

**IMPORTANT NOTICE:** This sample document is provided for instructional purposes only. Absolute Energy Raters is not rendering advice concerning any commission project or practices. This document is neither approved nor intended to serve as a standard form. The user of these documents should confer with qualified advisors with respect to its commissioning and other documentation.

## **Absolute Energy Raters Commissioning Plan Outline Template**

### **Introduction**

The commissioning plan template provides a framework and outline of the specific language for creating a project specific commissioning plan. The commissioning plan can be used directly to describe the commissioning process for design-bid-build projects that use a third party commissioning provider. Some sections will require the user to customize the language to fit owner requirements or project specific requirements. The commissioning plan should reflect the commissioning process as described in the construction specifications.

NOTE: This plan does not address LEED commissioning requirements. If you are engaged in a LEED project, visit the US Green Building Council's website at [www.usgbc.org](http://www.usgbc.org) and review the LEED guidelines for specific commissioning requirements.

## 1. General Building Information

Project Name	
Project Address	
Building Type	
Square Footage	
Building Description	
Owner Agency	
Scheduled Completion Date	

## 2. Overview

### 2.1 Abbreviations and Definitions

The following are common abbreviations used in this document.

A/E	Architect and design engineers	FPT	Functional performance test
CP	Commissioning provider	GC	General contractor
CC	Controls contractor	MC	Mechanical contractor
CX	Commissioning	PF	Pre-functional checklist
EM	Energy Manager	PM	Project Manager
CX Plan	Commissioning Plan document	Subs	Subcontractors to General
EC	Electrical contractor	TAB	Test and balance contractor
MM	Maintenance Manager	Staff	Maintenance Staff

### 2.2 Purpose of the Commissioning Plan

The purpose of the commissioning plan is to provide direction for the commissioning process during construction, providing resolution for issues such as scheduling, roles and responsibilities, lines of communication and reporting, approvals, and coordination.

### 2.3 Commissioning Goals and Objectives

Commissioning is a systematic process of ensuring that the building systems perform according to the design intent and the owner's operational requirements. All equipment and systems should be installed according to manufacturer's recommendations and the best practices and standards of the industry.

Commissioning will include documenting the design intent, followed by activities in the construction, acceptance, and warranty phases of the project. The participation of the contractors in commissioning activities will follow the requirements defined in the specifications. The three main goals of the commissioning process are:

1. Facilitate the final acceptance of the project at the earliest possible date.
2. Facilitate the transfer of the project to the owner’s maintenance staff.
3. Ensure that the comfort systems meet the requirements of the occupants.

Commissioning is also intended to achieve the following specific objectives:

- Document that equipment is installed and started per manufacturer’s recommendations.
- Document that equipment and systems receive complete operational checkout by installing contractors.
- Document system performance with thorough functional performance testing and monitoring.
- Verify the completeness of operations and maintenance materials.
- Ensure that the owner’s operating personnel are adequately trained on the operation and maintenance of building equipment.

## 2.4 Commissioning Scope

The following marked systems will be commissioned in this project. All general references to equipment in this document refer only to equipment that is to be commissioned.

<b>System</b>	<b>Equipment</b>	<b>Check</b>
HVAC System	Chillers	
	Pumps	
	Cooling tower	
	Boilers	
	Piping systems	
	Ductwork	
	Variable frequency drives	
	Air handlers	
	Packaged AC units	
	Packaged HP units	
	Terminal units	
	Unit heaters	
	Heat exchangers	
	Computer room cooling units	
	Fume hoods	
	Lab room pressures	
	Exhaust fans	
Chemical treatment systems		
HVAC control system		

Absolute Energy Raters Commissioning Plan

	Fire and smoke dampers	
Electrical System	Sweep or scheduled lighting controls	
	Daylight dimming controls	
	Lighting occupancy sensors	
	Power quality	
	Security system	
	Emergency power system	
	UPS systems	
	Fire and smoke alarm systems	
	Fire protection systems	
	Communications system	
	Public address/paging systems	
	Low Voltage Distribution Cable	
	Distribution Panel Circuit Breakers	
	Ground Fault Detection	
	Automatic Transfer Switch	
Other	Service water heaters	
	Refrigeration systems	
	Kitchen Equipment	

### 3. Commissioning Team Information

<b>Function</b>	<b>Name/Address</b>	<b>Contact Info</b>
Owner		
Project Manager		
Commissioning Provider		
Architect		
Mechanical Engineer		
Electrical Engineer		
General Contractor		
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
Maintenance Manager		

## 4. Roles and Responsibilities

### General Management Plan

In general, the CP coordinates the commissioning activities and reports to the owner's construction representative. The CP's responsibilities, along with all other contractors' commissioning responsibilities are detailed in the specifications. The Specifications will take precedence over this Commissioning Plan. All members work together to fulfill contracted responsibilities and meet the objectives of the Contract Documents.

#### 4.1 General Descriptions of Roles

General descriptions of the commissioning roles are as follows:

- CP: Coordinates the CX process, writes and/or reviews testing plans, directs and documents performance testing.
- PM: Facilitates and supports the CX process and gives final approval of the CX work.
- MM: Coordinates maintenance staff participation in commissioning activities.
- GC: Facilitates the CX process, ensures that Subs perform their responsibilities and integrates CX into the construction process and schedule.
- Subs: Demonstrate correct system performance.
- Staff: Participate in commissioning tasks and performance testing, review O&M documentation, attend training.
- A/E: Perform construction observation, approve O&M manuals and assist in resolving problems.
- Mfr.: Equipment manufacturers and vendors provide documentation to facilitate the commissioning work and perform contracted startup.

#### 4.2 Specifications and Commissioning

Commissioning language in the specifications details the scope of commissioning for this project. The following table lists the sections of the specifications that include commissioning related language with a brief description.

**Table 4-1: Specifications Related to Commissioning**

Section	Description

### 4.3 General Management Plan and Protocols

The following protocols will be used on this project.

Issue	Protocol
For requests for information (RFI) or formal documentation requests:	The CP goes first through the PM.
For minor or verbal information and clarifications:	The CP goes direct to the informed party.
For notifying contractors of deficiencies:	The CP documents deficiencies through the PM, but may discuss deficiency issues with contractors prior to notifying the PM.
For scheduling functional tests or training:	The CP provides input and coordination of testing and training. Scheduling is done through the PM.
For scheduling commissioning meetings:	The CP selects the date and schedules through the PM.
For making a request for significant changes:	The CP has no authority to issue change orders.
For making minor changes in specified sequences of operations:	Any required changes in sequences of operations required to correct operational deficiencies must be approved and documented by the PM and A/E team. The CP may recommend to the PM changes in sequences of operation to improve efficiency or control.
Subcontractors disagreeing with requests or interpretations by the CP shall:	Resolve issues at the lowest level possible. First with the CP, then with the GC and PM. Some issues may require input from the A/E team.

## **5. Commissioning Process**

This section sequentially details the commissioning process by commissioning task or activity.

### **5.1 Commissioning Scoping Meeting**

The scoping meeting brings together all members of the design, construction, and operations team that will be involved in the commissioning process. Each building system to be commissioned is addressed, including commissioning requirements, and completion and start-up schedules. During the scoping meeting, all parties agree on the scope of work, tasks, schedules, deliverables, and responsibilities for implementation of the Commissioning Plan.

### **5.2 Final Commissioning Plan**

The commissioning agent finalizes the draft Commissioning Plan using the information gathered from the scoping meeting. The initial commissioning schedule is also developed along with a detailed timeline. The timeline is fine-tuned as construction progresses.

### **5.3 Design Intent Documentation**

The design requirements, relative to the building systems selected for commissioning, must be explicitly documented in order to establish a baseline of performance expectations to which the actual installed performance is compared. The commissioning provider, with the assistance of the building owner and design team, prepares a Design Intent Summary that documents the design intent for those building systems selected for commissioning. The Design Intent Summary reflects the underlying assumptions and requirements that become represented in the construction documents.

### **5.4 Submittals**

The general contractor will provide the commissioning agent with a set of equipment and system submittals. This equipment data includes installation and start-up procedures, O&M data, performance data and temperature control drawings. The subcontractors, general contractor or A/E notify the commissioning agent of any new design intent or operating parameter changes, added control strategies and sequences of operation, or other change orders that may affect commissioned systems.

### **5.5 Site Observation**

The commissioning agent makes periodic site visits to witness equipment and system installations. Each site visit will have a specific agenda and will be coordinated with the general contractor site supervisor. The commissioning agent attends selected planning and job-site meetings in order to remain informed on construction progress and to update parties involved in commissioning. The general contractor provides the commissioning agent with information regarding substitutions or change orders that may affect commissioned equipment or the commissioning schedule.

## **5.6 Pre-functional Checklists and Startup Procedures**

A Pre-Functional Inspection Checklist are developed and completed for all mechanical equipment being commissioned. The checklist captures equipment nameplate and characteristics data, and confirms the as-built status of the equipment or system. The checklists ensure that the systems are complete and operational and document the installation of components and completion of systems.

The checklists are prepared by the commissioning agent from manufacturer's data, drawings and specifications to include the required installation, checkout, and start up procedures. The installing subcontractors date and initial the checklists as the construction and start-up is completed. The commissioning agent reviews and verifies the completed checklists before scheduling the functional performance testing.

## **5.7 Development of Functional Test and Verification Procedures**

Functional performance testing verifies the intended operation of individual components and system interactions under various conditions and modes of operation. The systems are run through all of the sequences of operation and the response of components is verified. Testing proceeds from components to subsystems to systems, and finally to interlocks and connections between systems.

The commissioning agent prepares functional performance test plans so that the complete sequence of operations is included. The commissioning agent obtains all documentation, including an updated points list, control sequences, and setpoints. If necessary, the commissioning agent may request clarifications from contractors and the design team regarding sequences and operation. Prior to execution, the commissioning agent provides a copy of the primary equipment tests to the installing subcontractor and general contractor who can review the tests for feasibility, safety, warranty and equipment protection.

## **5.8 Execution of Functional Testing Procedures**

The commissioning agent schedules functional tests through the general contractor and subcontractors. Under the supervision of the commissioning agent, the installing subcontractor performs the hardware and/or software manipulations required for the testing. Owner maintenance staff may also be present in order to assist in system observations. The commissioning agent witnesses and records the results of functional performance testing.

Any deficiencies found from functional performance testing will be documented in a Deficiency Report. The report will include all details of the components or systems found to be non-compliant with the parameters of the functional performance test plans and design documents. The deficiency report will become part of the punch list. The report will detail the adjustments or alterations required to correct the system operation, and identify the responsible party. The deficiency report will be continuously updated. The commissioning agent schedules any required retesting through the general contractor. Decisions regarding deficiencies and corrections are made at as low a level as possible, preferably between commissioning agent, sub-contractor and general contractor.

## **5.9 Short-Term Diagnostic Monitoring**

Short-term diagnostic testing, using data acquisition equipment or building automation system trends to record system operation over a two to three week period, may be used to investigate the dynamic interactions between components in the building system.

The monitoring occurs after occupancy to evaluate the building systems' performance under natural occupancy and ambient load conditions. The objectives of the monitoring are to evaluate scheduling, the interaction between heating and cooling, and the effectiveness of the system in meeting the comfort requirements of the occupants. .

## **5.10 Operations and Maintenance Manuals**

The operation and maintenance manuals prepared by the contractors for the owner's maintenance personnel are reviewed for completeness. The contractors are encouraged to submit O&M manuals at the earliest possible date. Materials may be added, or requested from the contractors, to stress and enhance the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. A database of preventative maintenance information may also be created from the materials in the O&M manuals.

## **5.11 Training and Orientation of Owner Personnel and Occupants**

Effective maintenance personnel training is critical to the long term performance of the new building. The commissioning agent will assist the owner and general contractor in organizing the training sessions by identifying the appropriate staff for each session and creating an overall training plan.

For each training session, the contractors provide a detailed agenda for each piece of equipment or system for which training is required. The agenda describes the training scope, duration, and methods, along with the name and qualifications of the trainers. The commissioning agent develops a plan for including in the training session contractors / trainers from different disciplines, when appropriate. The trainer documents each training session (duration, general subjects covered, and attendees). The commissioning agent may witness any of the training sessions.

## **5.12 Warranty Period**

Seasonal variation in operations or control strategies may require additional testing during peak cooling and heating seasons to verify system performance. During the warranty period, seasonal testing and other deferred testing is completed as required to fully test all sequences of operation. The commissioning agent coordinates this activity.

Tests are executed and deficiencies corrected by the appropriate subcontractors, witnessed by facilities staff and the commissioning agent. Any final adjustments to the O&M manuals and as-builts due to the testing are made.

The commissioning agent will request input from the owner's operations staff and occupants about the performance of the building systems. The commissioning agent also supports the general contractor's troubleshooting process during the warranty period. The general contractor's warranty team will first try and resolve the issues before requesting assistance from the commissioning agent.

### **5.13 Commissioning Report**

A final Commissioning Report will be compiled which summarizes all of the tasks, findings, and documentation of the commissioning process. The report will address the actual performance of the building systems in reference to the design documents. All test reports by various sub-contractors, manufacturers and controlling authorities will be incorporated into the final report.

The commissioning report includes:

- An evaluation of the operating condition of the systems at the time of functional test completion,
- Deficiencies that were discovered and the measures taken to correct them,
- Functional test procedures and results,
- Reports that document all commissioning field activities as they progressed, and
- A description and estimated schedule of required deferred testing.

## **6. Schedule**

### **6.1 General Issues**

The following sequential priorities are followed:

1. Equipment is not “temporarily” started (for heating or cooling), until pre-start checklist items and all manufacturer’s pre-start procedures are completed and moisture, dust and other environmental and building integrity issues have been addressed.
2. Functional performance testing does not begin until pre-functional, start-up and TAB is completed for a given system.
3. The controls system and equipment it controls are not functionally tested until all points have been calibrated and pre-functional checklists are completed.

**6.2 Project Schedule**  
**Preliminary Commissioning Schedule**

<b>Commissioning Activity</b>	<b>Duration</b>	<b>Estimated Start Date</b>	<b>Estimated Completion Date</b>
Document design intent and basis of design			
Commissioning Plan			
Preliminary Commissioning Plan			
Scoping Meeting			
Final Commissioning Plan			
Submittals and test writing			
Review Mechanical submittals			
Write Startup and PF checklists			
DDC program review meeting			
Write FPT Tests			
Construction Observation			
Site observations			
HVAC PF checklist completion			
Equipment startup			
Startup documentation			
Controls system checkout			
Test and Balance			
TAB air side			
TAB water side			
HVAC Functional performance testing			
Substantial Completion			
Post Acceptance Phase			
Owner move-in			
Short-term diagnostic monitoring			
O&M, training, reporting, warranty			
O&M Manuals submitted			
Review O&M manuals			
Review as-built documentation			
Seasonal testing			
Final commissioning report			