How to Implement Recommendations 5

Recommendations are contained in the individual tables in Chapter 3, "Recommendations by Climate." The following how-to tips are intended to provide guidance on good practices for implementing the recommendations as well as cautions to avoid known problems in energy-efficient construction.

QUALITY ASSURANCE

Quality and performance are never an accident. They are always the result of high intention, sincere effort, intelligent direction, and skilled execution. A high-quality building that functions in accordance with its design intent, and thus meets the performance goals established for it, requires that quality assurance (QA) be an integral part of the design and construction process as well as the continued operation of the facility. This process is typically referred to as *commissioning*.

To reduce project risk, commissioning (Cx) requires a dedicated person (one with no other project responsibilities) who can execute a systematic process that verifies that the systems and assemblies perform as required. An independent party, whether it is a third-party Cx professional or a capable member of the organization of the installing contractor, architect, or engineer of record, is needed to ensure that the strategy sets and recommendations contained in this Guide meet the owner's stated requirements. This person is the commissioning authority, or CxA.

The Cx process defined by ASHRAE's Guideline 0 and Guideline 1 are applicable to all buildings. Owners, occupants, and the delivery team benefit equally from the QA process. Large and complex buildings require a correspondingly greater level of effort than that required for small, simpler buildings. Small retail buildings covered by this Guide have relatively simple systems and generally do not require the level of Cx effort required for more complex buildings. The following Cx practice recommendations meet this objective.

Activity	Complete
Owner selects CxA/QA provider and commitment to QA to designers and, through the contract documents, to contractors. The owner's responsibility includes directing the team to resolve issues identified through the QA process.	
CxA/QA provider reviews the Owner's Project Requirements and the designers' basis-of-design documentation for completeness and clarity and identifies areas requiring further clarification.	
CxA/QA provider conducts focused review of 100% construction documents that verifies the design meets the defined objectives and criteria established by Owner's Project Requirements and documents concerns to owner and designers.	
CxA/QA provider reviews comments from design review with designers and owner and adjudicates issues.	
CxA/QA provider develops Cx specifications that define team roles and responsibilities and pass/fail criteria for performance verification.	
CxA/QA provider assists design team by providing overview of process to prospective bidders and answers questions at pre-bid meeting.	
CxA/QA provider prepares construction checklists and Cx plan and conducts meeting with project team and establishes tentative schedule for Cx activities.	
CxA/QA provider reviews submittal information for systems being commissioned and develops functional test procedures contractors will use to demonstrate commissioned system performance.	
CxA/QA provider conducts two site visits during construction to verify that concerns identified during 100% construction document review were corrected and to identify issues that would affect performance.	
CxA/QA provider schedules testing through GC and directs, witnesses, and documents the functional testing that demonstrates performance.	
CxA/QA provider reviews O&M information and verifies that owner is trained in warranty and preventive maintenance requirements and has operational and maintenance information needed to meet the requirements.	

Note that the following how-to tips address the recommendations in Chapter 3, as they are generally applicable to many specific construction projects.

Good Design Practice

QA1 Select Team

Selection of the correct team members is critical to the success of a project. Owners who understand the connection between a building's performance and its impact on the environment, the psychological and physiological perceptions of occupants, and the total cost of ownership also understand the importance of team dynamics in selecting the team members responsible for delivering their project. Owners should evaluate qualifications of candidates, their past performance, the cost of their services, and their availability when making a selection. Once the team is selected, a pre-design meeting should be held to define team members' roles and responsibilities. This includes defining deliverables at each phase of the process and the Cx process.

QA2 Selection of Quality Assurance Provider

Quality assurance is a systematic process of verifying the Owner's Project Requirements, operational needs, and basis of design and ensuring that the building performs in