



MAINTENANCE AND COMMISSIONING - CEM

REFRESHER TRAINING COURSE

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

CEM REFRESHER TRAINING COURSE





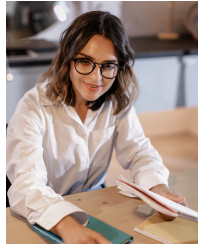
OCCUPANCY PHASE COMMISSIONING

FOR ENERGY PROFESSIONALS

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LEARNING OBJECTIVES

Occupancy Phase Commissioning

Occupancy Phase Commissioning Objectives

Occupancy & Operation Phase Commissioning Activities



OCCUPANCY PHASE COMMISSIONING

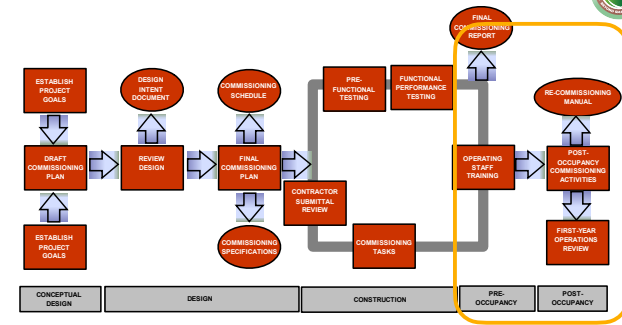
The Occupancy and Operation Phase normally begins at Substantial Completion when the building is turned over to the Owner, though some construction phase activities may still be in process.

In the Occupancy and Operations Phase all uncompleted activities from the construction phase are finished (project closeout activities) as well as the long-term processes for ensuring building performance over time being developed and put into place (ongoing maintenance and performance activities).

The reasons for post-occupancy testing are numerous; the most common reason is that some functional tests cannot be performed before occupancy either due to seasonal variables



TYPICAL COMMISSIONING PROCESS



OCCUPANCY & OPERATION PHASE CXA OBJECTIVES

Facilitate the continued engagement of the Cx team and verify the completion of outstanding Cx issues.

- ✓ Complete any seasonal and deferred functional testing and O&M staff training and occupant orientation.
- ✓ Complete systems and commissioning documentation.
- ✓ Evaluate project success, Optimize building performance.
- ✓ Develop and begin implementation of a plan for commissioning the building over time (Ongoing Commissioning).
- ✓ Survey occupants, formally check in with operations staff and assess issues.
- ✓ Benchmark energy performance and evaluate and track performance over time.



OCCUPANCY & OPERATION PHASE CXA ACTIVITIES

- ☑ Provide timely addressing and tracking of performance problems and incomplete items from the Cx Issues Log. The CxP encourages Owner project managers and contractors to address issues before the project loses sufficient momentum to effectively deal with them.
- ☑ Conduct and verify completion of outstanding O&M personnel training. According to the contract documents, the Contractor conducts deferred training of the O&M personnel. CxP or Owner personnel evaluate the effectiveness of the training program and make a recommendation as to the need for supplemental training.
- ☑ Complete seasonal and deferred functional testing.



OCCUPANCY & OPERATION PHASE CXA ACTIVITIES+

- ☑ Conduct periodic check-ins with Operation and Maintenance staff.
- ☑ Optimize systems.
- ☑ Conduct an occupant survey.
- ☑ Perform a Building Operations Review.
- ☑ Compile a Final Commissioning Report.
- ☑ Evaluate project success.
- ☑ Update the Project Documentation Systems Operations Guide
- ☑ Provide an Occupant User's Guide.
- ☑ Develop a preventive maintenance plan.
- ☑ Develop and begin implementation of the Ongoing Commissioning Program.
- ☑ Update the OPR and Systems Operations Guide.



COMMISSIONING: GENERAL

1. Design intent is important (know what you want and express it).
2. Commissioning experience and training is important. Get someone with experience to help the first time(s) and obtain proper training. This process can be extremely cost effective; do it right.
3. Facility staff should be involved in the process as soon as possible. This is especially critical in the formal commissioning activities (systems try out and tuning).



COMMISSIONING: GENERAL +



4. Commissioning is not a “quick fix” or a “one time activity”. It is a rather dramatic change in philosophy and an on-going activity. Management will be doing some phase of commissioning for the entire life of the facility. Remember, it is cost effective.

5. Commissioning is not implicit in construction. Management must make it happen.

6. Commissioning almost guarantees a smooth transition.

7. Commissioning must include training, systems manuals, maintenance manuals, and other documentation as needed.

COMMISSIONING: GENERAL +



8. Commissioning must include systems design for real time commissioning and parameters for when recommissioning is needed.

9. Commissioning does include observation by management, but it is much more, including observation of start up, testing adjusting and balancing, and other “normal” construction steps. We must change our thinking to include these as part of the total commissioning process.

COMMISSIONING DOCUMENTATION



1. Design intent and design drawings, specifications, etc.

2. Commissioning plan including specifications and procedures (before construction)

3. Complete documentation of all test results, TAB, modifications, etc. (as built, as modified)

4. Drawings and specifications brought “up to date” as needed by the changes made (“as built and modified”).

5. Systems manual with complete descriptions, equipment literature, drawings, etc. (complete “systems description”)

6. Maintenance manual (complete manual not just collection of equipment maintenance check list)

COMMISSIONING DOCUMENTATION

7. Training in operation and maintenance of all systems.

8. Recommissioning plans and parameters.

9. Real time commissioning systems design (will include many of the steps above).



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