ASHRAE Addenda a, b, c, and d to
ASHRAE Guideline 0-2005

ASHRAE GUIDELINE

The Commissioning Process

Approved by the ASHRAE Standards Committee on January 23, 2010, and by the ASHRAE Board of Directors on January 27, 2010.

This guideline is under continuous maintenance by a Standing Guideline Project Committee (SGPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the guideline. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site, http://www.ashrae.org, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Guideline may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada).

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SPECIAL NOTE

This Guideline was developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE Guidelines are developed under a review process, identifying a guideline for the design, testing, application, or evaluation of a specific product, concept, or practice. As a guideline it is not definitive but encompasses areas where there may be a variety of approaches, none of which must be precisely correct. ASHRAE Guidelines are written to assist professionals in the area of concern and expertise of ASHRAE's Technical Committees and Task Groups.

ASHRAE Guidelines are prepared by project committees appointed specifically for the purpose of writing Guidelines. The project committee chair and vice-chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Guideline.

Development of ASHRAE Guidelines follows procedures similar to those for ASHRAE Standards except that (a) committee balance is desired but not required, (b) an effort is made to achieve consensus but consensus is not required, (c) Guidelines are not appealable, and (d) Guidelines are not submitted to ANSI for approval.

The Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this Guideline,
b. participation in the next review of the Guideline,
c. offering constructive criticism for improving the Guideline, or
d. permission to reprint portions of the Guideline.

(This foreword is not a part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

FOREWORD

This addendum corrects an oversight in the current guideline in that Section 7.2.1.2 requires that a sampling approach be utilized for the Commissioning Process Tests, but it was not referenced in 7.2.9.1 or in 7.2.10.1. The added sentence in item "d" directs the user to include the sampling strategy.

Note: In this addendum, changes to the current guideline are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum a to Guideline 0-2005

[Note: Add the following sentence to item "d" of the list of items in Section 7.2.10.1 as shown below.]

7.2.10.1 Test Data Records capture test data, observations, and measurements. Data may be recorded on photographs, forms, or other means appropriate for the application. The following minimum information should be recorded.

(d) Identification of the system, equipment, or assembly under test. List the location and the construction document designation. Include the sampling strategy to be utilized for the test.

(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

FOREWORD

This addendum clarifies the meaning of Section 7.2.12.3, item a. The current wording has caused confusion regarding what defining the scope in this section entails, specifically when the Commissioning Process is not being applied to an entire project. The revision, by offering the example of the Construction Checklists completed since the last visit, shows how it is possible to define the scope of systems and assemblies that can be verified in this situation.

Note: In this addendum, changes to the current guideline are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifi-

Addendum b to Guideline 0-2005

[Note: Add the following sentence to item "a" of the list of items in Section 7.2.12.3 as shown below.]

7.2.12.3 The site visit procedure uses statistical sampling techniques for verification of the Construction Checklists and Record Documents. This provides assurance that the verification process is not biased and has reliable consistency. The recommended procedure has the following general steps:

(a) Identify the current state of construction to define the scope of systems and assemblies that can be verified. The Construction Checklists completed since the previous site visit provide one way to define this scope.

(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

FOREWORD

This addendum clarifies item "b" of Section 7.2.12.3. The current wording implies that you randomly select from all systems, not just those that were identified in item "a" of 7.2.12.3. This clarification will avoid confusion on the sampling approach presented in the Guideline.

Note: In this addendum, changes to the current guideline are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum c to Guideline 0-2005

[Note: Add the word "identified" to item "b" of Section 7.2.12.3 as shown below.]

7.2.12.3 The site visit procedure uses statistical sampling techniques for verification of the Construction Checklists and Record Documents. This provides assurance that the verification process is not biased and has reliable consistency. The recommended procedure has the following general steps:

(a) Identify the current state of construction to define the scope of systems and assemblies that can be verified.

(b) Randomly select between 2% and 10% of the systems and assemblies identified for verification. This can be accomplished by randomly selecting a starting point and selecting every tenth item from a list or by automatically generating a random sample from a computerized database.

(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

FOREWORD

This addendum clarifies what the guideline means by "quality-based sampling." Currently, Annex N only provides guidance for the completion of design reviews and does not address the other quality-based sampling referenced in the main body of the guideline. The changes described in this addendum provide better guidance on just what quality based sampling is in order to avoid confusion by practitioners and owners and to avoid improper application of the guideline.

Note: In this addendum, changes to the current guideline are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum d to Guideline 0-2005

[Note: At the end of sections 7.2.1.2, 7.2.7.1, and 7.2.9.2 (e), add the following sentence.]

7.2.1.2 Use quality-based sampling for verification of each task and test determined to be related to the Owner's Project Requirements during the Construction Phase. See Annex N for additional guidance.

7.2.7.1 It is recommended that a sampling strategy of randomly selecting 5% to 10% of the submittal be used to focus upon the quality and ability of the submittal to achieve the Owner's Project Requirements. If deviations are substantial, then review an additional 5% to 10%. If substantial deviations still exist, then reject the submittal and return it with comments. See Annex N for additional guidance.

7.2.9.2 (e) Use quality-based sampling for verification of each test determined to be related to the Owner's Project Requirements. See Annex N for additional guidance.

[Note: Add the following new sections to the end of Annex N.]

CONTRACTOR PHASE SUBMISSIONS

The focus of the review of contractor submittals by the Commissioning Authority during construction is different from that accomplished by the design professional. Whereas the design professional reviews all submittals against the contract documents (specifications), the Commissioning Authority compares a sample (typically 5-10%) of a submittal against the OPR and BoD. This different approach is due to the fact that the commissioning process role is to verify achievement of the OPR using quality tools.

The following are general guidelines for implementing quality based sampling on contractor submittals.

1. Submittal Received – verify submittal falls within commissioning process scope.
2. Select Sample for Review
   a. Single/Few (<10) Components: Choose every xth part of the submittal – for example, for a 10-page submittal, to get a 10% sample, divide each page into 6 parts and select every 10th block (resulting in 6 blocks to check).
   b. Multiple Components: choose every yth component (typically 20-30% of components) and then divide and select blocks as detailed above for "Single/Few (<10) Components."
3. Accomplish Review: For each sample block, review information contained against the OPR and BoD. Identify discontinuities.
4. Results: Document results of the review. Typically, if consistent issues are identified, the general quality of the submittal to achieve the OPR is lacking and the recommendation provided to the design professional should be to reject the submittal. In the Commissioning Authority write-up, it is important to state that a sampling approach was utilized to avoid having the design professional or others assume that the Commissioning Authority reviewed everything.

CONSTRUCTION PHASE TESTS AND VERIFICATIONS

The role of accomplishing site visits and commissioning process tests is the on-going verification of OPR achievement. As the contractor is responsible for 100% construction and checking of work, the commissioning process utilizes a sampling strategy in accomplishing verifications and tests.

1. Construction Checklist Verifications: During site visits, the completed Construction Checklists are verified (typically 2-10%). The following is general guidance for selecting and verifying Construction Checklists.
   a. Identify Completed Construction Checklists: Identify the Construction Checklists that have been completed since the last site visit.
   b. Select Sample: Depending upon the pace of construction and the size of the project, the number of new Construction Checklists can vary widely. The following is a general guide for sample rates based on the number of new Construction Checklists. Please note that this is not meant to be used directly for your project due to the many variables in determining acceptable sample rates and owner input. Randomly

# New Construction Checklists	Overall Sample Rate	Component Sample Rate
1-10	100%	70-100%
11-20	80%	50-70%
21-50	50%	30-50%
51-100	30%	15-30%
>100	2-20%	2-10%

select the Construction Checklists to be verified. Note that you often want to sample similar components as a group so that if there is only 1 or 2 of a particular component, it is not missed. Since the sampling rate is lower for these than for other components, you can compare results between similar components more easily.

c. Accomplish Verification: For the chosen sample, compare the completed Construction Checklist to the actual installation. Pay particular attention to common OPRs, such as accessibility, maintainability and future installation steps. Also, verify the record drawings with the actual installation.

2. Commissioning Process Tests: The preparation for the Commissioning Process Tests includes all of the activities completed during Pre-Design, Design, and Construction Phases, including design reviews, submittal reviews, Construction Checklist verifications, and verification of contractor completed tests and system startup. Therefore, the role of the Commissioning Process Tests is to provide the final report card for the project, with the expectation of getting an A+.

This process approach then utilizes sampling to better evaluate achievement of the OPR as the sampling allows for more in-depth testing as well as analysis of the results.

The same sampling approach used for Construction Checklists can be used for Commissioning Process Tests. The difference is that instead of using completed Construction Checklists as the sampling group, the focus of the test is the selection group. For example, the following are potential selection groups for their OPRs:

- Comfort: the individual rooms/spaces in the building.
- Exterior Enclosure: the individual components or assembly types, or each interface between components/assemblies.
- Energy: energy using components.

[Note: In addition to the changes described above, the formatting in Annex N will be revised when the guideline is next republished so that the "Design Phase Submissions" is a level above the other current headings. The two major headings in this addendum, Construction Phase Submissions" and "Construction Phase Tests and Verifications," will be formatted so they are on the same level as "Design Phase Submissions."]

[Note: When the guideline is next republished, an error found in two places in the current edition of the standard will be corrected. Near the end of the foreword, in a diagram showing the relationship between ASHRAE Guideline 0, ASHRAE Guideline 1.1, and NIBS guidelines, ASHRAE Guideline 1.1 is referred to as "ASHRAE Guideline 1-200X, The HVAC&R Commissioning Process: Technical Requirements". However, the guideline should now correctly be referred to by its actual designation and title, ASHRAE 1.1-2007, HVAC&R Technical Requirements for The Commissioning Process.," The same error occurs in Section 6, item 9, of Annex A on page 21 of the current guideline. This will be corrected also.]

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.