

COMMISSIONING RESPONSIBILITIES

Project Phases	Commissioning Tasks (1-12)	Rating Systems Tasks	Fundamental	Enhanced	Notes
Predesign, Design Phase					
Request for proposal Architect & engineer section	1 Designate commissioning authority (CxA).	EAprereq1- Task 1, EAc3- Task 1	Owner or Project Team	Owner or Project Team	The CxA must have experience with at least 2 other projects of similar managerial and technical complexity. See "Commissioning Authority Qualifications" tab for more information.
Owner's Project Requirements	2a Document Owner's Project Requirements OPR - owner works with design team to develop an outline that includes at a minimum: a. owner & user requirements b. environmental and sustainability goals c. energy efficiency goals d. indoor air quality goals e. equipment and system expectations f. building occupant and O&M personnel requirements	EAprereq1- Task 2	Owner or CxA* with Design Team	Owner or CxA* with Design Team	
Basis of Design	2b Document Basis of Design BOD - the design team must document the BOD for the systems to be commissioned prior to approval of contractor submittal of any commissioned equipment or systems. Must include at a minimum: a. primary design assumptions b. standards c. narrative descriptions	EAprereq1-Task 2	CxA**	CxA	Commissioned Systems (at a minimum) include: a. heating, ventilating, air conditioning and refrigeration systems (mechanical and passive) b. lighting and daylighting controls c. domestic hot water systems d. renewable energy systems
Schematic Design	3 Review OPR and BOD for clarity and completeness. The owner and design team are responsible for updates.	EAprereq1-Task 2, EAc3- Task 2	Project Team or CxA*	Project Team or CxA	
Design Development	4 Develop and implement commissioning plan that identifies the strategies, aspects, and responsibilities within the commissioning process for each phase of a project, for all project members. This document outlines the overall process, schedule, organization, responsibilities, and documentation requirements of the commissioning process. a. Commissioning Program Overview 1. goals and objectives 2. general project information 3. systems to be commissioned b. Commissioning Team 1. team members, roles, and responsibilities 2. communication protocol, coordination, meetings and management c. Commissioning Process Activities 1. documenting the OPR 2. preparing the BOD 3. developing systems functional test procedures 4. verifying systems performance 5. reporting deficiencies and the resolution process 6. accepting the building systems d. Additional tasks for Enhanced Commissioning 1. documenting the commissioning review process 2. reviewing contractor submittals 3. developing the systems manual 4. verifying the training of operations personnel 5. reviewing building operation after final acceptance	EAprereq1- Task 4	Project Team or CxA*	Project Team or CxA	Required Commissioning Plan Components a. brief overview of process b. list of all systems and assemblies included in CxA's scope of work c. identification of roles & responsibilities d. Mgmt, communication & reporting process e. Cx process activities for predesign, design, construction, and occupancy and operations phases, including development of OPR, review of BOD, schematic design, construction documents & submittals, construction phase verification, functional performance test development and implementation, 10 month warranty review f. list of expected work products g. list of commissioning process milestones
	5 Develop and incorporate commissioning requirements into the construction documents. a. Commissioning Requirements for CDs 1. commissioning team involvement 2. contractor's responsibilities 3. submittal review procedures for commissioned systems 4. operations and maintenance documentation, system manuals 5. meeting 6. construction verification procedures	EAprereq1- Task 3	Project Team or CxA*	Project Team or CxA	Often, all commissioning requirements are outlined in a section of the general conditions of the construction specifications. Placing all commissioning requirements in a single location gives responsibility for commissioning work to the general contractor, who can then assign responsibility to subcontractors.

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Construction Documents		<ul style="list-style-type: none"> 7. startup plan development and implementation 8. functional performance testing 9. acceptance and closeout (recommend requiring a certain number of visits to help "fine tune" the building) 10. training 11. warranty review site visit 				It is also valuable to refer to commissioning requirements on the drawings, in any bid forms, and in specification sections related to the systems to be commissioned.
	6	<p>Conduct commissioning design review prior to midconstruction documents</p> <ul style="list-style-type: none"> a. minimum of 1 review of OPR, BOD and design documents (back-check the review comments from past design submissions if applicable) b. ensure clarity, completeness, and adequacy of OPR c. verify that all issues discussed in the OPR are addressed adequately in the BOD d. review design documents for achieving the OPR and BOD and coordination of commissioned systems 	EAc3- Task 2	N/A	CxA	Additional reviews by the CxA throughout the design and construction process may be advisable and appropriate depending on the project duration, phasing, and complexity.
Construction Phase						
Equipment procurement & Equipment Installation	7	<p>Review contractor submittals applicable to systems being commissioned. Specifically evaluate the submittals for the following:</p> <ul style="list-style-type: none"> a. conformance with the OPR and BOD b. fulfilling operation and maintenance requirements c. facilitating performance testing 	EAc3- Task 3	N/A	CxA	
Functional testing Test and balance Performance testing acceptance	8	<p>Verify installation and performance of commissioned systems</p> <ul style="list-style-type: none"> a. Installation or Prefunctional Inspection <ul style="list-style-type: none"> 1. often occurs at startup of individual units of equipment using "prefunctional checklists" or "startup and checkout forms". (recommend that subtrades and GC have seen lists in advance and have completed their own prefunctional checks) 2. provide quality control to ensure that relatively minor issues are discovered and corrected prior to systems performance testing b. Systems or Functional Performance Testing <ul style="list-style-type: none"> 1. occurs one all system components are installed, energized, programmed, balanced, and otherwise ready for operation under part- and full-load conditions. 2. testing should include each process in the sequence of operation under central and packaged equipment control, including startup, shutdown, capacity modulation, emergency and failure modes, alarms, and interlocks to other equipment 3. typically relies on testing procedures developed by the CxA specifically for the system to be tested 4. testing may be performed by some combination of the CxA, the installing contractor, and others, depending on the procedures outlined in the commissioning specifications and the commissioning plan. 5. may reveal problems with the performance of the commissioned systems and may require significant follow-up and coordination among members of the project team c. Evaluation of Result <ul style="list-style-type: none"> 1. at each point in the process of installation inspections and systems performance testing, the CxA should evaluate whether the installed systems meet the criteria for the project as set forth in the OPR and the BOD 2. provide quality control to ensure that relatively minor issues are discovered and corrected prior to systems performance testing 	Eaprrereq1- Task 5	CxA	CxA	And and all discrepancies or deficiencies should be reported to the owner, and the team should work collaboratively to find an appropriate resolution. It is advised to develop and disclose the resolution process prior to any potential such issues.
Operations & Maintenance (O&M) manuals	9	<p>Develop systems manual for commissioned systems that includes the following:</p> <ul style="list-style-type: none"> a. final version of the BOD b. system single-line diagrams c. as-built sequences of operations, control drawings, and original setpoints d. operating instructions for integrated building systems e. recommended schedule of maintenance requirements and frequency, if not already included in the project O&M manuals 	EAc3- Task 4	N/A	Project Team or CxA	

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		<p>f. recommended schedule for retesting of commissioned systems with blank test forms from the original commissioning plan</p> <p>g. recommended schedule for calibrating sensors and actuators</p>				
O&M training	10	<p>Verify that requirements for training are completed and that owner expectations & contract obligations have been met.</p> <p>a. Common Training Topics</p> <ol style="list-style-type: none"> 1. general purpose of system (design intent) 2. use of O&M manuals 3. review of control drawings and schematics 4. startup, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, control setup and programming 5. troubleshooting, and alarms 6. interactions with other systems 7. adjustments and optimizing methods for energy conservation 8. health and safety issues 9. special maintenance and replacement sources 10. occupant interaction issues 11. system response to difference operating conditions 12. training for new or uncommon sustainable design features 	EAc3- Task 5	N/A	Project Team or CxA	Have a contract in place to review operation with O&M staff and occupants, including a plan for resolution of outstanding commissioning-related issues 10 months after substantial completion.
Substantial Completion	11	<p>Complete a summary commissioning report</p> <p>a. Fundamental Commissioning Report should include:</p> <ol style="list-style-type: none"> 1. executive summary of the process and the results of the commissioning program, including observations, conclusions, and any outstanding items. 2. history of any system deficiencies identified and how they were resolved, including any outstanding issues or seasonal testing scheduled for a later date 3. systems performance test results and evaluation 4. confirmation from the CxA indicating whether individual systems meet the OPR, BOD and contract documents <p>b. Enhance Commissioning Report (in addition to items above):</p> <ol style="list-style-type: none"> 1. summary of the design review process 2. summary of the submittal review process 3. summary of the O&M documentation and training process <p>c. Commissioning Report Components (recap)</p> <ol style="list-style-type: none"> 1. OPR & BOD 2. project commissioning specifications 3. verification of installation (construction checklist) 4. functional performance testing results & forms 5. O&M documentation evaluation (EAc3- Enhanced Cx) 6. training program evaluation (EAc3- Enhanced Cx) 7. description of commissioning process benefits 8. outstanding issues 9. contract and plan for resolution within 10 months of substantial completion (EAc3- Enhanced Cx) 	EAprereq1- Task 6	CxA	CxA	
Occupancy						
Systems Monitoring	12	<p>Review building operation within 10 months after substantial completion</p> <p>a. Include a plan for resolving outstanding issues</p> <p>b. all unresolved construction deficiencies as well as any deficiencies identified in this postoccupancy review should be documented and corrected under manufacturer or</p> <p>c. any significant issues identified by the CxA or owner/staff that will not be corrected should be recorded in the systems manual</p>	EAc3- Task 6	N/A	CxA	

* Although EA Prerequisite 1 does not require the CxA to be on the project team until just before the equipment installation phase, if brought in earlier, he or she can also help the owner develop the project requirements and assist with other important commissioning tasks.

** Some commissioning tasks can be performed by the owner or other project team members. However, the review of the Owner's Project Requirements and Basis of Design must be performed by the CxA. For EA Prerequisite 1, Fundamental Commissioning, this may be performed at any time before verification of equipment installation and acceptance.

CxA QUALIFICATIONS

Party Acting as Commissioning Authority (CxA)	Fundamental Commissioning Prerequisite ^{2, 4, 5}		Enhance Commissioning Credit ^{3, 4, 5}
	< 50,000 (sf)	≥ 50,000 (sf)	
employee or subcontractor of general contractor with construction responsibilities	Yes		
employee or subcontractor, with construction responsibilities, of construction manager who hold constructor contracts	Yes		
employee or subcontractor, with project design responsibilities, or the architect or engineer of record	Yes		
disinterested employee or subcontractor of general contractor or construction manager ¹	Yes	Yes	
disinterested employee of architect or engineer ¹	Yes	Yes	
disinterested subcontractor to architect or engineer ¹	Yes	Yes	Yes
construction manager not holding constructor contracts	Yes	Yes	Yes
independent consultant contracted to Owner	Yes	Yes	Yes
owner employee or staff	Yes	Yes	Yes
¹ "disinterested" means an employee or subcontractor who has no project responsibilities other than commissioning			
² EA Prerequisite 1 requirements (see Commissioning Responsibilities tab)			
³ EA Credit 3 requirements (the CxA must review the OPR, BOD and design documents prior to midconstruction documents phase and perform a back-check)			
⁴ the same CxA overseeing the enhanced commissioning tasks must also oversee the fundamental commissioning tasks			
⁵ regardless of who employs the CxA, he or she "shall have documented commissioning authority experience in at least two building projects" and ideally meet the minimum qualifications of having "a high level of experience in energy systems design, installation and operation, commissioning planning process management, hands-on field experience with energy systems performance, interaction, startup, balancing, testing, troubleshooting, operation, and maintenance procedures and energy systems automation control knowledge." (from "Who Can Be the Commissioning Authority?" 01/03/06 LEEDv2.2 Commissioning Subcommittee, posted under LEED Reference Documents, http://www.usgbc.org .)			