits. The course rests on the international transformer design and testing practice that manufacturers and purchasers share, described in general terms.

## Who Gains Most from Power Transformer Specification and Selection

- Engineers responsible for sizing and rating new substation and plant transformers
- Asset owners responsible for life-cycle cost and replacement decisions on transformer fleets
- Maintenance engineers responsible for accepting, testing and caring for units once installed
- Project engineers responsible for tender documents and bid comparison
- Protection engineers responsible for matching relaying to transformer characteristics

Utility and industrial groups that send planning, procurement and maintenance staff together gain most from a shared specification view.

## Power Transformer Specification and Selection Capabilities

Participants turn winding theory, loss data and thermal limits into clear purchasing choices for power and distribution units.

- Calculate rated power, voltage ratio and percentage impedance for a given duty — network planners
- Specify cooling class and overload capability against a measured load profile — plant operators
- Weigh capitalised no-load and load losses across competing bids — finance and procurement
- Select vector group and tap changer arrangement for paralleling and voltage control — system operators

- Design a factory and site test plan including insulating oil checks — maintenance engineers
- Apply fault symptoms and protection settings to selection choices — protection engineers

## Key Power Transformer Specification and Selection Terms

- Percentage impedance — the voltage drop across a transformer at rated current, which sets fault level and load sharing between parallel units.
- No-load loss — core loss drawn whenever the transformer is energised, regardless of the load it carries.
- Cooling class — the code describing how oil and air circulate to remove heat, natural or forced, which sets rating steps.
- Vector group — the winding connection and phase displacement between primary and secondary, which decides whether units can run in parallel.
- On-load tap changer — a switching device that changes the turns ratio under load to hold output voltage within limits.
- Dissolved gas analysis — measurement of gases in insulating oil that reveal overheating, arcing or partial discharge inside the tank.

## Power Transformer Specification and Selection Day by Day

### Day 1: Transformer Principles and Service Duty

- Magnetic Circuit and Turns Ratio — Choosing Voltage Ratio for the Network
- Equivalent Circuit and Regulation — Predicting Voltage Under Varying Load
- Core and Copper Loss Mechanisms — Setting Efficiency Expectations Early
- Load Profile and Ambient Survey — Defining the Real Service Duty
- Power Versus Distribution Unit Roles — Matching Unit Type to Application

### Day 2: Ratings, Impedance and Thermal Limits

- Rated Power and Overload Capability — Sizing for Growth and Contingency
- Percentage Impedance Selection — Balancing Fault Level Against Voltage Drop
- Cooling Classes and Rating Steps — Choosing Natural or Forced Cooling
- Hot-Spot Temperature and Insulation Ageing — Estimating Life Under Loading
- Insulation Levels and Clearances — Matching Withstand to System Voltage

### Day 3: Connections, Voltage Control and Protection

- Vector Groups and Phase Displacement — Enabling Safe Parallel Operation
- On-Load and Off-Circuit Tap Changers — Deciding the Voltage Control Range
- Neutral Earthing Arrangements — Limiting Earth Fault Current Safely
- Differential, Overcurrent and Gas-Actuated Relays — Aligning Protection With Design
- Fittings, Bushings and Monitoring Devices — Specifying Accessories and Sensors

## Day 4: Losses, Testing and Condition Evidence

- Loss Capitalisation Formula — Comparing Bids on Life-Cycle Cost
- Routine, Type and Special Factory Tests — Writing the Acceptance Plan
- Insulating Oil Quality Tests — Setting Acceptance and Monitoring Limits
- Dissolved Gas Interpretation — Linking Gas Patterns to Internal Faults
- Common Failure Modes and Troubleshooting — Feeding Field Lessons Into Specification

## Day 5: Practising the Transformer Purchase Specification

- Duty and Rating Case Review — Applying Load Profile and Thermal Limits
- Impedance and Vector Group Check — Confirming Parallel and Fault Duty
- Bid Evaluation Matrix — Scoring Losses, Delivery and Technical Deviations
- Test and Commissioning Schedule — Fixing Factory and Site Acceptance Points
- Transformer Purchase Specification — Completing the Document for Tender

## Applying Power Transformer Specification and Selection After the Course

- Review an existing transformer tender against the rating, impedance and cooling checks covered and record the gaps
- Lead a loss capitalisation comparison on the next transformer purchase with planning and finance colleagues

## Power Transformer Specification and Selection Questions FAQ

### What is power transformer specification and selection and why does it matter now?

It is the practice of turning network and plant needs into the ratings, impedance, cooling, connections and tests a manufacturer must meet. It matters now because lead times are long and losses run for decades, so early choices fix cost and reliability.

### Which roles gain most from power transformer specification and selection?

Planning, project, protection and maintenance engineers gain most, along with asset owners who decide on replacement. You benefit if you write, check or approve transformer tenders.

### How does power transformer specification and selection differ from a transformer maintenance course?

It looks forward to the purchase rather than back at an ageing unit. Maintenance courses focus on diagnostics and repair; here, oil testing and fault history are used to shape a better specification.

## What do you bring back from power transformer specification and selection?

You bring back a drafted purchase specification for a real need, with a rating case, impedance and vector group reasoning, a loss capitalisation basis and an acceptance test plan.

## Power Transformer Specification and Selection: The Way Forward

The transformer purchase specification first informs the choice between competing bids on losses and technical deviations. Planners, procurement staff and maintenance engineers use it to agree what is bought and accepted. After the first unit is energised, revisit the loading and temperature assumptions against measured data and adjust the template for the next purchase.