Substation design

Eaton's Power System Engineering team is your partner to build, remodel or expand your substation. Our experience and North American coverage make Eaton the choice to serve your local or national needs.

Our team of experienced engineers can provide the skills needed to successfully complete your project, from substation design to system analysis and simulation. Coupled with proven project management experience, Eaton can provide additional support up to and including turnkey EPC solutions.

Eaton's Electrical Services and Systems is one of the largest and most experienced teams of power system engineers in the industry. We offer a full portfolio of engineering and design services, energy management audits and power quality and reliability audits. Whether you provide solar energy to the electric grid or oversee a mission-critical operation where even a second of downtime is unacceptable, Eaton can help you stay open for business.

EATON

Powering Business Worldwide

Eaton's power system engineers bring extensive skills and expertise to power system design and analysis. Active participation in technical societies such as IEEE and collaboration with a variety of utilities and industries ensures that our engineers are knowledgeable about today's cutting edge engineering techniques.

Electrical design services

Eaton's electrical design services can extend from the transmission line to customer motors and equipment. Design services are integrated with analysis services, resulting in a complete engineered solution. The level of design detail can be customized from minimal design consultation and advice to a complete design package with specifications and drawings. Typical substation electrical design services include:

- Substation layout – plan and elevation design, equipment foundation and oil containment design.
- Electrical Equipment Sizing and Specification – Perform necessary calculations to determine appropriate equipment ratings, review of customer and site requirements, and provide applicable specifications.
- Protection and Control – Selection and application of electrical protection: substation equipment protection such as transformer, bus, breaker failure, feeder, line and line terminal utility protection; related communication design such as transfer trip; generator protection for generation sites. Design of breaker control ranging from simple tripping schemes to automatic transfer upon loss of source.
- Ground Grid Analysis and Design – calculations to ensure the design provides adequate safety for personnel during ground fault conditions. Modeling of the ground grid under fault conditions and calculation of the ground potential rise and step and touch potentials throughout the substation. Determination of optimal substation ground grid layout and specifications, or recommendations for improving existing grids.
- Other electrical engineering may include conduit or trench sizing and layout, control panel design, power factor correction or harmonic filter design, and other associated tasks.
- Regulatory approval – in conjunction with the design process, navigate the utility and jurisdictional regulatory requirements to gain project approval for the specific project design.

Power Systems Engineering is an integral part of Eaton's electrical service capabilities. The combined Eaton Electrical Services and Systems team can provide a full scope of Design and Construction Management Services to support your project needs:

Additional substation engineering and design capabilities

- Civil and structural design through 345 kV
- Control house layout and design

Multi-vendor equipment supply

- Supply of the complete range of Eaton substation product lines
- Coordination and resale of all third-party customer preferred components
- Prefabricated control house and electrocenter supply

Turnkey project and construction management

- Single-point responsibility throughout the entire project
- Centralized project management group
- On-site installation supervision
- Standardized documentation practices including scheduling, reporting and closeout

Installation services

- Nationwide subcontracting capability of all trades
- Site preparation, excavation, foundation installation and control house construction
- Steel dead-end and overhead bus structure assembly
- Equipment set and connect
- Acceptance testing and installation certification
- Start-up and ground-fault certifications
- Interconnect confirmation and commissioning
- Warranty extension and training
- Short/long term maintenance contracts
- 24/7 remote monitoring with expert support
- Pager-alert of critically monitored parameters
- Immediate personnel dispatch based on remote indication

Additional power system design and analysis services

In addition to substation design services, Eaton offers extensive analysis services to enhance performance and design, validate equipment selection and simulate response to abnormal conditions, including:

- Short-circuit analysis
- Protective device coordination
- Arc flash analysis
- Load measurement, load flow analysis, power factor correction
- Power quality measurement, harmonic analysis, harmonic mitigation and filter design
- Transient stability analysis
- Switching transient analysis, surge suppression and snubber design
- Energy management studies

Eaton can provide engineering services for a variety of systems and sources:

- Solar (photovoltaic, solar concentrator)
- Geothermal
- Wind
- Hydro
- Biomass

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