

**AMERICAN SOCIETY OF HEATING, REFRIGERATING AND
AIR CONDITIONING ENGINEERS, INC.**

1791 Tullie Circle, NE I Atlanta, GA 30329
(404) 636-8400

TC MINUTES COVER SHEET

T.C. NO. **7.9**

DATE OF MEETING: **January 25, 2004**

T.C. TITLE: **Commissioning**

LOCATION: **Anaheim, CA**

PRESENT				
VOTING	APPTD	NONVOTING	APPTD	NONMEMBERS
Janice Peterson	02	David Bevirt	01	Narendra Amarnani
Kristin Heinemeier	02	Richard Rose	02	Peter Golem
J.R. Anderson	00	Dave Shipley	03	Chad Grindle
Thomas Cappelin	00	Elia Sterling	03	J. Patrick Carpenter
John Castelvechi	03	Harvey Brickman	96	David Claridge
Timothy Corbett	02	Rick Cassault	03	Costas Balaras
Charlie Culp	01	Kenneth Fulk	00	Suresh Modi
Larry Fisher	02	Walter Grondzik	03	AB Blalock
Jeff Traylor	02	Daniel Henon	01	James Persaud
Brandt Williams	03	Charles Kieffer	00	E. Mitchell Swann
Gerald Kettler	02	Michael King	03	Fred Golestan
		Carl Lawson	02	Christie Kjellman
		William McCartney	02	Tom Davidson
		Andy Nolfo	02	Don Larsson
		Ken Peet	03	Derek Jakaras
		John Rieke	99	Phillip Trafton
		Robert Towell	99	Moncef Krarti
				Henry Hays

ABSENT					
VOTING	APPTD	NONVOTING	APPTD	NONVOTING	APPTD
Rodney Lewis	03	Thomas Logan	03	Charles Henck	02
J.C. Visier (Intl.)	01	Karl Stum	03	Eli Howard	03
David Bornside	03	Hollace Bailey	99	Edward Iczkowski	02
Barry Bridges	03	David Butler	99	Eric Jenison	00
		Natascha Castro	02	Michael Kuk	00
		Wayne Dunn	01	Henry Manczyk	03
		Jay Enck	01	Frederick Schroeder	00
		Daniel Frasier	02	Christopher Smith	99
		Ken Gillespie	02	Cedric Trueman	00
		Stephen Hanser	98	Dennis Tuttle	94
		James Harrison	99	Henry Vance	01
		Phil Haves	98	Chun Fai Wong	03

DISTRIBUTION

ALL VOTING MEMBERS AND LIAISONS:

<i>TAC Chairman</i>	Arthur McIvor	<i>TEGA</i>	Melvin Glass	<i>Staff Standards</i>	Claire Ramspeck
<i>TAC Section Head</i>	Birol Kilgis	<i>Special Pubs</i>	Marilyn Listvan	<i>Staff Res/ Tech</i>	Michael Vaughn
<i>Research</i>	Drury Crawley	<i>Standards</i>	Merle McBride	<i>ALI Liaison</i>	William Buck
<i>Journal/ Insights</i>	Ismena Deacon	<i>Program</i>	Jim Willson		

ASHRAE T.C. 7.9 ACTIVITIES SHEET

CHAIR: Janice Peterson

VICE CHAIR: Jerry Kettler

SECRETARY: Kristin Heinemeier

TC MEETING SCHEDULE

<i>Location - Past 12 months</i>	<i>Date</i>	<i>Location - Next 12 months</i>	<i>Date</i>
Kansas City	6/03	Nashville	6/04
Anaheim	1/04	Orlando	2/05

TC SUBCOMMITTEES

<u>Function</u>	<u>Chairman</u>
Handbook	Karl Stum
Program	Richard Rose
Membership	Elia Sterling
Research	Dave Shipley
Long Range Planning	Jerry Kettler
Standards	Rodney Lewis
Commissioning Guideline(s)	Carl Lawson
Web Master	Dave Shipley
Journal/Insights	Larry Fisher

RESEARCH PROJECTS – Current

<u>Number</u>	<u>Title</u>
RP1137	Field performance Assessment of VAV Control Systems Before and After Commissioning

LONG RANGE RESEARCH PLAN

Priority	Title	W.S. Written	Approved By R&T
1)	1247-TRP: Field Performance Assessment of Package Equipment to Quantify the Need for Monitoring, FDD, and Continuous Commissioning	Yes	Yes
2)	RTAR 2005-56: The Impact of Commissioning on Comfort	RTAR	No
3)	RTAR 2005:57: Effectiveness of Statistical Random Sampling of newly constructed HVAC Systems for Building Commissioning	RTAR	No
4)	Performance Test Methods for existing rooftop units	No	No
5)	Field-Based Evaluation of Functional Performance Tests	No	No
6)	Methods of Improving Persistence of Commissioning Savings in Control Systems	No	No
7)	One Time vs Short-Term vs Seasonal Testing of Air-Handling Units	No	No

STANDARDS ACTIVITIES

Guideline 0 submitted for public review, status will be reported on at next meeting.

Guideline 1 under revision.

Three new guidelines have been proposed (title/purpose/scope).

TECHNICAL PAPERS

From sponsored research - none

From other sources - unknown

PROGRAMS**TC SPONSORED SYMPOSIA** (Past 2 years, **present** and *planned*);

Cx Starts with Design Intent	Walt Grondzik	06/02
Cx Specialty Facilities	Carl Lawson	01/03

TC SPONSORED SEMINARS (Past 2 years, **present** and *planned*)

Impact of Cx on Commercial Markets	Andy Nolfo	01/03
Cx Specialty Facilities	Carl Lawson	01/03
Cx Life Safety Systems	Carl Lawson	06/03
Impact of Total Building Cx	Carl Lawson	01/04
Cx is More than FPT	Rich Rose	01/04
<i>Training Cx Agents</i>	<i>Jerry Kettler</i>	<i>06/04</i>
<i>Retrocommissioning</i>	<i>Andy Nolfo</i>	<i>06/04</i>
<i>Cx of DDC</i>	<i>Rodney Lewis</i>	<i>02/05</i>
<i>Hi-Tech Facility Cx</i>	<i>Richard Rose</i>	<i>06/05</i>

TC SPONSORED FORUMS (Past 2 years, **present** and *planned*)

Persistence of Savings for Central Systems	Ken Peet	06/03
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PROGRAM PLAN: (See Above and attached)

JOURNAL PUBLICATIONS (Past 3 years, present and planned) - unknown

MEETING MINUTES – Sunday, January 25, 2004

**ASHRAE T.C. 7.9 - Commissioning
Anaheim, CA**

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1. The meeting was called to order at 3:05 pm by Chairman Peterson
 2. Self introductions were conducted.
 3. Attendance sheets were distributed, and roll was taken: 9 out of 14 Voting members in attendance.
 4. Vice Chairman Comments: none.
 5. Agenda was reviewed and no additions were made.
 6. Motion was made and seconded to approve minutes from Chicago. (Corbett/Castelvecchi, 9/0/0).
 7. Administrative matters: After this meeting, the roll over roster will be determined. Individuals interested in being corresponding membership are encouraged to contact Chair Peterson. The chair thanked those who provided feedback on the Design Intent article. A memo related to Homeland Security was discussed. Harvey Brickman suggested we consider whether there are any research topics related to this. There will be a satellite broadcast on Homeland Security on April 14.
 8. Correspondence: None.
 9. Society Liaisons: Harvey Brickman indicated that T.C. 7.9 should have a handbook committee chair, list of revisers and reviewers for the 2007 revision of the Applications Handbook chapter on Building Commissioning. The “Authors’ and Revisers’ Guide” is on the website. We need to vote to approve the chapter revision by summer 2005 or Winter 2006 meeting at the latest. If we’re not already writing, we’re behind! If we do not provide a revision on time, it will go in without revision.

SUBCOMMITTEE REPORTS

10. Membership committee: No report.
11. Program Committee: See attached report. Comments were received on today’s program: the rooms were all standing-room only, so bigger rooms are needed. Some felt the presentations were repetitious, and that more detail was needed. Richard will lay out a list of titles for the next meeting. Richard will send out the upcoming program ideas by email,

- to get input from those who cannot make the 1-3pm time slot on Saturday.
12. Research Committee: See attached report. On RP 1137, since we cosponsored the research, it would be a good idea for us to cosponsor with TC1.4 the symposium for Orlando. The contractor is expected to submit their final report by 3/1/04 (18 months overdue).
 13. Handbook Committee: Carl Lawson volunteered to help get the process going...he will send out the previous version. Several individuals volunteered to participate in the revision: Peet, Culp, Fisher, Bornside, Kele, and John Groms.
 14. Long Range Planning Committee: See attached report. Janice, Rick and Jerry met on Saturday, and discussed their new draft of "Commissioning Support Guidelines." They recommend continuing progress on Guidelines 1 and 0. They feel we need an Education Subcommittee, to get the guidelines to owners, and new engineers (eg, at Universities). We also need to define a minimum skillset. Three of the new Guidelines have been submitted, and we expect activity in Nashville. Carl Lawson suggested putting some of the text that is currently in section 2.2 of these guidelines ("This guideline provides...") into the background section so that the scope can be more brief. Comments were made that the guideline for training should include targeted trainees, and that there should be a guideline for Contractors, for Owners, and for CAs.
 15. Standards Committee: No report.
 16. Commissioning Guidelines Committee: Guideline 0 has been submitted. There are some issues with individuals on SPLS. Chuck is trying to rectify the issue. Some committee members may need to rescind their votes. Guideline 1 is moving along. It may be issued for public review this year. The committee met between the Kansas City and Anaheim meetings.
 17. Website: There have been a lot of changes to the website this year. The site is now on a new ASHRAE TC webserver. It can be accessed thru the ASHRAE.org website, or directly at tc79.ashraets.org. The public portion of the website provides the name, affiliation, position, and years on the committee, unless the webmaster receives permission to post additional contact information. The private portion of the site provides additional contact information, unless the webmaster receives a request NOT to post this information. The site includes news, meetings, information about activities (information and papers, powerpoints), completed research projects, handbook, FAQs. ASHRAE is also doing a listserv and bulletin board. Program chairs should know that ASHRAE would like to archive program presentations.
 18. Journal and Insights/International: This committee has been merged with Special Publications, to form the Publications Committee. They are requesting Journal articles with certain keywords: "LEED", "Green". They are considering a "Green Corner", and would like to see information on "Commissioning and Green" or "Commissioning and LEED".

LIAISON REPORTS

19. GPC-1 'HVAC Commissioning Process' – Walter Grondzik: Covered under Commissioning Guidelines Committee report.
20. GPC-4 'O&M Documentation' – Jerry Kettler – Nothing active. They went out to review, received comments and have responded to comments. They should publish shortly.
21. SP-91 'Guideline for Hospital and Healthcare' – Carl Lawson – Guideline was published in Kansas City, and as of Jan 24, it had sold 10,000 copies. They have gotten good response from healthcare industry.
22. SSPC 62 'Ventilation for Acceptable IAQ' – Eli Howard – No report.
23. SPC-90.1 'Energy Efficient Design of New Buildings' – Cedric Trueman – No report.
24. SPC 111 'Test, Adjust and Balance' – Jerry Kettler – They are currently resolving the last few comments, and trying to get it out.
25. GPC 11P 'MOT for Control Components' – Jerry Kettler. They are close to getting this out. It is having issues because it is currently not really written as a method of test. They are considering changing the title so that it is not a MOT. It should be out for public review in Nashville.
26. TC1.4 – 'Control Theory and Application' – Larry Fisher – No report.
27. TC1.8 – 'Owning and Operating Costs' – Barry Bridges – No report.
28. TC9.7 – 'Test and Balance' – Rodney Lewis – No report.
29. TC 1.12 – 'Moisture Management in Buildings' – Carl Lawson – This was TG 9MMB. They are planning an Orlando seminar: Problem buildings in Florida. They are working on a design guide for health facilities (Carl is chair).
30. TC 9.9 – 'Mission Critical Facilities, Technology Spaces and Electronic Equipment' – This new TC would like to have a liaison with TC7.9, because these facilities have a greater than average need for commissioning. It applies to buildings such as data centers, and telecom. They would like to get together groups such as the 24x7 exchange, and Uptime Institute.
31. Building Commissioning Association Liaison – Rick Casault – BCA is working on a new logo and new website. Their certification program is close to reality, and the test will be ready to be taken by the end of the year. Chapters and regions are being set up. Their next annual meeting is at the NCBC, May 17-19 in Atlanta.
32. LEED Liaison – JR. Anderson – Over 5000 people attended the recent USGBC meeting. They had very good speakers, and the participants included owners, architects, contractors, landscapers, and interior designers. (The meeting included a drawing for a Toyota Prius!) They have a technical resource committee, which includes Karl Stum and Chad Dorgan.

BUSINESS

33. Old Business: None.
34. New Business:
 - a. The research committee asked for a discussion of the way that sampling is handled in Guideline 0. It was proposed that a research topic be put together to determine if and when sampling is preferable to 100% commissioning. They felt however, that there may be better ways to address this controversy. It was identified that Guideline 0 allows either sampling or 100% commissioning. It would be a good idea for the GPC to sponsor a forum on this topic, since it is so controversial.
35. The next TC7.9 Committee meeting will be on June 27, 2004 at 3 PM in Nashville, TN.
36. Motion to adjourn was made at 17:01 and passed by acclamation.

—END OF REPORT—

ATTACHMENTS

- Program Committee Report p. 5
- Research Committee Report p. 6
- Long Range Planning Committee Report p. 16

Program Committee Report – January 25, 2004 – Anaheim

TC 7.9 PROGRAM SCHEDULE

Status

City	Type	Title	Chairman	Speakers	Abstract Complete	Paper Complete	Paper Approved
Anaheim 1/24/04 to 1/28/04	Seminar	Impact of Total Building Cx	Carl Lawson	Charles Culp Chad Dorgan			Completed
Anaheim 1/24/04 to 1/28/04	Seminar	CX is more than FPT	Rich Rose	Tim Corbett Jeff Traylor Bill McCartney Jerry Kettler			Completed
Nashville 6/26/04 to 6/30/04	Seminar	Training Cx Agents	Gerry Kettler	Jeff Traylor Charlie Culp Andy Hoiro Rick Casault			
Nashville 6/26/04 to 6/30/04	Seminar	Retro-Commissioning	Andy Nolfo	Janice Peterson Tim Corbett Charlie Culp Carl Lawson			
Orlando 2/05/05 to 2/09/05	Seminar	Cx of DDC Systems	Rodney Lewis	Ken Gillespie Larry Fisher Jim Cogan Steve Doty			
Denver, CO 6/25/05 to 6/29/05	Seminar	High-Tech Facility Cx	Rich Rose	Charles Kieffer Chris Kurkjuin/Rich Greco			
Chicago 1/21/06 to 1/25/06	Seminar						
Quebec City 6/24/06 to 6/28/06	Seminar						
Dallas 1/27/07 to 1/31/07	Seminar						

TC 7.9 Research Subcommittee Report

2004 Annual Meeting

Saturday, January 24, 2003, 1:00-3:00pm

Anaheim Convention Center 213C

1. Call to Order (Dave Shipley)

Attendees: Ken Peet, J.R. Anderson, Maria Corsi, Daniel Choiniere, Ken Gillespie, Kristin Heinemeier, Daniel Henon, Natascha Castro, Janice Peterson.

2. Funded Projects

<i>Priority</i>	<i>Title</i>	<i>Status</i>	<i>Contractor</i>	<i>Notes</i>
	RP 1137 – Field Performance Assessment of VAV Control systems Before and After Commissioning	In-Progress	Patrick Fleming/ Stantech Consulting	Meeting this evening at 5, presenting final report. PMSC met in KC and had lots of comments and concerns. They were provided to PI and they have improved the document in response. 20 MB file or something, so it hasn't been distributed. Important to 7.6 also, because of potential impact on test method.

3. Projects in the Pipeline

(Note: A new research plan is not due at this time. The priority order shown below has not been formally voted on by the subcommittee and should be considered approximate. It will be finalized in Nashville.)

Presentation about 1312-WS Tools for Evaluating Fault Detection and Diagnostic Methods for Air-Handling Units

Maria Corsi distributed a summary and detailed work statement on behalf of the author, John House. She described the objectives of the project:

- Adapt an existing simulation model of an AHU to produce fault-free and faulty data for a number of different types of faults and for a range of severities that can be used to assess the performance of AHU AFDD methods.
- A further objective is to validate the simulation model using data from a laboratory or field site.
- Those data also could be used to test AFDD methods for AHUs.

Ken Gillespie expressed concern about overlap with 1092, which is using Air Model. This project is just starting up this meeting. The work statement needs to address that issue. Ken will provide a copy of that work statement to John House. Kristin indicated that our co-sponsorship would require more comment about commissioning. Some of the faults are commissioning-related; others are more related to continuous commissioning.

The Research Subcommittee expressed interest in this work statement, but will consider it again at the next meeting, when we will be identifying our top priorities for submission to ASHRAE.

<i>Priority</i>	<i>Title</i>	<i>Status</i>	<i>Author</i>	<i>Notes</i>
1	1274-TRP: Field Performance Assessment of Packaged Equipment to Quantify the Benefits of Proper Service and Assessing the Long Term Need for Monitoring, FDD, and Continuous Commissioning Technology	Work Stmt	Todd Rossi	Sponsored by 4.11; Prioritized RTAR. This went out to bid and some bids were received. A PES is meeting in Anaheim to recommend which bid to accept. Meeting tomorrow night for final selection – two out of three are very good.
2	RTAR 2005-56: The Impact of Commissioning on Comfort	RTAR	Dave Shipley	RTAR drafted, revised according to some preliminary comments from TC 2.1, and submitted. RTAR returned by RAC with comments. The comments are substantive and point to the need to step back and do some other things first. Ken Gillespie will provide Kristin Heinemeier with information on the project to develop a database of commissioned buildings in California; Kristin will then prepare an RTAR to “Compile a National Database of Commissioning Case Studies.”
3	RTAR 2005-57: Effectiveness of Statistical Random Sampling Technology of newly constructed HVAC Systems for Building Commissioning	RTAR	J.R. Anderson	Draft RTAR submitted. No comments were returned. Subcommittee passed a motion in reference to this RTAR, as detailed below this table.
4	Performance Test Methods for existing rooftop units	Title	Needs Champion	Dovetail with TC4.11 project on Field Performance Assessment. No action at this time.
5	Field-Based Evaluation of Functional	Title	Needs Champion –	Select subset of FPT Library and evaluate the

<i>Priority</i>	<i>Title</i>	<i>Status</i>	<i>Author</i>	<i>Notes</i>
	Performance Tests		maybe Phil Haves?	technical and practical aspects of the proposed methods.
6	Methods of Improving Persistence of Commissioning Savings in Control Systems	Title	Ken Peet, David Underwood	Ken Peet submitted a Forum that seems to have been approved but didn't fit into the Anaheim schedule. He will try again.
7	One Time vs Short-Term vs Seasonal Testing of Air-Handling Units	Title	Mingsheng Liu	Awaiting outcome of WS-1092

Motion – In response to discussion of RTAR #3, the Research Subcommittee would prefer that TC 7.9 take an official position that Guideline 0 should permit targeted sampling or weighted sampling that accounts for the potential impact of specific equipment.

4. Overall Discussion of TC 7.9 Research

Ken updated us on activities in California. There is considerable work going on related to commissioning. There is a website for the California Commissioning Collaborative, cacx.org, which provides some information on these activities. There are tools being developed, to generate specifications, identify costs, design intent, with hopes of adding tools for training and system manuals. Energy Design Resources and Savings By Design, energy efficiency program sfunded by the California utilities, is funding the work. Information is on the website energydesignresources.com. The programs are statewide, but each utility implements it in its own service territory.

Guideline 20, XML Definitions for HVAC&R, is using the flowchart from Guideline 1-1996, to look at the information flow that happens in the commissioning process. Goal is to include commissioning as a topic within Guideline 20. XML is the system for helping transfer data from one software system to another.

We need to stake out our ground in the research area. We've been so unsuccessful in getting research funded that we need to figure out where our unique place is that isn't already covered by other committees. We perhaps need to identify more rigorously scientific definitions that we can use to design research projects that meet the scientific standards ASHRAE research committees are used to. A data model is perhaps the way to address this.

Texas A&M is doing a study of two schools, one not commissioned (already built) and the other to be commissioned. Kristin distributed a project description and solicited comment.

Research Subcommittee Membership

TC 7.9 Building Commissioning

Attend?	Name	Organization	E-mail	Phone	Fax
	J. R. Anderson	Anderson Engineering	Jrhazel@bellsouth.net	901-754-5420	901-753-2585
	Bryan Alcorn	California Energy Commission	Balcorn@energy.state.ca.us	916-654-4222	
	David Branson	Compliance Services Group, Inc.	Djbranson@csg.net	806/748-0040	806/748-0030
	Harvey Brickman	Tishman	brickman@tishman.com	212-399-3651	212-739-6088
	Barry Bridges	Sebesta Blomberg	bbridges@sebesta.com	651-634-0775	651-634-7400
	Charlie Culp	Texas A&M University	Cculp@tamu.edu	979/458-2654	979/862-3336
	Wayne Dunn	Sunbelt Solutions	waynedunn@aol.com	904-737-5700	904-737-0932
	H. Jay Enck	CH2Mhill	Jenck@CH2M.com	770/604-9095	770/604-9183
	Glenn Friedman	Taylor Engineering	gfriedman@taylor-engineering.com	510-749-9135	510-749-9136
	James Gartner	Roberts Gordon	jimg@rg-inc.org	513-759-4327	513-759-4328
X	Ken Gillespie	Pacific Gas & Electric	KLG2@pge.com	925-866-5329	
	Kristin Heinemeier	Brooks Energy & Sustainability Lab	kristin-h@tamu.edu	210-534-7227 x23	210-534-7238
	Daniel Henon	Sewanee – The University of the South	dhenon@sewanee.edu	931-598-1913	931-598-1745

Attend?	Name	Organization	E-mail	Phone	Fax
	John House	Iowa Energy Center	jhouse@energy.iastate.edu	515-965-7345	515-965-7056
	Daniel Choiniere	Natural Resources Canada	Daniel.choiniere@nrcan.gr.ca	703-803-2980	703-803-3732
	Mingsheng Liu	University of Nebraska	mliu2@unl.edu	402-554-2173	
	Andy Nolfo	National Environmental Balancing Bureau	anolfo@prodigy.net	636-227-4326	636-227-0425
	Tim O'Connor	Glaxo Wellcome Inc.	TJO9480@GlaxoWellcome.com	919-483-2085	919-483-0403
X	Ken Peet	LSE Engineering Inc.	Kpeet@lse-engineering.com	502-584-8930	502-584-8934
Non Member	David Bornside	Siemens	David.bornside@siemens.com	847-941-5422	847-215-9519
	Mary Ann Piette	Lawrence Berkeley National Lab	MAPiette@LBL.gov	510-486-6286	510-486-4673
	Dave Shipley	Marbek Resource Consultants	Shipley@marbek.ca	613/523-0784 x232	613/523-0717
	Elia Sterling	Theodor D. Sterling and Assoc.	Elia@sterlingiaq.com	604-681-2701	604-681-2702
	Karl Stum	Ch2Mhill	kstum@CH2M.com	503/235-5022	
	Cedric Trueman	Trueman Engineering Services	ctrueman@ampsc.com	250-472-3521	250-472-3524
	Dave Underwood	U.S. Army Corps of Engineers	d-underwood@cecer.army.mil	217-373-6780	217-373-6740
	David Venters	BuileFile	dgventers@buildfile.com	904-703-0861	904-737-0932

Attend?	Name	Organization	E-mail	Phone	Fax
	Jean Christophe Visier	CSTB	vizier@cstb.fr	+33 164688294	+33 164688350
	Craig Wray	Lawrence Berkeley National Labs	cpwray@lbl.gov	510-486-4021	510-486-6658
Non Member	Costas Balaras	National Observatory of Athens	costas@meteo.noa.gr		
Non-member	Maria Corsi	Iowa Energy Center	mcorsi@energy.iastate.edu	515-965-7343	
	Janice Peterson	Portland General Electric	Janice_Peterson@pgn.com		

RESEARCH TOPIC ACCEPTANCE REQUEST

Title: The Impact of Commissioning on Comfort

Research Category: Indoor Air Quality, Comfort and Health

Research Classification: Basic and Applied

TC/TG Priority: 4 (TC 7.9)

Estimated Cost:

Other Interested TC/TGs: 2.1

Possible Co-funding Organizations: Maybe BOMA? DOE?

Handbook Chapters to be Affected By Results of this Project: Fundamentals Ch. 8, Applications Ch. 41

State-of-the-Art (Background):

Standard 55 specifies the combinations of indoor space environment and personal factors that will produce thermal environmental conditions acceptable to 80% or more of the occupants within a space. Building codes do not typically require compliance with Standard 55, but it forms a component of the standard of care for HVAC system design.

ASHRAE's previous research includes RP #702, a field study on thermal comfort in hot humid climates (by MacQuarie University), RP #821, a field study on thermal comfort in a cold climate (by Concordia University), and RP#921, a field study on thermal comfort in hot arid climates (by Murdoch University). Richard deDear and Gail Brager compiled and analyzed numerous studies of thermal comfort in occupied buildings, mostly office buildings, in RP #884 "Developing An Adaptive Model Of Thermal Comfort And Preference." The data available from these studies may provide a baseline from current building populations for the variation in achievement of thermal comfort conditions.

Current ASHRAE research (1257-TRP) is aimed at quantifying the effects of temperature, humidity, air supply rate, and supply air quality on academic performance of school children. The proposed research fits in the context of this and other efforts to quantify the benefits of designing buildings to achieve thermal comfort conditions.

Advancement to the State-of-the-Art:

Advocates of building commissioning claim that one of the benefits of the approach is improved thermal comfort in the commissioned buildings. In effect, commissioning is expected to reduce the likelihood that the HVAC systems provided in a building will fail to achieve comfort conditions in a given space. If this effect is significant, the value of the comfort improvements associated with commissioning will likely exceed the value of most of its other claimed benefits.

Because there is a lack of hard statistical evidence on the benefits of commissioning, there is a need for ASHRAE-sponsored research to provide this information. A study targeted at comfort benefits will begin to address this need, but only if the sample size is large enough to identify a statistically significant difference between comfort in commissioned buildings and comfort in non-conditioned buildings.

Ideally, the study would define commissioning strictly in accordance with ASHRAE Guideline 1. In reality, commissioning practice is a continuum. For the purposes of this study, commissioning is an independent, binary variable. Researchers will have to agree on a threshold of practice above which a building will be

considered commissioned. This threshold will have to be set appropriately so that enough buildings meet it to permit statistical analysis. The dependent variable to be measured is the number of Standard 55 compliance errors measured during a site visit. This measurement would need to be normalized by number of zones measured.

The successful study will offer its key conclusion in the following form: “Commissioning a building to at least the described threshold of practice will reduce Standard 55 compliance errors by xx%.”

Justification and Value to ASHRAE

Research that shows the connection between commissioning and comfort will enhance the value of both Guideline 1 and Standard 55. It will provide compelling evidence of the value of implementing commissioning, which will increase the number of practitioners who adopt Guideline 1. If the link between commissioning and comfort is real, this will in turn increase the number of buildings that successfully meet their comfort objectives. Furthermore, commissioning according to the Guideline requires documented design intent documents, which are likely to include an explicit comfort requirement—an opportunity for increased use of Standard 55.

Objective

The overall objective is to gather evidence on the connection between commissioning and thermal comfort.

The following tasks will be required:

- Agree on a level of commissioning practiced in enough buildings to permit statistical analysis.
- Identify a category of buildings from which both a sample of commissioned buildings and a control group of non-commissioned buildings can be drawn.
- Review data collected in previous studies (consult TC 2.1 for data), to calculate mean and standard deviation for the key research variable: number of Standard 55 compliance errors measured in a given building at a given time (normalized by number of zones measured in a given building).
- Use the standard deviation from previous studies to calculate a required sample size.
- Collect data on the key research variable for a sample of commissioned buildings and a control group of non-commissioned buildings
- Analyze the data and write a technical paper

E-mail: shipleym@marbek.ca

Revised: 21 January 2003

TO: Janice Peterson, Chair TC 7.9

FROM: Mike Vaughn
Manager of Research and Technical Services

CC: Wayne Reedy, Research Liaison 7.0
David Shipley, TC 7.9, Research Subcommittee Chair

DATE: December 8, 2003

SUBJECT: RTAR# 2005-56, "THE IMPACT OF COMMISSIONING ON COMFORT"

At their recent fall meeting in Atlanta, the Research Administration Committee (RAC) reviewed the subject Research Topic Acceptance Request (RTAR) and voted to return it. The reasons given are:

- *What will be included in the definition of commissioning? Excluded? Will this focus on one type of building, such as schools, or several building types?*
- *What is the value of this research to Society membership? Justification is not convincing yet-- 'research shows', which research? Please cite this research in RTAR under references*
- *Can enough buildings be sampled so that statistically significant data is obtained? Difficulties include: there are numerous other variables besides commissioning that will affect thermal comfort; continuum nature of commissioning; even in non-commissioned buildings there are user and operator adaptations that affect thermal comfort - thermostat adjustment, opening/closing curtains & blinds, etc. All of these things boost the required sample size, probably to astronomical levels.*

Please address the above comments with the help of your Research Liaison 7.0, Wayne Reedy, (wayne.reedy@carrier.utc.com or rl7@ashrae.org) if the TC decides to resubmit this research topic for possible inclusion in the Society's 2005-2006 Research Plan next August.

RESEARCH TOPIC ACCEPTANCE REQUEST (RTAR)

Title: Utilization of Random Sampling Technology in Performing Building Commissioning

Research Category: Operation and Maintenance Tools

Research Classification: Applied

TC/TG Priority: 3 (TC 7.9)

Estimated Cost: \$125,000.00

Other Interested TC/TGs: 1.5; 4.1; 4.7; 4.11

Possible Co-Funding Organizations: NIBS (National Institute of Building Sciences); BCA (Building Commissioning Association)

Handbook Chapters to be Affected By Results of this Project: HVAC Applications Chapter 42 "New Building Commissioning"

State-of-the-Art (Background):

The application of statistical techniques is well known in the manufacturing arena as well as many other areas. However, the application of this statistical approach to the application of Building Commissioning is new and misunderstood. Some organizations have had success in applying the technology, however, it has proved difficult to stimulate a larger segment of the profession to move toward this accepted principle: it is not necessary to test 100% of a population to determine the projected results, good or bad.

Advancement to the State-of-the-Art:

The advancement of the application would be beneficial from the ease and economical benefit to the commissioning practitioners and owners of buildings. This project would build on the lessons of statistical sampling in other industries, to document and test the technique as part of the building commissioning process.

Justification and Value to ASHRAE:

To provide adequate supported tested evidence the application of this statistical technique would benefit the practice of commissioning buildings and their components and systems. It is hoped that the research would lead to the development of a guide to using statistical sampling in commissioning. The guide would then become a special publication.

Objective:

The objective would be to test the statistical sampling approach in three commercial buildings: small, medium, and large. The project will:

1. Develop a documented understanding of how statistical sampling is used on actual projects, i.e., document the process itself;
2. Develop a documented understanding of how non-statistical sampling is used on actual projects, i.e., document the alternative process;
3. Compare the two options and give analysis of the benefits and disadvantages of each; and
4. Make recommendations as to when and how each should be applied.

T.C. 7.9 Long Range Planning Committee Report

Jan 24, 2004

This Commissioning process is quickly being adopted throughout the country. The Total Building Commissioning Process documents coordinated by National Institute of Building Sciences (NIBS) will expand the process into new trades and areas. The current efforts are targeted at new construction projects. The existing buildings that have not been commissioned, and are not operating properly, present additional opportunities to apply the process but with modified procedures.

We now have a rapidly expanding market for new building Commissioning and a potentially larger market for Retro-commissioning. However there are several issues challenging the growth momentum and quality in the process. These issues are:

1. Lack of documented benefits and results of commissioning. A simple understandable marketing program for commissioning to owners, architects, engineers, contractors and other users of commissioning could be developed from this data.
2. A defined skill set for trained commissioning providers.
3. Training program requirements for commissioning providers.
4. Coordination of other guidelines that are included in or support commissioning, such as: program and design phase activities, O&M data (Guideline 4), smoke control (Guideline 5), and building operations training.
5. Application tools and “boilerplate” for providers to uniformly apply the processes.
6. Interface and cooperation with other organizations in the above efforts.

To address these problems ASHRAE has the opportunity to provide needed guidance.

1. Continue the development of Guideline 0 and update revision of the 1996 issue of Guideline One and supporting user information. This effort is being coordinated with the efforts of NIBS to create a total building commissioning process.
2. The use of commissioning is often limited by the lack of marketing and knowledge of the process and its many success stories. ASHRAE should sponsor research on cost/ benefit relationship and specific results of commissioning. The result of these efforts should be a simple explanation of the need for and results of commissioning.

3. Develop or assist in the development of an educational program for owners, architects, consultants, and contractors to facilitate their participation in the process including:
 - A. Commissioning Results and Benefits.
 - B. Developing Commissioning Programs.
 - C. Commissioning Verification and Testing Methodologies.
 - D. Commissioning Documentation Requirements.
 - E. Operations Training.

3. Develop a series of commissioning related guidelines. The revision process for Guideline 0 and One is expanding the amount of information and examples included. There is a need to supplement Guideline 0 and One with additional documents to build a coordinated set of guidelines from design through building operation. See the following attachments for new guidelines being submitted.

4. Develop a listing of the basic skill sets need to provide commissioning. ASHRAE or other organization can then provide training and certifications. This should also include quality and integrity issues and interrelationships with other professionals.

5. Develop a set of training requirements to facilitate the training if commissioning providers.

6. Assist in the development of college level training in commissioning for engineering and technician programs.

7. Work with the engineering licensing boards to include commissioning knowledge in the PE exam.

PROPOSED COMMISSIONING GUIDELINES SYSTEM

Commissioning is a new process to many in the design and construction industries. It can be a very complicated process. This leads to the need for guidelines for the industry to assimilate the commissioning process.

With the near completion of Guideline '0' and the progress on the revisions to Guideline '1', additional guidelines to support these two are needed. The new guidelines should be related by organization and numbering to the existing Commissioning Guidelines. This grouping allows the coordination of the guidelines and ASHRAE then has a larger number of documents for targeted audiences.

This would result in the renumbering and revision to some existing guidelines.

The following group of guidelines is proposed:

Guideline 0 The Commissioning Process (Guideline 0)

Guideline 1.1 HVAC&R Technical Requirements for The Commissioning Process
(Presently guideline 1)

Guideline 1.2 Technical Requirements for Commissioning Existing Building HVAC&R
Systems

Guideline 1.3 Preparation of Owners Project Requirements and Basis of Design
Documents for HVAC&R Systems Commissioning

Guideline 1.4 Preparation of Building Systems Manuals and OEM Documentation for
HVAC&R Building Systems Commissioning (Presently guideline 4)

Guideline 1.5 Technical Requirements for Commissioning Smoke Exhaust Systems
(Presently guideline 5)

Guideline 1.6 Technical Requirements for Commissioning Building HVAC&R Controls
Systems

Guideline 1.7 Training for Building Operation and Maintenance for the HVAC&R
Commissioning Process

Guideline 1.8 Technical Requirements for Commissioning of Medical and Laboratory
Facility HVAC&R Systems

Guideline 1.9 Commissioning for the LEED[™] Program

Guideline 1.10 Training for the Commissioning Process

Proposed ASHRAE Guideline

Title: Technical Requirements for Commissioning Existing Building HVAC&R Systems

1. Purpose: The purpose of this guideline is to provide a recommended process for the commissioning of existing building HVAC&R systems.

2. Scope:
 - 2.1 The procedures, methods and documentation requirements in this guideline cover the commissioning process for all types of existing HVAC&R systems for buildings. The advantages of and need for existing building system commissioning, and an explanation of commissioning process variations for existing buildings are detailed.

 - 2.2 This guideline provides procedures for the development of:
 - (a) Owner's project requirements for existing systems.
 - (b) Processes for documentation of existing systems and equipment
 - (c) Commissioning and testing plans for existing systems
 - (d) Verification and functional and performance testing for equipment and systems
 - (e) Training programs for operating and maintenance personnel
 - (f) Documentation processes

Cognizant TC: 7.9

Guideline Committee Chair: Richard B. Casault, PE, 02021028

Proposed ASHRAE Guideline

Title: Preparation of Owner's Project Requirements and Basis of Design for the HVAC&R Commissioning Process

1.Purpose: The purpose of this guideline is to describe the methodologies, formats, and minimum requirements for developing owner's program requirements, basis of design, and related documents to define the use, function, and operation of building HVAC&R systems for the commissioning process.

2. Scope: 2.1 The guideline will include:

- (a) owner's workshop procedures,
- (b) methods and checklists for the development decision process,
- (c) participants and their function,
- (d) approval and revision processes,
- (e) document formats and processing,
- (f) the use of the owner's project requirements documents for production of the basis of design.
- (g) basis of design development
- (h) use of owner's project requirements and basis of design documents for design and construction phases.

Cognizant TC: 7.9

Guideline Committee Chair: Jeff J. Traylor, 05207160

Proposed ASHRAE Guideline

Title: Training for Building Operation and Maintenance for the HVAC&R Commissioning Process

1.Purpose: The purpose of this guideline is to provide methodologies and formats for developing training plans and conducting training programs during the commissioning process for operation and maintenance of building HVAC systems.

2. Scope: 2.1 The procedures, methods and documentation requirements in this guideline cover the development of training plans, gathering training materials, and conducting training programs for building HVAC system operation and maintenance personnel

2.2 The guideline will include:

- (a) Instructions for the development of training requirements and plans,
- (b) Testing and verification of personnel training needs and results,
- (c) Training formats and examples of plans and training records,
- (d) Sources and development of training material,
- (e) Methods for conducting training,
- (f) Evaluating training programs,
- (g) Recording training,
- (h) Retraining.

Cognizant TC: 7.9 and 7.3

Guideline Committee Chair: Walter T.Grondzik, 00281691

January 24, 2004

Janice C. Peterson
2743 SE 31
Portland, OR 97202

The Manager of Standards
ASHRAE
1791 Tullie Circle, NE
Atlanta, GA 30329

Subject: Proposed New Guidelines

Dear Standards Manager,

The following outline and proposals are submitted to initiate the guideline formation process on three new guidelines. These new guidelines are in support of the Commissioning Process and are intended to have a related number system as used in the 40, 62, and 90 series.

The proposed series and the title, purpose and scope of the three new guidelines were approved by Technical Committee 7.9, Commissioning, at the Kansas City meeting in June 2003 by a vote of 10/0/0. The proposed guideline 1.7 on Training for Maintenance was also approved by TC 7.3 at the same meeting.

As the current Commissioning Guidelines are being completed, we are recognizing the needs and requests for additional direction in development of specialty areas in the commissioning process.

Sincerely,

Janice C. Peterson
Chair TC 7.9