



MAINTENANCE AND COMMISSIONING - CEM

REFRESHER TRAINING COURSE

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP

CEM REFRESHER TRAINING COURSE





CONSTRUCTION PHASE COMMISSIONING

FOR ENERGY PROFESSIONALS

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP

CEM REFRESHER TRAINING COURSE



LEARNING OBJECTIVES





- Construction Phase Commissioning
- Commissioning Specifications
- Typical Commissioning Process
- Construction Phase Commissioning Objectives
- CxA Specifications Section 01810: Commissioning
- Construction Phase Commissioning Activities

COMMISSIONING SPECIFICATIONS

In the construction phase, the commissioning process transitions from planning to application and is active during the entire construction phase. During pre-construction, the commissioning schedules are developed and integrated into the construction schedules.

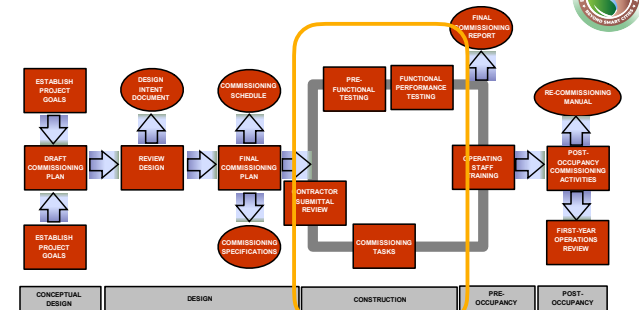
The CxP reviews the submittals for the commissioned systems and further develops the field observation, testing, and functional and performance requirements and checklists in the commissioning plans.

In coordination with the construction schedules, the FPTs are conducted by the contractors along with the CxP as a witness.

Based on FPT results, a preliminary commissioning report is drafted and reviewed by the Owner and, if necessary, the local jurisdictions.

During pre-construction, the commissioning schedules are developed and integrated into the construction schedules.

TYPICAL COMMISSIONING PROCESS



CONSTRUCTION PHASE COMMISSIONING OBJECTIVES

Successful construction phase commissioning is a well-coordinated quality assurance and control process that encompasses installation, start-up, functional testing, documentation and training.

- ✓ The Commissioning Plan (Cx Plan), the OPR, and BOD are updated.
- ✓ Commissioning team members understand their roles and responsibilities for the construction phase commissioning activities.
- ✓ Equipment, systems, and assemblies are properly installed, maintainable, and functioning properly as required to meet the OPR.
- ✓ The operations and maintenance (O&M) personnel are provided with complete and proper systems operating documentation.
- ✓ The O&M personnel, and occupants as needed, are properly trained. Training materials and documentation compiled to facilitate repeating training and training new staff in the future.

CONSTRUCTION PHASE COMMISSIONING ACTIVITIES



- ☑ Updates to the Cx Plan, BOD, and the OPR to reflect changes made to the project by their original creators.
- ☑ Each project should be evaluated and when sufficiently advantageous to the success of the project, utilize electronic and cloud-based Cx management processes.
- ☑ Integrate the Commissioning Schedule into construction schedule. The CxP works with the contractor to integrate the Cx activities into the construction schedule, with adequate time to complete all commissioning activities.
- ☑ Conduct construction phase commissioning kick-off meeting

CONSTRUCTION PHASE COMMISSIONING ACTIVITIES+



- ☑ The CxP reviews submittals of commissioned equipment concurrently with the design team in a coordinated process that all parties agree to. Reviews normally focus on issues relative to commissioning facilitation.
- ☑ Hold construction phase controls integration meetings.
- ☑ Develop the master list of commissioned equipment, systems and assemblies. This list may also be utilized by the owner for O&M purposes
- ☑ During construction, the CxP, or the Contractor with CxP (with Owner review) should prepare from the specifications a list of the required warranties, spare parts and closeout documentation.
- ☑ Complete development of project specific Construction Checklists.

CONSTRUCTION PHASE COMMISSIONING ACTIVITIES+



- ☑ Develop functional testing procedures and test data forms. The functional test procedure forms are developed, usually by the CxP (or approved by them if developed by others), after the controls submittals and other commissioned systems and assemblies are approved.
- ☑ Maintain Issue Log. The CxP maintains an Issues Log to document and track commissioning items that do not comply with the construction documents and OPR.
- ☑ Conduct regularly scheduled commissioning coordination meetings.
- ☑ The contractor thoroughly executes the Construction Checklists and other required startup and checkout documentation and submits to the CxP and other required parties in a timely manner so they can be used to aid confirming test readiness.

CONSTRUCTION PHASE COMMISSIONING ACTIVITIES+

- ☑ Conduct regularly scheduled site visits. Site visits by the CxP are often held in concert with the construction or commissioning coordination meetings.
- ☑ Assist project team with resolution of issues. The commissioning provider provides constructive input for the resolution of system deficiencies.
- ☑ The CxP reviews contractor and special agency equipment start-up and quality control testing documents and witness selected or critical startups and contractor quality control tests
- ☑ CxP reviews requests for information and change orders of commissioned equipment. Comment as warranted to maintain the OPR.



CONSTRUCTION PHASE COMMISSIONING ACTIVITIES+

- ☑ Review the Testing, Adjusting and Balancing (TAB) plan and report.
- ☑ Confirm Functional Test Readiness.
- ☑ Coordinate, execute and document functional testing.
- ☑ CxP reviews contractor as-built documents, warranties and O&M Manuals.
- ☑ Compile the Construction Phase Commissioning Report.
- ☑ Finish Preparing the Systems Operations Guide. The Systems Operations Guide prepared by the CxP whose preparation began during design, provides the information needed to understand and properly operate, the building systems and assemblies and is submitted to the Owner



CONSTRUCTION PHASE COMMISSIONING ACTIVITIES+

- ☑ Prepare the Commissioning Record. The CxP assembles documentation of the Cx process and submits to the Owner. Refer to the Design Phase, Section 3, for its contents.
- ☑ Assemble the Contractor's Project Turnover Documentation.
- ☑ Verify training of the owner O&M personnel and end users. Verify that the training for the owner's operating staff is conducted in accordance with the project documents.

The key objective of the owner's operating staff training is to convey knowledge and skills required to effectively and efficiently operate the facility. This includes an understanding of the OPR and BOD as well as training on the purpose and use of the Systems Operations Guide

