



# COMMISSIONING

reference guide



Though often considered by owners to be a “nice to have”, it’s now widely accepted that a properly executed building commissioning (Cx) program is vital to the successful implementation and operations of a mission critical facility. The commissioning process, when performed according to accepted industry standards, will ensure that the facility’s electrical and mechanical infrastructure will meet the owner’s operational intent for:

- Maintainability
- Fault Tolerance
- Efficiency
- Operability
- Functionality
- Expansion Capability
- Process Improvement

An effective commissioning program validates that the components, sub-systems and systems are properly designed, manufactured, installed, tested and documented– according to the owner’s intended use of the facility - and that its staff are properly trained and prepared to operate it.

Commissioning benefits the entire lifespan of your facility, from conceptual design on through construction, new building Cx, and then later through re-commissioning of systems after changes are implemented such as an equipment refresh or improvement project. It has its own lexicon and acronyms, some of which we’ll describe here for future reference.

## COMMISSIONING INDUSTRY GROUPS

There are several industry organizations that have developed commissioning guidelines and standards over the past two decades in to order to align the needs of the owner with the services being provided by the Commissioning Authority. Each of these industry groups has developed certification programs to increase building owners’ confidence in the critical job knowledge, skills and abilities of the Commissioning Authority.

- **ASHRAE** - American Society of Heating, Refrigeration and A/C Engineers
  - **CPMP** - Commissioning Process Management Professional
- **ACG** - Associated Air Balance Council’s Commissioning Group
  - **CxA** - Certified Commissioning Authority
- **BCA** - Building Commissioning Association
  - **CCP** - Certified Commissioning Professional
- **AEE** - Association of Energy Engineers
  - **EBCP** - Existing Building Commissioning Professional



While these organizations and certification program are beneficial, they are typically focused on building commissioning. Commissioning of mission critical facilities involves unique considerations for the specialized electrical, mechanical and controls systems inherent to them. The founders of Rubicon helped pioneer the adoption of commissioning within the mission critical industry at the turn of the millennium. Many of the processes that were put in place then have evolved into standard practices.

# TYPES OF COMMISSIONING

Most commissioning programs can be grouped into three types:

- **New Building Commissioning**
- **Retro-Commissioning**
- **Re-Commissioning**

## **New Building Commissioning**

Commissioning begins long before the first shovel hits the ground. A proper New Building Cx program involves the Cx Agent as a crucial component of the design and construction phases of the project. – and then continues as a resource to the owner’s construction and operations teams.

### **Programming Phase (Pre-Design)**

- Document Owner’s operational intent (aka Owner’s Project Requirements or OPR)
- Document design team’s Basis of Design (BOD)

### **Design Phase**

- Review the design against the OPR and BOD.
- Provide recommendations for design that will result in operational benefits to the owner.
- Develop Cx program, specifications and preliminary schedule.

### **Construction Phase**

Implement industry standard Cx Levels:

- **Level 1** – Factory Witness Testing (FWT) – Assures that critical infrastructure equipment is rigorously tested at the factory according to the CxA and the engineer’s requirements. This step avoids substandard testing being performed by the manufacturer, and allows for modifications to be made to the equipment while still at the factory, and reduces the instance of issues during start-up and functional performance testing.
- **Level 2** – Equipment acceptance – Although performed primarily by the installing contractor, this step ensures that all equipment is properly received and stored, and that all loose parts and spare parts have arrived prior to being needed.
- **Level 3** – Pre-functional testing (PFT) and start-up –In this step, Rubicon as the CxA develops and provides to the installing contractor detailed checklists for performing pre-functional tests such as conductor testing, torque checks of cable terminations and pipe flushing. Rubicon will witness a sampling of these tests, as well as the start-up of major equipment by the manufacturer’s authorized technician.
- **Level 4** – Functional component testing (FCT) and functional performance testing (FPT) – This level provides assurances that individual discrete components – sensors, switches, valves, etc. – that make up the larger systems are operating properly. Once that is verified, the systems themselves are tested under load and switching conditions to validate performance as specified.

- **Level 5** – Integrated systems testing (IST) – the final level of the commissioning process during construction, IST tests all of the discrete electrical and mechanical systems as one integrated critical facility. The entire systems is tested under load, and exposed to a variety of failure scenarios to validate the final installation meets the original owner’s operational requirements.

### **Occupancy Phase**

- Once all systems have been validated, Rubicon ensures that your operations team is prepared to effectively operate the site. This includes:
  - o Review of system as-built documentation
  - o Review of O&M manuals, warranty information, training programs
  - o Development of standard operating procedures
  - o Seasonal testing

## **Existing Building Commissioning (or Retro-Cx)**

Existing Building Cx is performed on facilities or systems on which commissioning was not previously performed. It’s a process of retroactively determining whether the electrical and mechanical systems are performing as intended, and provides the owner a basis from which improvements or remediation may be planned and implemented.

## **Re-Commissioning**

Re-Commissioning generally involves commissioning an active facility or sub-system after changes have been introduced. This could be the result of a positive event such as an expansion or equipment refresh, or because of a remediation effort to cure system deficiencies. Re-Commissioning is an intricate process that may involve several phases of construction and commissioning due to the inherent nature of performing such activities in an active facility where the ongoing operations cannot be impacted. It typically involves the development of detailed Methods of Procedures (MOPs) that define the steps of commissioning necessary to preserve the integrity of the critical load.

Rubicon’s experienced Cx staff excels at this type of critical commissioning process within an operating facility.

Rubicon provides our mission critical clients the highest level of service and support. We recruit, train and empower the best experts we can find in the industry. Whether for new construction commissioning, retro commissioning of an existing facility, or re-commissioning after an equipment refresh– Rubicon has the skillset, experience and tools to provide this crucial validation step in the successful implementation of your project.

## ABOUT RUBICON TECHNICAL SERVICES

Rubicon offers a balanced, objective and vendor neutral commissioning program performed by our experienced team of commissioning agents (CxAs). Rubicon's testing specialists and commissioning engineers are experts in the complexities of validating mission critical electrical and mechanical infrastructure. Individuals are handpicked for their training, certifications and unique skill sets including:

- ASHRAE – Cx Process Management Professional (CPMP)
- Association of Energy Engineers (AEE) - Existing Building Cx Professional (EBCP)
- Licensed Professional Engineer
- NETA Certified Level 3 Technician
- Alerton BAS Certified Programmer
- Certified Infrared I & III Thermographers
- OSHA 30 Safety Training

Rubicon will staff your project with hands on professionals who understand your systems from both a theoretical design level and from a nuts and bolts field level. This attribute is crucial in the commissioning process for troubleshooting and optimization of the building systems. It's a mindset and a culture that cannot easily be replicated.

For more information on commissioning, or to discuss the commissioning of an upcoming project, please email us at [info@RubiconTechServices.com](mailto:info@RubiconTechServices.com) or call us at **678-638-6646**

## GLOSSARY OF COMMISSIONING TERMINOLOGY

**Acceptance** – A formal action taken by a person with appropriate authority declaring that some aspect of the construction meets their defined requirements, thus permitting follow-on activities to proceed according to the Commissioning Plan.

**Basis of Design** – A document that provides a record of the concepts, calculations, decisions and product selections used to meet the Owner's Project Requirements.

**Commissioning (aka Commissioning Process)** – A quality focused process for enhancing the delivery of a construction project by verifying and documenting that the facility and all of its systems and assemblies are planned, design, installed, tested, operated and maintained to meet the Owner's Project Requirements.

**Commissioning Authority (aka Commissioning Agent)** – An entity identified by the Owner who leads, plans, schedules and coordinates the Commissioning Team to implement the Commissioning Plan.

**Commissioning Plan** – a document developed by the Commissioning Authority for use by the Commissioning Team that outlines the organization, schedule, allocation of resources and documentation requirements of the Commissioning Process.

**Commissioning Team** – the various entities that take part in the implementation of the Commissioning Process, typically including but not limited to the Owner, Architect, Engineers, Commissioning Authority, Contractors and Equipment Vendors.

**Deficiency Log (aka Issues Log)** – A formal and ongoing record of problems or concerns – and their resolution – that have been raised by the members of the Commissioning Team during the course of the Commissioning Process.

**Owner's Project Requirements (aka Project Intent)** – A written document that details the functional requirements of a project and the expectations of how it will be used and operated.

**Systems Manual** – A system focused composite document that includes the operation manuals, maintenance manuals, as-built documentation, warranties and additional information of use to the Owner's during the occupancy and operations of the facility.

**Test Procedure (aka Test Script)** – A written protocol that defines methods, personnel and expectations for tests conducted on components, equipment, assemblies, systems and interfaces among systems. In a retro or re-commissioning, this may include specific steps to avoid disruption of the active facility systems.

**Verification** – The process by which specific documents, components, equipment, assemblies, systems and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.