





Trust the Leaders in Mission Critical Commissioning

For more than a decade, Electrical Reliability Services (ERS) has been a leader in the commissioning of critical space facilities. Unlike some commissioners who primarily provide administrative oversight, the commissioning services team from ERS offers a comprehensive, hands-on approach to commissioning. As an independent Commissioning Authority (CxA), ERS works objectively in your best interest to ensure your project requirements are met. We will work with you and your project teams from pre-design through construction and up to one-year post-occupancy to verify and document that systems are designed, constructed, and tested to function safely operates as intended and meets your specific project requirements.

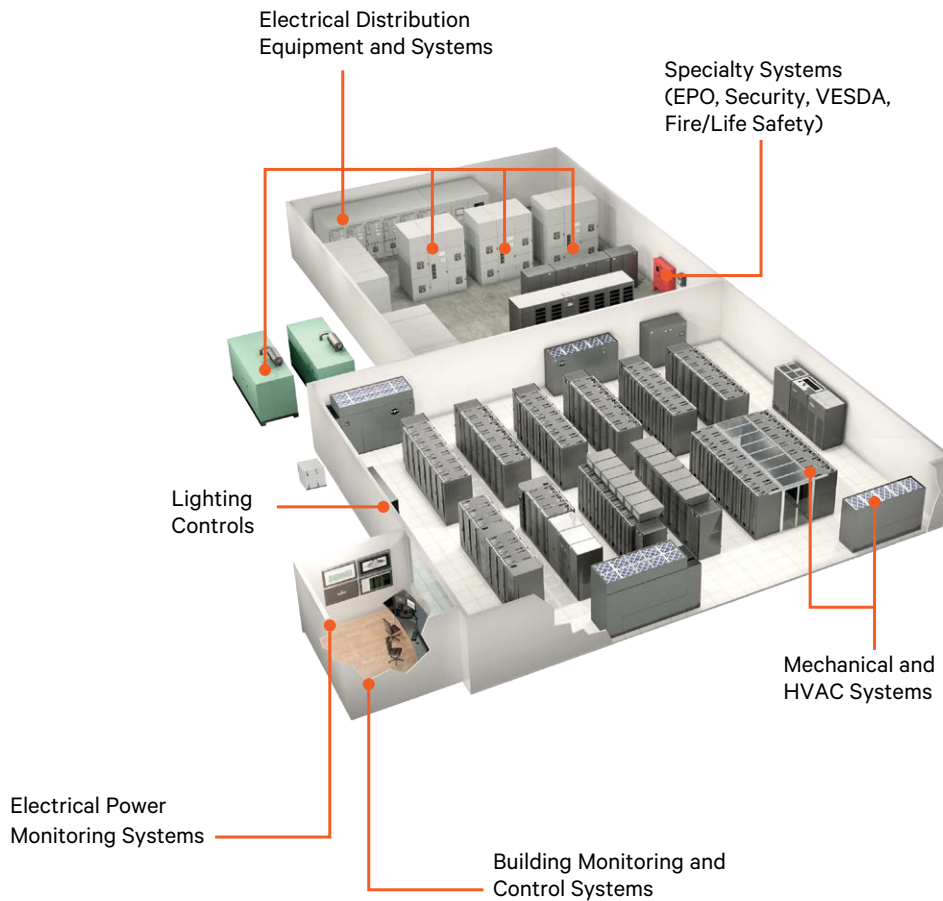
By working hand in hand with your design engineers and general contractor, our commissioners will ensure your mission critical facility meets your needs from day one. As a result, your project is much more likely to be delivered on time and on budget. Even more important, commissioning services ensure you get the results you expect. From lower operating costs and improved energy efficiency, to reduced downtime and higher data center availability, commissioning your project today delivers benefits for many years to come.

Ensuring Project Requirements Are Met

Designing a mission critical facility involves a significant investment of time and money. Understandably, you expect a return on that investment, and you have a specific list of requirements you hope to achieve, from improving availability, to enhancing safety, boosting efficiency, and cutting your operational costs. Through comprehensive commissioning services, the experts at ERS can help guarantee your project delivers the outcomes you expect.

Commissioning is a quality process that focuses on verifying and documenting that the facility and all its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

Frequently Commissioned Systems in a Mission Critical Facility



Benefits of Commissioning

Time

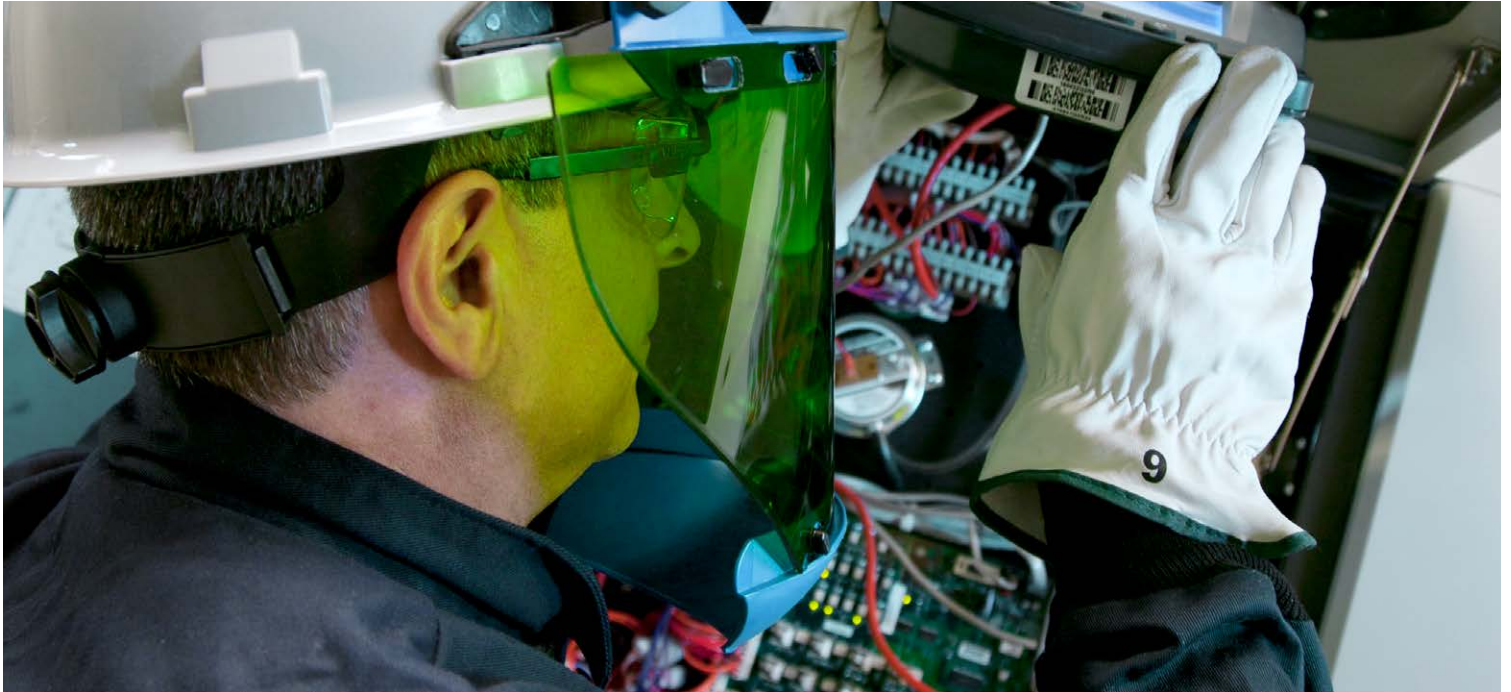
- Project completed on schedule
- Fewer change orders
- Faster startup and operation

Costs

- Project completed on budget
- Reduced operating costs
- Energy efficiency savings

Availability

- Functional and integrated systems testing ensures operational performance and reliability
- Training and Systems Manual prepares O&M staff for take over
- Recommended maintenance ensures peak performance



"Commissioning is arguably the single most cost-effective strategy for reducing energy, costs, and greenhouse gas emissions in buildings today. It is estimated that non-residential buildings in the United States alone could realize \$30 billion per year in energy savings by the year 2030."

– Lawrence Berkeley National Laboratory

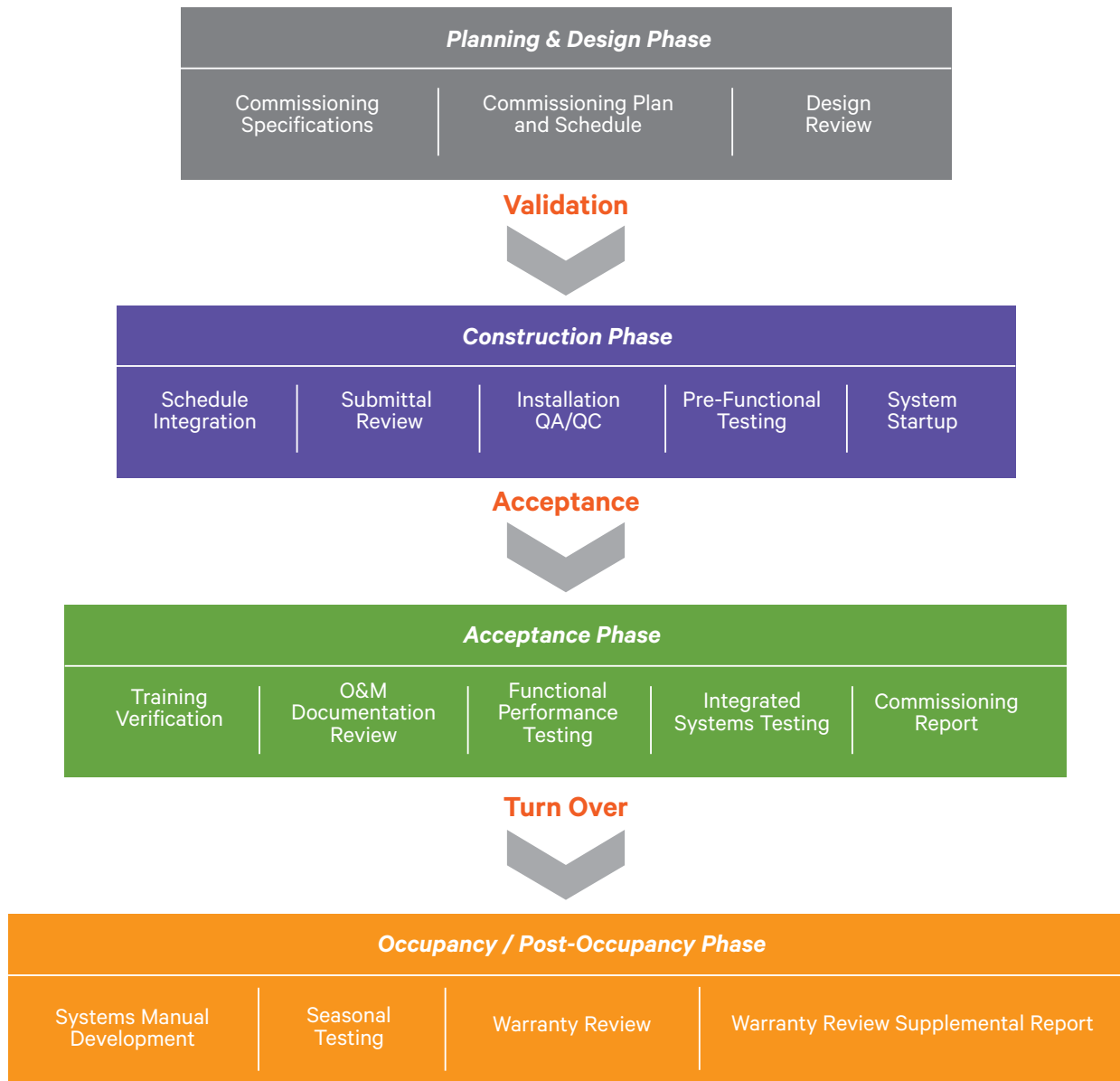
As the Commissioning Authority (CxA), ERS provides planning and oversight to help ensure your project is completed on time and on budget according to the project requirements. Our commissioning activities include:

- Help owner define and verify project requirements
- Commission per LEED requirements (if applicable)
- Develop commissioning specifications and plan
- Perform design review and verify Basis of Design (BoD)
- Ensure that all systems and assemblies are properly installed
- Test and verify the critical mechanical and electrical infrastructure
- Conduct integrated systems testing
- Ensure operating manuals are developed
- Verify training is conducted
- Verify complete and accurate documentation including Commissioning Report
- Conduct seasonal testing and warranty review

Full Lifecycle Commissioning

Commissioning is a quality assurance process that begins during planning and design and continues through construction, acceptance, occupancy, and post-occupancy. The activities performed during each phase of the commissioning process include activities from commissioning plan and specifications development, design review and scheduling to testing and verification, final commissioning report, training verification and warranty reviews.

Phases of the Commissioning Process





Planning/Design Phase

In conjunction with the general commissioning activities, the following specific commissioning activities are addressed during the Planning/Design Phase.

Commissioning Specifications and Plan

Based on your project's OPR document, our commissioners will develop clear, concise, and complete Commissioning Specifications and a Commissioning Plan. The documents clearly and accurately identify all systems to be commissioned and define the scope and schedule for all commissioning activities. The documents also outline the roles and responsibilities for all parties involved in the process, including the owner, design team, general contractor, subcontractors, and equipment vendors. The Commissioning Specifications and Plan establish clear project expectations and provide a roadmap to keep everyone on track during all phases of your project.

Design Reviews

The ERS commissioning services team will work closely with your design team to ensure the design of your new system adheres to your OPR document. We review design plans for general quality and coordination, and complete detailed reviews of design specifications for each discipline. When necessary, our commissioners will make recommendations for bringing design plans in line with the OPR. We track and document any design variances and complete final design reviews to ensure all issues are resolved. We will make sure the design meets your needs before construction begins, saving you time and money and ensuring a greater level of satisfaction with your completed system.

Commissioning Kickoff Meeting

The ERS commissioning services team will schedule a commissioning kickoff meeting with the owner, owner representative, and design team. This meeting is to ensure the commissioning process and expectations for the project are clear, concise, and in agreement by all parties. This meeting will set the tone for the balance of the project with respect to commissioning.

Construction Phase

In conjunction with the general commissioning activities, the following specific commissioning activities are addressed during the Construction Phase.

Schedule Integration

During the construction phase of your project, our commissioning engineers will develop and monitor the commissioning schedule, along with the overall construction schedule, ensuring the schedule is current and accurate. When reviewing the schedule, we will update and monitor all equipment delays and schedule changes. Any delays and changes are documented and reported to all parties to avoid unnecessary or unwarranted claims.

Submittal Reviews

Our commissioning services team will work with your general contractor, subcontractors, and equipment vendors to ensure your systems are built in accordance with the OPR. We begin by reviewing all contractor submittals, including bills of materials, specifications, cut sheets, manufacturer and equipment certificates, shop drawings, warranty information, performance data, startup and test procedures and sequences of operation. For each submittal, our commissioners verify compliance with the latest construction documents and sequence of operations, evaluate submittals for system-wide operational considerations and make recommendations for correcting any variances.

Commissioning Procedure Development

As submittals are reviewed and approved, the ERS commissioning team will develop project specific commissioning procedures. The commissioning procedures are submitted to the project team for review and comment, which we then follow up with updated final procedures with all comments addressed.

Commissioning Software (Cx Alloy)

The ERS commissioning team streamlines the commissioning process by utilizing Cx Alloy or other cloud-based software/tools for one convenient source for project commissioning information. Thus, all of the commissioning procedures, issues, and daily commissioning reports will be developed using this software. This allows the project team to track the project status and documentation in real-time, while providing transparency for the entire project team throughout the entire process.

Factory Witness Testing

The ERS commissioning team will review the factory witness testing (FWT) plan requirements to ensure these conform with the project specifications. In addition, the commissioning team will witness the testing at the factory to ensure the equipment tested performs per the approved functional performance requirements. If any issues are discovered during the FWT, these will be documented and tracked to closure, preferably prior to leaving the factory/testing site. A FWT report will be submitted for each piece of equipment.

Site Acceptance Inspection

The acceptance of the equipment as it is delivered to the construction site is the responsibility of the General Contractor and/or installing contractor. This phase of the commissioning is vital to ensure the equipment delivered is not damaged and the equipment meets the requirements per the approved submittal. Any discrepancies or questions shall be communicated to the owner and design team for resolution.

Installation and Startup

To prevent potentially costly problems upon startup, we verify and document that equipment is installed and started up per the manufacturer's recommendations and industry accepted standards. The commissioning team will also verify that the equipment and systems receive complete operational checks including electrical and mechanical checks before equipment and system startup. Our field commissioners witness and document vendor startup of critical pieces of equipment.

Pre-functional Equipment Verifications

For each major piece of equipment, we will develop a pre-functional checklist to confirm that equipment is in compliance with the OPR and construction documents before functional testing begins. The checklist will include a list of items to be inspected to verify proper installation and operation of the equipment or system.





Acceptance Phase

In conjunction with the general commissioning activities, the following specific commissioning activities are addressed during the Acceptance Phase.

Functional Testing and Integrated Systems Testing

Our team develops functional checklists and performs functional testing in all operational modes to confirm that each piece of equipment operates per the design intent. Once the functional testing is completed, a comprehensive integrated systems test is performed. This test is considered the most comprehensive test your system will ever receive. The process verifies integrated functional operation of critical building systems under designed load and under emergency conditions. Our commissioners will develop an Integrated Systems Test script detailing the testing process for the entire critical system including the electrical and mechanical primary systems, redundant systems, backup systems, emergency and automatic switching systems, and building automation systems (BAS).

Training and O&M Verification

A knowledgeable O&M staff can help ensure the ongoing success of your data center. Our commissioners ensure that equipment vendors and control contractors provide adequate training for both O&M staff and data center owners. They will ensure that training covers safe operating and maintenance procedures for your newly installed system. Upon request, we can also evaluate your training program to ensure compliance with NFPA 70E requirements. Our commissioners can also validate trainer qualifications, review training schedules, inspect training areas for appropriateness, and review training handouts to ensure greater trainee comprehension.

Commissioning Report

At the end of the commissioning process, we will document the entire project in the form of a comprehensive Commissioning Report. This report includes the following:

- A statement that systems have been completed in accordance with the contract documents and that the systems are performing in accordance with the final OPR document
- Identification and discussion of any substitutions, compromises, or variances between the final design intent, contract documents and as-built conditions
- Final completed testing procedures and all supporting data (i.e. screenshots, trending results, PQM results, etc.)
- Summary of all issues resolved and unresolved and any recommendations for resolution
- Lessons learned for use in future commissioning project efforts



Occupancy/Post-Occupancy Phase

In conjunction with the general commissioning activities, the following specific commissioning activities are addressed during the Occupancy/Post-Occupancy Phase.

Systems Manual

ERS commissioning engineers work with your general contractor to prepare a thorough Systems Manual for all commissioned building systems. These documents ensure that your O&M staff has the right resources for troubleshooting and future training and that your staff is equipped to efficiently and effectively operate your systems for years to come.

Seasonal Testing

Some critical tests can only be performed once systems are fully operational. Other tests cannot be performed until the occupancy phase of a project because they require specific environmental conditions that cannot be simulated during construction. During the project's occupancy phase, we will perform any deferred or seasonal testing and provide documentation of all test results.

Warranty Review and Supplemental Report

Our commissioning services team will conduct a thorough onsite warranty review to identify any operational or system performance issues that may be covered under the terms of your warranty. They will work with your general contractor to make sure these issues are resolved before the warranty expires. In addition, a warranty review supplemental report will be developed and delivered to the owner for final project closeout.



Commissioning Expertise. Demonstrated Results.

Single-Source Accountability

ERS streamlines the commissioning effort, providing one convenient source of project information throughout the commissioning process. Early on, we enroll all project stakeholders into a cohesive unit with a shared stake in project success. We facilitate collaboration, communication and commitment between you and your design team, general contractor, subcontractors, vendors, and commissioners. Your project stays on track and on budget with fewer change orders, costly delays, and rework. You stay up to date on progress every step of the way.

Flexible Budgets

We recommend a comprehensive commissioning process. However, we understand that your unique needs and commissioning budget may not allow for a full scope of services. Our commissioning team will work with you to tailor services to your specific project. We can offer a cost-effective approach with a reduced commissioning scope that meets your budget while ensuring the operational reliability of commissioned systems.

Strategic Partnerships

Through professional partnerships with other experienced commissioning providers, ERS provides the highest level of expertise for commissioning a variety of facilities and building systems, including electrical, mechanical, controls, and specialty systems, as well as structures and building envelopes.

Return on Investment

Cost and benefit analyses conducted on dozens of completed commissioning projects demonstrate that commissioning services generate a return on investment that far exceeds the cost of commissioning. Our commissioners identify design, installation, and startup deficiencies to help safeguard against human errors that contribute to failures and outages, safety problems, and inefficiencies. By ensuring that commissioned systems meet your requirements, our services pay for themselves many times over — delivering a solid return on your investment.

Qualified Resources

Our team has provided commissioning services for critical space facilities ranging from small POP sites to large laboratories and Tier IV enterprise data centers. With upwards of 100 data center projects in our portfolio — including both Gold and Silver LEED data centers — we have an intimate understanding of data center owners' needs and how to achieve specific objectives through commissioning services.

ERS actively participates in the Building Commissioning Association and the InterNational Electrical Testing Association (NETA). Our talented staff includes Certified Qualified Commissioning Providers (QCxP), NETA Certified field engineers, and LEED Accredited Professionals (AP) with training in ASHRAE commissioning guidelines and the LEED rating system. With service locations across the United States, we are well positioned to perform commissioning on facilities anywhere in the nation.





“The investment we made in commissioning has paid for itself many times over. ERS identified and corrected issues before they led to costly project delays. And thanks to their comprehensive services, we’re realizing the results we wanted from our new system. We’re confident that our new data center will operate efficiently and without interruption for many years.”

- NATIONAL FINANCIAL SERVICES GROUP

Other Commissioning Services

ERS offers flexible solutions to solve your unique challenges. If our commissioning packages do not meet your needs, you can customize your own solution by choosing from these individual commissioning services:

- OPR Workshop
- LEED Commissioning
- Re-Commissioning
- Energy Audits
- Title 24 Commissioning
- Facility Audits
- MOP/SOP/EOP Procedure Development

Related Services

In addition to commissioning, we provide the following related services to support your facility throughout its lifecycle:

- Acceptance testing
- Arc flash analysis
- Safety and compliance audit
- Short circuit and coordination study
- Safety assessment
- Failure/fault investigation
- Electrical maintenance
- Computation fluid dynamics analysis

Electrical Reliability Services — Your Partner for Success.

Don't leave your mission critical facility to chance. Trust the experts at ERS to ensure your success.

A comprehensive commissioning process that begins pre-design and continues into the occupancy phase of your project can ensure that your new mission critical facility operates as intended and meets your specific project requirements. With our full scope of services and our expertise with both field verifications and project documentation, ERS's commissioning services team can help define project requirements, verify that your system is designed, constructed, and operated in accordance with those requirements, and document every step of the process.

You can trust us to protect your considerable investment in your facility and to ensure your complete satisfaction with your commissioned equipment and systems for years to come.

Visit ERS.vertiv.com to learn more about our services.



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