

## **Existing Building Commissioning ASHRAE Guidelines Update**

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### **Synopsis**

This paper informs the building commissioning community of important new commissioning process guidelines being developed by ASHRAE. It seeks attendee suggestions about the content of the guidelines, and solicits public review participation. An introduction of committee members promotes discussions of the guidelines with them during Conference networking breaks.

An ASHRAE guideline project committee is currently developing two new guidelines for the commissioning process in existing buildings. Proposed Guideline 0.2P describes the commissioning process for existing building systems and assemblies. Proposed Guideline 1.2P describes HVAC&R technical requirements of the commissioning process for existing building systems and assemblies.

This paper discusses the relationship of the two proposed new guidelines to the already-published ASHRAE Guidelines 0-2005 *The Commissioning Process* and 1.1-2007 *HVAC&R Technical Requirements for the Commissioning Process*. Significant developments at ASHRAE during the last half of 2008 bring the proposed guidelines into alignment with the structure and philosophy of the published guidelines.

This paper presets an overview of the structure and content of the proposed guidelines. It describes the development schedule and status of the two proposed new guidelines, and the success criteria established by the guideline committees. The paper describes the new electronic public review process which ASHRAE adopted and which applies to these guidelines.

### **About the Author**

Rick Casault is the president of Casault Engineering, Seattle, Washington, founded in 1994 to provide building commissioning services. Rick provides building commissioning services for new facilities and existing buildings and systems, and master planning for building commissioning. He has over 23 years of experience in the commissioning, operation, design and management of laboratory, medical, public transportation, institutional, industrial and commercial facilities. His commissioning projects include hospitals, offices, greenhouses, libraries, underground light rail transit facilities, corrections facilities, performing arts centers, teaching and research lab facilities, boiler plants, and schools. Previously, he led the development and implementation of the University of Washington's building commissioning

program. He also designed and managed mechanical systems at a consulting firm, and worked as a journey-level railroad freight car mechanic.

As the result of his dedication to improving the practice of commissioning, Rick received the 2002 Benner Award for outstanding achievement in making building commissioning “business as usual.” He was the founding president and a director of the Building Commissioning Association. He is an author and teacher of the ASHRAE Professional Development Seminar on Building Commissioning, the APPA workshop on Building Commissioning, and co-author of “The Building Commissioning Handbook, Second Edition” and other publications. He chairs ASHRAE Guideline Project Committee 1.2, which is responsible for two proposed new guidelines, Guideline 0.2P, “The Commissioning Process for Existing Building Systems and Assemblies,” and Guideline 1.2P, “HVAC&R Technical Requirements of the Commissioning Process for Existing Building Systems and Assemblies.” He was also a member of the ASHRAE Guideline Project Committees that wrote the new Guideline 0-2005 “The Commissioning Process;” and the revised Guideline 1.1-2007 “HVAC&R Technical Requirements for the Commissioning Process.” Rick is a licensed professional mechanical engineer, a BCA Certified Commissioning Professional, and a CSI Construction Documents Technologist.

## Introduction

ASHRAE recognizes the urgent importance of applying the commissioning process to the vast stock of existing buildings, most of which have never been commissioned. After completing two commissioning process guidelines focused primarily on new construction, ASHRAE launched an effort to create proposed guidelines for the application of the commissioning process to existing buildings, systems and assemblies: Guideline 0.2P, *The Commissioning Process for Existing Building Systems and Assemblies*, and Guideline 1.2P, *HVAC&R Technical Requirements of the Commissioning Process for Existing Building Systems and Assemblies*.

## Background

### **Current ASHRAE Guidelines**

In 1982 the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) established a committee to document best practices to achieve facilities that performed according to an owner's needs and requirements. ASHRAE published its first commissioning guideline in 1989, Guideline 1-1989, *Guideline for Commissioning of HVAC Systems*, and published an updated version in 1996. ASHRAE published Guideline 0-2005, *The Commissioning Process* in 2005 to address the underlying quality-based commissioning process without reference to a specific discipline. ASHRAE Guideline 1.1-2007, *HVAC Technical Requirements for the Commissioning Process*, published in 2007, describes technical requirements for the application of the commissioning process described in Guideline 0-2005. The technical commissioning process requirements for different building systems are now being developed in individual discipline technical guidelines, separate from the commissioning process requirements that are defined in Guideline 0-2005.

### **Guideline Project Committee**

ASHRAE creates guidelines in response to proposals from the membership or a committee. ASHRAE created Guideline Project Committee 30 (GPC 30) to prepare a proposed guideline, *The Commissioning Process for Existing HVAC&R Systems*. GPC 30 first met informally in Quebec on 26 June 2006. The Committee first met officially by phone conference on 17 November 2006 with 14 members and several guests. ASHRAE assigned the Committee a new number, GPC 1.2, in June 2007 as part of a realignment of ASHRAE commissioning guideline numbering in general.

### **Title, Purpose and Scope**

Title, Purpose, and Scope (TPS) are the standardized titles of the first three sections of ASHRAE guidelines. The proposed TPS is submitted to the ASHRAE Board of Directors for approval and may only be changed with their consent.

## TPS Evolution

Guideline Project Committee 30 (GPC 30, the Committee) assumed responsibility to create a proposed guideline in response to the following TPS in 2006:

### ASHRAE Guideline 30P

- **Title:** The Commissioning Process for Existing HVAC&R Systems
- **Purpose:**
  - 1.1 The purpose of this guideline is to describe the commissioning process for existing HVAC&R Systems
- **Scope:**
  - 2.1 The procedures, methods and documentation requirements in the guideline describe each phase of the Commissioning process for existing HVAC&R systems. This guideline details the advantages of and need for existing HVAC&R System commissioning. This guideline discusses variations in the application of the commissioning process to existing HVAC&R Systems compared to the commissioning process defined in Guideline 0-2005.
  - 2.2 This guideline describes procedures for:
    - a.) documentation of owners project requirements
    - b.) discovery and evaluation of available documentation for existing HVAC&R systems
    - c.) development of supplemental documentation for existing HVAC&R systems and equipment for which complete documentation is available
    - d.) preliminary evaluation of the condition of existing HVAC&R systems
    - e.) development of a prioritized commissioning plan, including schedule and budget estimates
    - f.) development of corrective action recommendations
    - g.) testing of complete corrective actions
    - h.) training or operating and maintenance personnel
    - i.) final documentation

However, the Committee soon realized the need for revision of the approved TPS. Committee members recognized the importance of addressing other existing building systems, not solely HVAC&R, in the scope of the commissioning process. We decided to pursue a structure similar to the one established by ASHRAE and National Institute of Building Sciences (NIBS) in developing the whole building commissioning process guidelines.

The ASHRAE/NIBS whole building commissioning process guidelines started with documentation of the commissioning process applicable to all building systems and assemblies, ASHRAE Guideline 0-2005, *The Commissioning Process*. Technical requirements guidelines for the various groups of systems and assemblies will supplement the process guideline. Two technical requirements guidelines have been published so far: ASHRAE Guideline 1.1-2007, *HVAC&R Technical Requirements for the Commissioning Process*, and NIBS Guideline 3-2006 *Technical Requirements for the Commissioning Process*.

The Committee recommended to ASHRAE that our task be revised to create two new proposed guidelines. After some negotiations to fine-tune the language and numbering, ASHRAE approved the TPS for two guidelines in June 2008 and October 2008.

**ASHRAE Guideline 0.2P,**

- **Title:** The Commissioning Process for Existing Building Systems and Assemblies
- **Purpose:** The purpose of this guideline is to describe the procedures, methods, documentation requirements and physical activities of the commissioning process using the principles developed in ASHRAE Guideline 0, The Commissioning Process.
- **Scope:** This guideline applies to existing building systems and assemblies.

**ASHRAE Guideline 1.2P:**

- **Title:** HVAC&R Technical Requirements of the Commissioning Process for Existing Building Systems and Assemblies.
- **Purpose:** The purpose of this guideline is to describe the technical requirements of the commissioning process for existing HVAC&R systems and assemblies, based on the processes described in ASHRAE Guideline 0.2P-200X, The Commissioning Process for Existing Systems and Assemblies.
- **Scope:** The guideline applies to existing HVAC&R systems and assemblies.

**Schedule**

The Committee committed to complete a first draft by January 2009, a public review draft by January 2010, and vote for publication by June 2010. After we accepted the new responsibility for two proposed guidelines, we revised the schedule to produce the first draft of Guideline 0.2P in June 2009 and the first draft of Guideline 1.2P in January 2011, with public review drafts of both by June 2011 and vote for publication of both by January 2012.

Although the Committee had nearly completed the first draft of the process portion of the guideline under the original TPS by the time ASHRAE approved the split into two guidelines, we chose to delay public review of Guideline 0.2P (process) until Guideline 1.2P (technical requirements) was also ready for public review. What we learned in developing Guidelines 0-2005 and 1.1-2007 motivated this strategy.

Guidelines 0-2005 and 1.1-2007 were developed sequentially. Guideline 0-2005 was approved for publication before work started in earnest on 1.1-2007. Most of the Guideline 0-2005 committee members stayed on to develop Guideline 1.1-2007. As we worked on Guideline 1.1-2007, we realized that we could have done some things differently in Guideline 0-2005 that would have improved both documents. An ASHRAE committee is now working on continuous maintenance of Guideline 0-2005 in order to incorporate the lessons learned in developing Guideline 1.1-2007, and other improvements.

The GPC 1.2 Committee realized we would have an opportunity to incorporate into the public review draft of Guideline 0.2P the lessons we will surely learn as we write Guideline 1.2P

technical requirements. We decided to delay public review of Guideline 0.2P so we could apply what we learn writing Guideline 1.2P.

## **Progress**

We sent a draft of the body of Guideline 0.2P to our editorial subcommittee in May 2009. The full Committee will begin detailed review of the edited draft at the ASHRAE meeting in Louisville in June 2009. A number of Guideline 0.2P Annexes are currently being assembled. The Committee is now turning its primary attention and efforts to Guideline 1.2P.

## **Committee Organization**

When ASHRAE approved the TPS for Guidelines 0.2P and 1.2P, GPC 1.2 accepted responsibility for both guidelines. Formally, there are two GPC's, one for each guideline. However, the officers and members of GPC 1.2 agreed to serve as GPC 0.2, with the same officers and roster.

Within the Committee, we have split up into task groups, informally referred to as subcommittees, each responsible for developing the text of one section of the guideline and coordination with other task groups. There are no formal "Subcommittees" as defined by ASHRAE. We also have task groups responsible for definitions, overview and coordination, and editorial work.

## **Meetings**

The Committee meets for one and a half days at the ASHRAE Summer and Winter meetings each year. We also meet by phone/web conference hookup monthly for two hours.

## **Internal Guideline Success Criteria**

During our first meetings, the Committee sought to define the criteria by which we would gauge the success of our efforts. Similar to developing the Owner's Project Requirements, we brainstormed to identify a broad range of success criteria and then ranked the criteria by voting. The resulting success criteria guide our efforts and may be used by you to judge the quality of our work. The criteria reference Guideline 30, but are understood to apply to Guidelines 0.2P and 1.2P as the successors to Guideline 30. The following are the top ten criteria as ranked by Committee members (quoted verbatim here, as presented in the ranking process):

1. Written to be highly usable – clear, simple, concise – its structure and content encourage its universal application
2. Industry-wide adoption
  - Widespread use in RFQs and RFPs
  - Utilities adopt Guideline 30 for their programs
  - States mandate Guideline as part of codes
  - Published articles citing the Guideline 30 as a used standard

- LEED EB adopts Guideline 30 (“LEED Certified”)
  - Adoption and market penetration, high participation
3. A clear set of requirements for the EB commissioning process
  4. Create a standard framework that is repeatable
  5. Guideline has universal application for most/all building and system types
  6. Sustainable operating results, persistence into the future
  7. Set a clear goal for the EB commissioning process, include key components of the goal
  8. Users find Guideline 30 useful, few outstanding questions
  9. Guideline 30 is consistent with Guideline 0-2005
  10. Provide the required tools for executing the process

As you may appreciate, the Committee has set an ambitiously high bar for our own acceptance of the work.

## **Coordination and Organization**

### ***Process versus Technical Requirements***

The distinction between the two types of guidelines is important. The difference between the commissioning process guideline (0.2P) and the HVAC&R technical requirements guideline (1.2P) is similar to the difference between the general requirements of a construction contract and the various specification divisions.

General requirements describe requirements that apply to the entire project. Individual specification divisions describe the work for a particular building system. Specification divisions do not repeat general requirements, but may elaborate how they apply to the work of the division. Good specification writing avoids describing the details particular to a single division of the work in the general requirements. One would not, for example, describe the requirement for an extended warranty for the chiller in the general requirements; that provision belongs in Division 23. One would, however, describe the procedure for documenting warranty coverage in the General Requirements.

Similarly, the commissioning process guidelines (0-2005 and 0.2P) describe the commissioning process as it applies to all building systems and assemblies. If an activity applies only to the HVAC&R systems, it should not be described in the process guideline; it should be included in the technical requirements guideline.

For example, the process guideline describes how to determine and document current facility requirements (CFR), such as reliability and availability. The technical requirements guideline, by contrast, lists the specific CFR topics that should be considered relative to HVAC&R systems, such as quality and redundancy of prime heat sources.

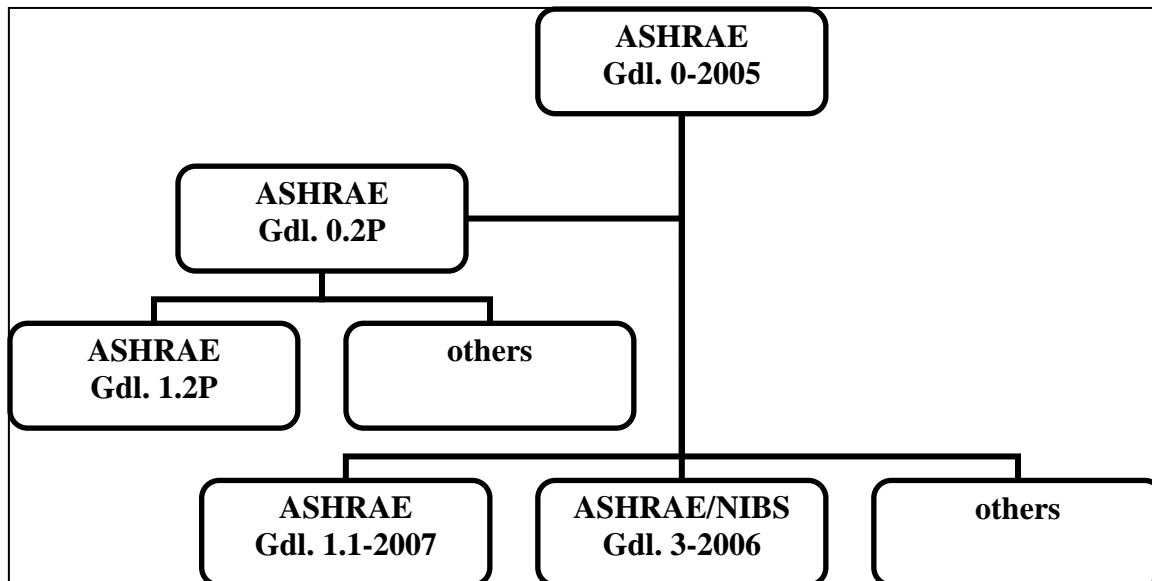
Separating process from technical requirements facilitates assembly of a series of commissioning guidelines to describe the process and technical requirements for the whole building. One, Guideline 0.2P, describes the existing building commissioning process for all systems. Each

building system will then have its own technical requirements guideline, written by subject matter experts. The first of the technical requirements guidelines will be Guideline 1.2P for HVAC&R.

### **Relationship to Guideline 0-2005**

ASHRAE Guideline 0-2005, *The Commissioning Process*, is the “grand-daddy” of them all. The quality principles described in Guideline 0-2005 apply not only to all systems in new construction, but to existing facilities as well. Guideline 0.2P will elaborate in detail the application of the quality principles set out in Guideline 0-2005 for the commissioning process in existing buildings.

Annex A in Guideline 0-2005 is a guide for developing supplementary technical guidelines for the commissioning process, which was applied in the development of Guidelines 1.1-2007 and 3-2006. Similarly, Guideline 0.2P will have an annex to guide the development of supplementary technical guidelines for the commissioning process in existing buildings, which Guideline 1.2P will follow. The result will be a series of guidelines for the commissioning process for new and existing facilities, all consistently organized for ease of reference. Figure A, below, illustrates the relationships of the various commissioning process guidelines.



**Figure A: Relationship of Commissioning Process Guidelines**

### **Organization**

The steps of the existing building commissioning process materialize in what appears to be a linear, chronological fashion. However, the Committee recognized that the process is likely to be iterative. Activities in a step midway through the existing building commissioning process often cause us to revisit an earlier step or to jump ahead to a succeeding step before moving on, a characteristic one Committee member compared to a “do-loop.”

For example, during the Discovery/Planning step, we may encounter a condition during a walk-through which can and should be rectified on the spot, such as disconnected damper linkage. After verifying that the linkage should indeed be connected, we make the correction, an activity normally performed in the Implementation step, without even waiting to complete the intervening Investigation step. We have essentially “looped forward” to perform an Implementation task before continuing with the Discovery/Planning work.

Likewise, in the Implementation step, we may make an improvement that reveals the need for further evaluation of another improvement, causing us to “loop back” to the Investigation step before proceeding with the rest of the Implementation work.

Developing a single flow chart that depicts the various “do-loop” possibilities concisely is a challenge. Our inclination is to include several flow charts in Guideline 0.2P, in order to depict the overall process flow and the detailed process flows within each step. The overall process chart will suggest in a generic manner that loops may exist between the various steps. The details of those loops can then be shown in the flow chart for each step.

## **Guideline 0.2P Content**

It is premature to share with you a draft of Guideline 0.2P. However, some tentative ideas may help you anticipate the content of the public review draft of the Guideline.

### ***Terminology***

You may have noticed the lack of the terms, “retro-commissioning” and “re-commissioning.” The Committee is inclined to move away from these misused terms, preferring to simply refer to the existing building commissioning process.

The other significant shift resulted from our understanding that the phrase, “owner’s project requirements” (OPR) is not entirely applicable to an existing facility for two reasons. First, there may not be a project at all in terms of a capital project. Second, and perhaps more importantly, OPR suggests criteria that were developed at the time of construction. Returning a 40 year old building to performance in accord with the original OPR would in most cases be a disservice to the owner.

We have tentatively settled on the term “current facility requirements” (CFR) in lieu of OPR. The content of the CFR document and the process used to develop it are similar to the OPR, but it focuses on current, and to the extent known, future, facility requirements. The CFR will be less concerned with design and construction issues than an OPR.

### ***Existing Building Commissioning Process Steps***

While there are some similarities between the phases of new construction and the steps in the commissioning process for existing facilities, the differences dominate. The titles and content of the existing building commissioning process steps listed below are still tentative.

## **Discovery/Planning**

The Discovery/Planning step involves preparatory activities for the existing building commissioning process, including an initial facility survey, development of a strategic plan, CFR, and an initial existing building commissioning plan.

## **Investigation**

Investigation, as the name implies, includes conducting the site investigation to compare the actual building conditions and system performance with the owner's current operational needs and requirements defined by the CFR. A written investigation plan guides site investigation activities, including performance monitoring and testing. Investigation concludes with the compilation and evaluation of a master list of findings and recommendations to improve building and system performance to meet the CFR.

## **Implementation**

During the Implementation step, the owner makes the final decisions on which Investigation recommendations to implement. Accepted recommendations are implemented and then inspected, tested, and verified to meet the CFR. Design and/or construction service contracts may be needed to complete some of the work.

## **Hand-Off**

Hand-Off activities ensure a smooth transition between the existing building commissioning team, the owner, and the personnel responsible for operating and maintaining the facility. Activities include finalization of the systems manuals, training and evaluation of training, gathering lessons learned, and reporting.

## **Continuous Implementation**

Continuous Implementation is more than a step; it is a process designed to continually track the performance of commissioned buildings to ensure the benefits obtained through the preceding steps are maintained over the life of the facility. It is used to monitor the performance of all identified building systems and operational strategies, identify deviations from acceptable performance parameters, correct any identified faults and update all building documentation. Continuous Implementation also includes scheduled, periodic activities to evaluate performance of systems and personnel and to intervene as necessary.

## Public Involvement

Involvement in the development of ASHRAE guidelines is open to the public, regardless of ASHRAE membership.

### **Committee Membership**

Guideline Project Committees are governed under the rules of ASHRAE Project Committees. Membership is open to all. Currently GPC 1.2 is rather large, with 27 voting members. Attrition or added workload may result in openings for additional members. Interested individuals willing to commit to attending every Committee meeting until the guidelines are published may obtain application materials from ASHRAE by calling (678) 539-1125.

### **Committee Meetings**

Committee meetings, whether on site or via telephone/web conference links, are open to the public. Committee meeting schedules are published in advance in the ASHRAE Standards Action newsletter, available at <http://www.ashrae.org/technology/page/331>.

### **Public Review**

ASHRAE submits all guidelines that are proposed or revised for public review, generally for 45 days. Public review is open to the public, and we encourage you to participate. Public review of draft ASHRAE guidelines is now handled entirely on the ASHRAE website. ASHRAE no longer accepts hardcopy review comments.

To access the public review process, navigate to <http://www.ashrae.org/technology/page/331>. Directions are located about a third of the way down the page under the banner, “Public Review Draft Standards and Online Comment Database.” Follow the directions under “Instructions for Commenters.” The “Click Here” button will open a login page to record comments. ASHRAE members use their ASHRAE login. Others create a new login. ASHRAE membership is not required.

The Committee will respond online to each comment received. Commenters can access their comments and the Committee’s responses through the same Online Comment Database login process. Commenters may respond to the Committees responses if they wish.

ASHRAE has also changed their expectations for the quality of the drafts the committees send for public review. Public review drafts are now expected to be ready for publication. The only changes should be those made in response to reviewers, or changes to the annexes, which are not considered part of the body of the guideline. If the Committee makes substantive changes to the public review draft, i.e. anything more than simple editing, whether in response to review comments or the result of Committee initiative, the guideline must be submitted for another public review.

On behalf of my colleagues on GPC 1.2, thank you for your interest in the work of our Committee. We look forward to your participation in making these two proposed existing building commissioning process guidelines valuable, widely-accepted tools that are user-friendly.