

Fundamental Commissioning and Verification

Prerequisite

Intent

To support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

Requirements

Commissioning Process Scope

Complete the following commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1–2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.

Requirements for exterior enclosures are limited to inclusion in the owner's project requirements (OPR) and basis of design (BOD), as well as the review of the OPR, BOD and project design. NIBS Guideline 3-2012 for Exterior Enclosures provides additional guidance.

- Develop the OPR
- Develop a BOD

The commissioning authority (CxA) must do the following:

- Review the OPR, BOD, and project design.
- Develop and implement a Cx plan.
- Confirm incorporation of Cx requirements into the construction documents.
- Develop construction checklists.
- Develop a system test procedure.
- Verify system test execution.
- Maintain an issues and benefits log throughout the Cx process.
- Prepare a final Cx process report.
- Document all findings and recommendations and report directly to the owner throughout the process.

The review of the exterior enclosure design may be performed by a qualified member of the design or construction team (or an employee of that firm) who is not directly responsible for design of the building envelope.

Commissioning Authority

By the end of the design development phase, engage a commissioning authority with the following qualifications.

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- The CxA must have documented commissioning process experience on at least two building projects with a similar scope of work. The experience must extend from early design phase through at least 10 months of occupancy;
- The CxA may be a qualified employee of the owner, an independent consultant, or an employee of the design or construction firm who is not part of the project's design or construction team, or a disinterested subcontractor of the design or construction team.
 - For projects smaller than 20,000 square feet (1 860 square meters), the CxA may be a qualified member of the design or construction team. In all cases, the CxA must report his or her findings directly to the owner.

Project teams that intend to pursue EA Credit Enhanced Commissioning should note a difference in the CxA qualifications: for the credit, the CxA may not be an employee of the design or construction firm nor a subcontractor to the construction firm.

Current Facilities Requirements and Operations and Maintenance Plan

Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently. The plan must include the following:

- a sequence of operations for the building;
- the building occupancy schedule;
- equipment run-time schedules;
- setpoints for all HVAC equipment;
- set lighting levels throughout the building;
- minimum outside air requirements;
- any changes in schedules or setpoints for different seasons, days of the week, and times of day;
- a systems narrative describing the mechanical and electrical systems and equipment;
- a preventive maintenance plan for building equipment described in the systems narrative; and
- a commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities.

Enhanced Commissioning

Enhanced Commissioning

Credit

Intent

To further support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

Requirements

Implement, or have in place a contract to implement, the following commissioning process activities in addition to those required under EA Prerequisite Fundamental Commissioning and Verification.

Commissioning authority

The CxA must have documented commissioning process experience on at least two building projects with a similar scope of work. The experience must extend from early design phase through at least 10 months of occupancy;

The CxA may be a qualified employee of the owner, an independent consultant, or a disinterested subcontractor of the design team.

Option 1. Enhanced systems commissioning (3-4 points)

Path 1: Enhanced commissioning (3 points)

Complete the following commissioning process (CxP) activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies in accordance with ASHRAE Guideline 0–2005 and ASHRAE Guideline 1.1–2007 for HVAC&R systems, as they relate to energy, water, indoor environmental quality, and durability.

The commissioning authority must do the following:

- Review contractor submittals.
- Verify inclusion of systems manual requirements in construction documents.
- Verify inclusion of operator and occupant training requirements in construction documents.
- Verify systems manual updates and delivery.
- Verify operator and occupant training delivery and effectiveness.
- Verify seasonal testing.
- Review building operations 10 months after substantial completion.
- Develop an on-going commissioning plan.
- Include all enhanced commissioning tasks in the OPR and BOD.

OR

Path 2: Enhanced and monitoring-based commissioning (4 points)

Achieve Path 1.

AND

Enhanced Commissioning

Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems.

Include the procedures and measurement points in the commissioning plan. Address the following:

- roles and responsibilities;
- measurement requirements (meters, points, metering systems, data access);
- the points to be tracked, with frequency and duration for trend monitoring;
- the limits of acceptable values for tracked points and metered values (where appropriate, predictive algorithms may be used to compare ideal values with actual values);
- the elements used to evaluate performance, including conflict between systems, out-of-sequence operation of systems components, and energy and water usage profiles;
- an action plan for identifying and correcting operational errors and deficiencies;
- training to prevent errors;
- planning for repairs needed to maintain performance; and
- the frequency of analyses in the first year of occupancy (at least quarterly).

Update the systems manual with any modifications or new settings, and give the reason for any modifications from the original design.

AND / OR

Option 2. Envelope commissioning (2 points)

Fulfill the requirements in EA Prerequisite Fundamental Commissioning and Verification as they apply to the building's thermal envelope in addition to mechanical and electrical systems and assemblies.

Complete the following commissioning process (CxP) activities for the building's thermal envelope in accordance with ASHRAE Guideline 0–2005 and the National Institute of Building Sciences (NIBS) Guideline 3–2012, Exterior Enclosure Technical Requirements for the Commissioning Process, as they relate to energy, water, indoor environmental quality, and durability.

Commissioning authority must complete the following:

- Review contractor submittals.
- Verify inclusion of systems manual requirements in construction documents.
- Verify inclusion of operator and occupant training requirements in construction documents.
- Verify systems manual updates and delivery.
- Verify operator and occupant training delivery and effectiveness.
- Verify seasonal testing.
- Review building operations 10 months after substantial completion.
- Develop an on-going commissioning plan

Commissioning Activities (Cx)

Commissioning Activities (Cx)

Phase	Cx Task	Responsible Party	Cx	Enhanced Cx	MBCx	BECx
Pre-design	Develop OPR	Owner	X	X	X	X
Schematic Design	Develop BOD, including envelope requirements	Project Team	X	X	X	X
	Include general monitoring, metering, and trending req's.	Project Team			X	
Design	Engage CxA	Owner	X	X	X	X
Documents	Develop Initial commissioning plan	CxA	X	X	X	X
	Include monitoring requirements, equipment	CxA			X	
	Include envelope requirements	CxA				X
	Conduct OPR, BOD and design document review	CxA, Owner, Project Team	X	X	X	X
	Prepare systems manual outline	CxA, Owner		X	X	X
	Include monitoring requirements, equipment	CxA, Owner			X	
	Include envelope requirements	CxA, Owner				X
	Document training requirements	CxA, Owner		X	X	X
Construction Documents	Update OPR and BOD as necessary	CxA, Owner, Project Team	X	X	X	X
	Issue Cx specifications for inclusion in bid/permit documents	CxA	X	X	X	X
	Include enhanced Cx requirements	CxA		X	X	X
	Include monitoring based requirements	CxA			X	
	Include envelope based requirements	CxA				X
	Update OPR and BOD as necessary	CxA, Owner, Project Team	X	X	X	X
Construction	Conduct design review (recommended)	CxA, Owner, Project Team	X	X	X	X
	Update OPR and BOD as necessary	CxA, Owner, Project Team	X	X	X	X
	Perform prefunctional inspections	CxA	X	X	X	X
	Complete submittal reviews before accept. by Project Team	CxA		X	X	X
	Update OPR, BOD, Cx plan, systems manual as necessary	CxA	X	X	X	X
	Issue Owner's training requirements	CxA to Contractor		X	X	X
	Issue construction checklists	CxA	X	X	X	X
	Issue functional performance scripts for contractor review	CxA, Contractor	X	X	X	X
	Issue verified TAB report	Contractor, CxA	X	X	X	X
	Issue/review completed construction checklist	Contractor, CxA	X	X	X	X
	Execute functional performance tests	CxA, Contractor	X	X	X	X
	Document issues in issues log	CxA	X	X	X	X
	Compile final systems manual	CxA		X	X	X
	Complete final commissioning report	CxA	X	X	X	X
	Verify training plan has been implemented	CxA, Contractor, Operators	X	X	X	X
Occupancy & Operations	Complete Cx report	CxA	X	X	X	X
	Compile operations and maintenance plan	CxA	X	X	X	X
	Compile final systems manual	CxA, Contractor, Operators		X	X	X
	Perform seasonal testing	CxA, Contractor, Operators		X	X	X
	Perform 10 month review	CxA, Contractor, Operators		X	X	X
	Develop ongoing Cx plan	CxA, Building Operators		X	X	X

Cx: Fundamental Commissioning and Verification

Enhanced Cx: Enhanced Commissioning

MBCx: Monitoring-based commissioning

BECx: Building envelope commissioning

Commissioning Authority (CxA)

Commissioning Authority (CxA)

Can...	Who is...	be CxA for...	
		Fundamental Cx	Enhanced Cx
an employee of the architecture or engineering firm	a member of the design team (e.g., a project architect, engineer, or energy modeler who is also the HVAC designer)	NO unless project is under 20,000 ft ² (1860 m ²)	NO
	not a member of the design team (e.g., a LEED administrator or energy modeler who is not participating in the design)	YES	YES
a subconsultant to the architecture or engineering firm	a member of the design team (e.g., a project engineer subcontracted to the architect)	NO unless project is under 20,000 ft ² (1860 m ²)	NO
	not a member of the design team (e.g., a LEED administrator, Cx specialist, energy modeler)	YES	NO
an employee or subcontractor of the general contractor or construction manager	a member of the construction team	NO unless project is under 20,000 ft ² (1860 m ²)	NO
	not a member of the construction team	YES	NO
an employee of the owner or an independent consultant contracted to the owner		YES	YES