Data Centre Electrical Installations

TECHNICAL GUIDE | Power infrastructure, distribution and critical facilities

QUEST Electrical designs, installs, modifies and maintains electrical power infrastructure for data centres, server rooms and critical IT facilities. This guide outlines the technical considerations for reliable distribution, integration and project delivery.

1. Establishing the electrical design basis

• **Demand and capacity:** confirm existing and forecast IT loads, cooling and auxiliary loads, diversity assumptions and available supply capacity.

• **Supply arrangement:** review incoming LV switchgear, existing distribution, UPS and standby-generation interfaces, and the operational consequences of each change.

• **Resilience:** establish the client's required power availability, redundancy philosophy and maintenance arrangements before finalising circuit routes or changeover plans.

• **Site information:** obtain current single-line diagrams, equipment schedules, protective device settings, cable routes and any operational restrictions.

2. LV switchgear and distribution equipment

QUEST's stated service scope includes main LV switchgear and switchboards rated **630A–6300A**, and MCCB, section and distribution boards rated **125A–630A**. Actual ratings, fault withstand, form of separation and enclosure requirements are determined by project design.

Equipment / element	Technical design considerations
Main LV switchgear	Prospective fault level, incoming capacity, protection coordination, maintainability and future ways
MCCB and section boards	Outgoing circuit ratings, discrimination/selectivity, metering and circuit identification
Sub-main distribution	Cable sizing, installation method, voltage drop, fault protection and routing
Server rack circuits	Single-/three-phase supply, dedicated circuits, load allocation and labelling

3. Cable routes and containment

Specify cable ladder, tray, basket, trunking or conduit according to load, access, segregation, mechanical protection and building constraints. Coordinate cable routes with cooling plant, existing services and any fire-compartment penetrations.

Power Integration & Installation

TECHNICAL GUIDE | UPS, standby power and live-facility working

4. UPS and standby power interfaces

QUEST installs electrical connections to UPS equipment and associated distribution, together with infrastructure for standby generator connections. The UPS or generator specialist's equipment requirements, bypass arrangements, earthing configuration and operating sequences must be confirmed during design.

• Identify normal, protected and standby-fed loads and document which circuits are affected by each proposed change.

• Check source characteristics, prospective fault current and protection operation for each relevant operating mode.

• Coordinate shutdown, bypass and changeover procedures with the client and relevant equipment specialists; do not assume uninterrupted operation during modifications.

5. Protection, earthing and power quality

Protection selection should account for fault current, overload, selectivity and disconnection requirements. Provide appropriate earthing and protective bonding, and assess surge protection, metering and power monitoring in line with the installation design.

For server and IT loads, consider harmonic content, neutral loading, inrush characteristics and actual equipment power requirements. Any power-quality or capacity concerns should be investigated with suitable measurements before specifying remedial upgrades.

6. Cooling and associated plant supplies

Data centre infrastructure also includes supplies to cooling, ventilation and related mechanical equipment. Coordinate electrical ratings, local isolation, control interfaces and maintenance access with the mechanical contractor and facility operations team.

7. Planning installation works in an operational facility

• **Survey:** verify the existing installation and identify the live circuits, access restrictions and critical dependencies.

• **Method:** agree safe isolation, permits, temporary arrangements and switching responsibilities before work begins.

• **Delivery:** use planned shutdowns, phased installations and coordinated electrical changeovers where appropriate.

• **Reinstatement:** inspect and test affected circuits, restore supplies under an agreed procedure and verify operation with the client.

8. Project-specific standards

Electrical installation work is designed and verified to applicable requirements of **BS 7671** and the **Electricity at Work Regulations 1989**. Relevant switchgear assemblies may fall under **BS EN IEC 61439**. Additional data centre requirements and client specifications must be established for each project.

Testing, Maintenance & Handover

TECHNICAL GUIDE | Verification, condition assessment and operational readiness

9. Inspection, testing and commissioning

Inspection and testing should follow the agreed scope and the nature of the work, with procedures adapted to avoid unnecessary risk to critical loads. Commissioning may include:

- Visual inspection of switchgear, cable routes, terminations, protective bonding and circuit identification.
- Appropriate electrical tests of new or altered circuits, including continuity, insulation resistance, polarity and protective-device verification where applicable.
- Confirmation of protection settings and coordination with the approved design and equipment manufacturer instructions.
- Functional checks of metering, monitoring and interfaces with UPS, standby-power and mechanical systems, involving the relevant specialists.
- Controlled energisation, load verification and recorded handover of any outstanding actions.

10. Ongoing maintenance and condition assessment

QUEST's service scope includes Electrical Installation Condition Reports (EICRs), fixed-wire testing, thermal imaging of LV switchgear and distribution equipment, fault finding and remedial works. Maintenance frequency and inspection methods should be risk-based and agreed with the facility operator.

Thermal imaging is a condition-assessment tool, not a substitute for electrical inspection or testing. Results depend on equipment load, accessibility and operating conditions.

11. Technical handover checklist

- Approved drawings and updated single-line diagrams
- Equipment and outgoing circuit schedules; cable identification
- Electrical inspection and test results; relevant certificates
- Protection settings and commissioning records, as applicable
- UPS / generator interface and changeover records where in scope
- Operations, maintenance and access instructions
- Outstanding defects, limitations and agreed remedial actions

12. Scope and design limitations

This guide describes QUEST Electrical's electrical infrastructure services. It is not a project-specific design, equipment specification or assurance of any particular availability tier. Redundancy, UPS autonomy, generator performance, operating procedures and other resilience requirements must be established and verified for the individual facility.