

AABC Commissioning Group AIA Provider Number 50111116



Acceptance and Testing for a Quality Turnover to Sustainable Operations & Maintenance

Course Number: CXENERGY1712

SEDUCATION STREET

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Course Description

This presentation demonstrates how to use commissioning to supplement the planning, design and construction process to achieve a better systems outcome. Attendees will learn the key closeout steps necessary for better operations and maintenance; how to line up the project contract responsibilities for a quality turnover to operations; and the basic tasks required for a quality acceptance and turnover process that improves the stakeholder environment.



Learning Objectives

At the end of the this course, participants will be able to:

1. Learn how to use commissioning to supplement the Planning, Design and Construction process to achieve a better systems outcome.

2. Learn the key closeout steps necessary for better operations and maintenance.

3. Learn how to line up the project contract responsibilities for a quality turnover to operations.

4. Learn about the basic tasks required for a quality acceptance and turnover process

that improves the stakeholder environment.



Acceptance and Testing for A Quality Turnover to Sustainable **Operations & Maintenance**

AKF Group LLC for CxEnergy 2017

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What is a Successful Project?



Purpose of Cx on a Project?



"By failing to prepare, you are preparing to fail"

— Ben Franklin

What Level of Cx is Needed?

SCHEDULE

BUDGET

ASHRAE outlines the process and

The Mission Critical Data Center industry defines these levels

- Level 1 Factory Acceptance Testing (Not required per LEED)^{SCOPE}
- Level 2 Component Start-Up (LEED typical)
- Level 3 Equipment Level Testing (LEED typical)
- Level 4 System Interface Level Testing (Above LEED + Life Safety + ELEC)
- Level 5 Integrated System Level Testing (BSL/ Data Center/Critical System Typical)

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APPA Institute for Facilities Management

The Building Commissioning Handbook (APPA with the BCA)

ASHE published the Health Facility Commissioning (HFCx) Guidelines in 2010 and handbook in 2012.

Both build from the ASHRAE Cx Guidelines

Highlights transition to Sustainable Operations and Compliance for Health & Educational Research Facilities

APPA used to stand for the Association of Physical Plant Administrators (ASHE) American Society for Healthcare Engineering of the American Hospital Association



When Does Closeout Start?



The Importance of Formal Acceptance and Turnover Process

- Improve the end user transition into the new space.
- Verify that the Contractor installed what was bought by the Owner.
- Clearly signals installation completion and warranty start dates.
- Reduce the amount and cost of Proposed Change Orders.
- O & M training for <u>Energy and Compliance</u>

Commissioning: A Quality Assurance Process

Utilize your Cx Team in ANY phase of a Project



Planning for Turnover in SPEC

SECTION 01 91 00

GENERAL COMMISSIONING FOR MEP-FP SYSTEMS

- B. Related Sections:
 - 1. 013100 Coordination
 - 2. 013300 Submittals
 - 3. 014000 Quality Requirements
 - 4. 014100 Testing and Inspection
 - 5. 016000 Product Requirements
 - 6. 017300 Execution Requirements
 - 7. 017700 Closeout Procedures
 - 8. 017823 Operating and Maintenance Data
 - 9. 018119 IAQ Management Plan
 - 10. 210800 COMMISSIONING OF FIRE PROTECTION SYSTEMS
 - 11. 220800 COMMISSIONING OF PLUMBING SYSTEMS
 - 12. 230800 COMMISSIONING OF HVAC SYSTEMS
 - 13. 260800 COMMISSIONING OF ELECTRICAL SYSTEMS
 - 14. Building Envelope Quality Assurance Program (BEQAP)
 - 15. Construction Documents
 - 16. Section includes the general commissioning process requirements for Life Safety, Energy, MEP, HVAC&R, and Building systems, assemblies, and equipment.

Typical Client Project Phases

Design Guide Phases

- Phase 1 Pre-Design/Programming
- Phase 2 Schematic Design
- Phase 3 Design Development
- Phase 4 Construction Documents
- Phase 5 Construction Administration

Cx Phase per RFP

- Phase 1 Design
- Phase 2 Construction and Acceptance
- Phase 3 Warranty Period

Recommended Commissioning & Testing Phases

- Programming Phase
- Design/Bid Phase
- Construction Phase
- Acceptance Phase
- Integrated Systems Testing
- Post-Occupancy/ Warranty Phase



Acceptance as a Milestone



A formal Acceptance is the most important Milestone in Construction Closeout

- Whether performed by a 3rd party, the House, Owner's Representative, or GC with A/E/House Witnessing.
- Clear contract expectations for Acceptance, Turnover, and Closeout.

OPR + BOD = Construction Documents? <u>CONFIRMED</u>, then

Verified Installation + Validated Performance = ACCEPTANCE

Roadmap to Final Acceptance

Initial System Acceptance In

Integrated System Tests Completee

System Performance Verification Equipment Functional Verification Vendor Start up Forms SPEC Testing Sequence of Operation Approved Vendor Installation Checklists Factory Acceptance Tests



Do Contract Deliverables Match R<u>esponsibilities</u>?

- What are the expectations for Closeout and Turnover?
- Does your team use a Project Closeout Checklist?
- Is the Commissioning Authority the Acceptance Authority?
- Is there overlap between the EOR, Cx, and AHJ Inspections?
- Payment retainage for deliverable enforcement outlined?

Sample Closeout Guidelines





HARVARD Planning & Project Management PROPERTY INFORMATION RESOURCE CENTER (PIRC)

CLOSE-OUT PACKAGE

At the end of a project, a close-out package is to be completed and submitted to RED+F per the Final Payment Checklist. Below is a list of many of the required items. The goal is to have all projects closed 120 days after the first user has moved in. The design team shall request from the RED+F PM they provide the latest version of this checklist.

	Resp Party	Date Rec'd	Description
1	A/E		Letter(s) of substantial completion for all permits (Mech, Plumb, Struct, Fire Protection, General Construction).
2	A/E		Construction documents in AutoCad or DXF format, to SPM Plan room. Transmittals to close-out binder.
3	A/E		DOB Signed and Sealed drawings.
4	A/E		NYC Department of Buildings and FDNY inspections completed.
5	A/E		As-built AutoCad or DX format documents received and forwarded to SPM to update Archibus file.
6	C		MEP as built drawings (3 CD copies of pdf files).
7	С		Completed close out matrix by trade.
8	С		NYC Filing and Final permits (Electrical, Plumbing, Fire, etc.).
9	C		Equipment use permits.
10	C		Contractor's Warranty and Approval for Final Payment letter.

Capital Project Closeout

Construction Documentation Requirements

Guidelines for Architects, Contractors, and Project Managers

Funding the Acceptance Effort

- New Construction Project Capital
- Deferred Maintenance Project Capital
- Energy Project Incentives
- Track Energy Savings to fund the O & M, Repair Budge
- Marketing and Fundraising Demands



 Implement Metering & Verification (M & V) to capture energy savings and demand

Project Flow from Programming to Operations?

- Does the Facility have a Turnover Protocol?
- How do we Closeout a Project?
- Who is responsible for Accepting the M/E/P and FP Equipment and Systems?
- What internal documents have to get updated for Compliance?
- Can the House maintain and test all this new equipment?
- Was Operations involved in the project before catching the Turnover?

Clarify Systems and Equipment for Cx and Training in RFPs for a Level Bid Process and Fit to Purpose Level of Cx

A. Professional Services

Commissioning services will be provided to ensure the HVAC equipment and associated controls, electrical service and distribution, and related equipment are installed as specified, properly started, tested, documented and are operating according to the intent of the construction documents. The Commissioning Authority (CxA) will also be responsible for verifying the completeness of operation and maintenance manuals and ensure that operations personnel are properly trained on the new equipment. The Commissioning process will be based on ASHRAE Guideline 0-2005. The guideline describes commissioning activities in the program, design, construction, acceptance, and post-acceptance phases of the project.

"Client Project Closeout " Standard Creation?



Occupancy Plan

Standard Reports

Testing



Develop an Acceptance & Turnover Plan

<u>COAST</u> from Construction to Operations

- COORDINATE with Design, Operations, Commissioning, and Contractor Testing
- ORGANIZE Responsibilities in SPEC and Contracts
- **ACCEPTANCE** Spec Checklist of Contract Deliverables
- **SEQUENCE** of events and Milestones into schedule
- **TRANSITION** from Performance Requirements to Operations

Expectations for the Acceptance Team

Add <u>LUSTER</u> to the Project

- LOG all commissioning related issues with expected dates of correction
- **UPDATE** to Operations on progress
- SUMMARY of the accuracy and completeness of each system Turnover package
- TRACK the status of closeout documentation for each equipment and system
- **ENCOURAGE** the early development of closeout documentation

Post Operations and Occupancy Acceptance

CLOSE the loop with Operations

- **CORRECTIVE** action process for defects found during warranty period
- LINE-UP O&M, Repair, and Management System
- ORGANIZE seasonal or deferred Functional Performance Testing
- **SELECT** responsible CHAMPION for the effort until work is completed.
- **ESTABLISH** compliance and energy metrics relative to performance.

Formal Acceptance Meeting Agenda

INSURE Follow-up and Transition to Operations

- INVITE Parties with Expectations and an Agenda
- **NOTIFY** Operations and End Users
- SIGN IN and Meeting Minutes
- **UNDERSTAND** the Open Issues
- **REVIEW** any Specified Materials
- **EXCEPTIONS** to Equipment and Systems

Cx Acceptance & Turnover Summary

- Each project requires an Acceptance and Turnover Plan for Closeout.
- Clearly identify the roles and responsibilities of each Project Team member.
- Highlight contract deliverables during scope review and kick off meetings.
- Assign a responsible party as the Accepting Authority.
- Better understanding of which Compliance Documentation require updates.
- Reduces the risk of partial acceptance and warranty pit falls.
- Improves project management, change management, end user

Closeout starts at the Pre-Design/ Programming Phase



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This concludes The American Institute of Architects Continuing Education Systems Course

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