

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

1791 Tullie Circle,
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TC/TG/TRG MINUTES COVER SHEET

(Minutes of all TC/TG/TRG Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/TRG NO.	TC6.1	DATE	February 26, 2013
TC/TG/TRG TITLE	Steam and Hydronic Systems		
DATE OF MEETING	January 29, 2013	LOCATION	Dallas, TX

MEMBERS PRESENT	YEAR APPT	MEMBERS ABSENT	YEAR APPT	EX-OFFICIO MEMBERS & ADDITIONAL PRESENT
Voting		Voting		
Ramez Afify	2011			
Jason Atkisson	2011			
Tricia Bruenn	2009			
John Glunt	2009			
Trevor Houck	2010			
Julia Keen	2010			
Michael McDermott	2011			
Ken Luther	2011			
Rex Scare	2011			
Steve Tredinnick	2009			
Edward Tsui	2011			
Corresponding		Corresponding		VISITORS PRESENT
Robert Bean	2005	Roy Ahlgren	2009	Lam Duong
Niels Bidstrup	2009	Raymond Albrecht	2002	Robert Glass
Tom Cappellin	2010	Steve Anthony	2011	Ulf Johansson
William Coad	2007	Charles Arnold	2003	Jack Kang
Kim Cross	2010	Gil Avery	2006	Joanna Mauer
Hooman Daneshmand	2011	Peter Baade	2008	Jennifer McGrath
Scott Fisher	2011	Donald Bahnfleth	2006	Hailey Mick
Hans Hansen		William Bahnfleth	2007	Thomas Olmsted
Gary Harbison	2013	David Bixby	1994	Mark Owen
Mark Hegberg	2011	Albert Black	1987	Gay Powell
Larry Konopacz	2008	Cyrus Blackmore	2007	Alison Williams
David Lee		Jeffrey Boldt	2010	Aykut Yilmaz
Frank Myers	2007	Thomas Butcher	2010	
Thomas Neill	2011	Michael Collarin	2010	
Michael O'Rourke	2011	Kelly Cramm	2006	
Reddy Palicharla	2011	Vikram Doshi	1996	
Donald Prather	2010	Fredric Goldner	2009	

Earl Rightmier	2005	Farhad Golestan	2010	
Mick Schwedler	2011	Wilbur Haag Jr.	1995	
Greg Towsley	2009	Richard Hegberg	2010	
Robert Walker	2010	Martha Hewett	2009	
		Kevin Hoey	2003	
		Joseph Hoose	2005	
		Chris Jacques	2010	
		Miha Kavcic	2007	
		Jack Kersten	1996	
		Trace Laux	2010	
		Evans Lizardos	2010	
		Thomas Logan	1996	
		Kenneth Magsam	2010	
		Zoltan Magyar	2005	
		Terrence Moses	2001	
		Mark Mueller	1999	
		Marc Neufcourt	2009	
		Drew Overmiller	2008	
		Earl Rightmier	2005	
		James Rishel	1987	
		Brent Ross	2005	
		Aniruddh Roy	2009	
		James Schlachter	2008	
		William Schulte	2011	
		Alexander Sleiman	2006	
		Alpdeniz Soysal	2011	
		Harvey Stenger	2010	
		Kevin Stuart	2010	
		Bodh Subherwal	2010	
		Joseph Thuman	2007	
		David Tree	1999	

All Members of TC/TG/TRG plus the following:

TAC Section Head:	John Dunlap, PE
TAC Chair	Charles Culp, III
All Committee Liaisons as Shown on TC/TG/TRG Roster	ALI/PDC - John Nix, II
	Handbook Fundamentals – Forrest Yount
	Handbook Fundamentals – David Yuill, PE
	Research – Stephen Hancock
	Special Publications – William Fleming
	Standards – James Vallort
Manager of Standards	Stephanie Reiniche
Staff Liason/Research/Tech Services	Michael Vaughn

MEETING MINUTES

TC 6.1 Hydronic and Steam Equipment and Systems

Dallas, TX

January 29, 2013

1. Call to Order:

Chair Keen called the meeting to order. The Chair welcomed all in attendance, and self-introductions were made. An attendance sheet was passed and signed by those in attendance. A quorum was present with attendance by 11 of 11 voting members (2 voting members arriving late), including 1 non-quorum voting member..

Technical Committee 6.1 is concerned with all aspects of hydronic and steam systems. This includes the application of boilers, chillers, terminal units, and all accessories and controls making up the total system as well as the design of the integrated system. In addition to comfort applications of both heating and cooling, snow melting systems are included. Cooperation with other TCs is recognized in areas such as control, noise and vibration, refrigeration, pumps and hydronic and service water piping.

2. Setting of the Agenda:

The Chair passed out an updated Agenda. Motion by Rex Scare, seconded by Jason Atkisson to approve the agenda. Motion passed 8-0-1.

3. Approval of San Antonio Meeting Minutes

Motion by Ken Luther, seconded by John Glunt to approve the San Antonio 2012 meeting minutes. Motion passed 9-0-1.

4. Recognition of Liaisons:

No liaisons were present.

5. Chair's Report

Chair Keen summarized the key items from the Section 6 Breakfast.

- (a) All members need to update their bios on the ASHRAE website.
- (b) TCs have been asked to review their membership lists to insure all listed are active and interested in remaining a member of the TC.
- (c) A new award is being established for the 'best TC'.
- (d) A PowerPoint presentation has been developed to explain the role and responsibilities of TCs to the local ASHRAE Chapters. TC members

are being asked to present this at their local chapters. A link to this presentation “Presentation Template for TC Members to use with ASHRAE Chapters” can be found on the ASHRAE Technical Activities Committee website <https://www.ashrae.org/standards-research--technology/technical-committees>.

- (e) The ASHRAE Code of Ethics approved on 1/31/07 was read. It is attached to these meeting notes.
- (f) Multitask groups are being established between multiple TCs. No one present is participating in one.

6. Sub-Committee Reports

- A. Programs: Mike McDermott (Chair). Subcommittee meeting minutes of January 28, 2013, are attached.

Chair McDermott reviewed the two programs sponsored by TC 6.1 at this meeting [Seminar 3 – Fundamental Pipe Selection and Control; and a Technical Paper – Pumping System Bypass Orifice Testing and Analysis].

A look ahead for the Denver, New York, and Seattle programs is attached.

Ken Luther suggested perhaps TC 6.1 could participate in a seminar in New York regarding tall buildings, perhaps co-sponsoring with TC 9.1 – Large Building Air-Conditioning Systems.

Ideas for future programs are always welcome to Mike McDermott.

- B. Research: Tom Cappellin (Chair). Subcommittee meeting minutes of January 29, 2013 attached. This includes updates from the Research Chairs Breakfast Meeting.

(Discussion of SPC155/RP196 is located under G. Standards of these meeting notes.)

- C. Handbook: Rex Scare (Chair). Subcommittee meeting minutes of January 28, 2013, attached.

Chair Scare circulated a sign up list for editors/reviewers for upcoming 2016 chapters. A copy of the assignments is attached. Also, any corresponding member not in attendance is welcome to volunteer and become part of the editing/review process.

Discussion continued on merging Fundamentals Chapter 22 – Pipe Sizing and Systems Chapter 46 – Pipe, Tubes, and Fittings into a single ‘Hydronic System Pipe Design’ Chapter in Fundamentals. The Systems Chapter 46 will be deleted beginning with the 2020 Handbook.

Approval was received from the ASHRAE Handbook to create a Chilled Water Plant Design Chapter. Steve Tredinnick is the editor for this chapter.

Chair Scare thanked Mick Schwedler for his work on the edits for Chapter 13(S) – Hydronic Heating and Cooling.

Bob Walker provided a report from TC 1.4 – Control Theory and Application regarding the coverage of control valves in both TC 1.4 and TC 6.1's Handbook chapters. Control valves (sizing, selection, etc.) will remain in Chapter 47(S) – Valves, while TC 1.4 will address the control of the valves in their chapters.

D. Chilled Water Sub Committee : Steve Tredinnick (Chair).

Chair Tredinnick stated the work on the new Handbook chapter on Chilled Water Plant Design scheduled for 2016 has begun.

Bill Coad questioned what the definition between a chilled water plant and a chilled water system would be for purposes of the chapter. Chair Tredinnick said the chapter is to be focused on the overall design of the chilled water plant. Julia Keen stated the single chapter could be used as the beginning of a complete design guide for chiller water plant design.

Frank Myers suggested incorporating the pipe sizing guidelines established by 90.1.

E. Membership: John Glunt (Chair). Chair Glunt reports the roster for TC 6.1 goes into effect after the June meeting in Denver. The terms of two voting members end after the June meeting.

Julia Keen reminded the visitors to the meeting to access the ASHRAE website to become a corresponding member of TC 6.1.

F. Professional Development (ALI). Greg Towsley (Chair): Chair Towsley reports there are no actions for the TC from the Professional Development Committee.

SDL 7 is at ASHRAE for review and typesetting before moving forward with the SI Version.

The SDL 12 contract awarded to Mark Hegberg is still in process.

G. Standards: Mike O'Rourke (Chair).

Standard 55: Chair O'Rourke reported it is in continuous maintenance mode. The group is working to get the standard in a more readable format. The last few sections have been approved and public review is planned. The goal is to republish the standard this year. Standard 55 has been approved as an ASHRAE Standard and the preparation of a user's manual has been approved by ASHRAE.

Standard 155/RP196: Frank Myers reports Martha Hewlett is retiring as chair and Tom Bucher will replace her as the chair. Myers asked the committee to honor Martha with a round of applause for the work she's done on this standard. A memorandum of understanding has been signed by ASHRAE and AHI for the joint standard. There is a proposal to stay with combustion efficiency as the standard, Myers is chairing a working group to define the test methodology (combustion efficiency vs. thermal efficiency). Due to the length of time the TC may be asked to vote on the original contract either in Denver or by electronic ballot.

Greg Towsley reported on 90.1.

Addendum ak

- o Public review ended 25 June 2012; 8 commenters and 21 comments
- o Working Group formed, developed a revised proposal, approved by TC6.1, and submitted to 90.1 MSC for consideration for 2nd public review
- o 90.1 MSC review submittal in October 2012 – “thought at first it would be fine since so many of the requirements were the same as the current language, but...it has a lot of problems.”
- o Modified ak with minor changes:
 - § deleted the DP reset off valve position – “since it was effectively deleted by the exception that said it was not required if supply water temperature was reset off valve position. But since the latter is required, then the former was always true and the DP reset never was required.”
 - § deleted 6.5.4.2 since it is the subject of a proposed addendum (Pump Isolation)
- o Continues to be a disagreement as to the control method that cannot get resolved
- o November 14, 2012 - A 2nd public review draft was created from changes above with a letter ballot.
- o Nov 30, 2012 – MSC letter ballot ended, had negative vote with comment, will require recirculation ballot.
- o Jan. 1, 2013 - recirculation ballot issued in MSC
- o Jan. 19, 2013 – Confirmed that 2nd PR passed MSC with one member dissenting - MSC to work compromise with dissenter before bringing to main SSPC

Bill Coad discussed the proposal for all chilled water pumps to have inverter drives. Greg Towsley reported 90.1 requires hot and chilled water systems with a total of 10hp and larger to have inverter drives. Ken Luther asked if other methods are allowed besides variable speed drives.

Addendum br (motor efficiency)

- o Update current motor efficiencies
- o Public Review ended; no comments above with a letter ballot.

Addendum cd (piping definition)

- o Current standard “piping” is required to have minimum levels of insulation, pipe sizes, etc. In all cases, the intent was that the same requirements also apply to all of the piping accessories that are in series with the piping that also sees fluid flow, such as pumps, valves, strainers, air separators, etc.
- o cleans all “piping” and “pipe” wording in 90.1
- o 1 comment, withdrawn

Pump Isolation Proposal

- o Reducing pump energy; shut off flow through inactive chillers/boilers;
- o Submitted to the SSPC for their approval for publication for public review during the main SSPC 90.1 - unable to bring to vote

Greg Towsley also updated the following from the last meeting.

- Framework document was placed on the DOE website Friday, January 25, 2013. The document is 134 pages with 111 requests for information from the DOE. It involves test procedures and energy efficiency standards for pumps. The public hearing is February 20, 2013. The preliminary analysis is expected in 2014.
- NOTE: In Section 11, the DOE is requesting comments from “user subgroups” if they will be “affected disproportionately by new or revised energy conservation standards”.

H. WEB Site: Jason Atkisson (Chair) Chair Atkisson stated the website has been updated with all but the recent corresponding member changes. That will occur soon.

7. Liaison Reports from other TC’s and Organizations.

There were no reports.

8. Old Business:

Carlson/Holohan Industry Award of Excellence. John Glunt reported ASHRAE has been asked to make this a society award. Typically the Society only allows an award to be named after a person in exception instances. Also, there are questions regarding who will keep possession of the wheel.

Robert Bean reports Holohan has offered to take his name off the award, but some previous winners are uncomfortable with this. This work is on-going. Robert Bean also suggests the wheel go to either the Smithsonian or ASHRAE Museums.

Bill Coad report Gil Carlson received the Pioneer of the Industry Award. He stated the Society would be happy to protect the wheel, but the artifact (wheel) needs to be separated from the award.

Guideline 8 Energy Cost Allocation for Multiple-Occupancy Residential Buildings: Chair Keen reported Adam Hinge states the guideline is out of date and there have been no requests to update the guideline. Mark Hegberg and Mike O'Rourke reviewed the document after a request was brought forward at the Annual Meeting in San Antonio. Both felt the document was so out of date that a complete overhaul would be required but there is concern Guideline 8 is no longer being referenced by the industry.

Bill Coad provided some history of the guideline. He stated it was originally intended to be a standard. The document was based on European district heat systems from 25 years ago utilizing low temperature hot water for heating.

Steve Tredinnick stated he would like to review the document prior to deciding either updating or discontinuing the guideline.

Chair Keen asked if anyone is referencing or using this guideline. There was no acknowledgement the guideline was in use.

Motion by John Glunt, seconded by Ken Luther, to discontinue Guideline 8. The motion passed 7-0 with 4 abstentions. Chair Keen stated Adam Hinge will be advised to remove it from the list of current guidelines.

Status of new pump efficiency standard: Framework document was placed on the DOE website Friday, January 25, 2013. The document is 134 pages with 111 requests for information from the DOE. It involves test procedures and energy efficiency standards for pumps. The public hearing is February 20, 2013. The preliminary analysis is expected in 2014. NOTE: In Section 11, the DOE is requesting comments from "user subgroups" if they will be "affected disproportionately by new or revised energy conservation standards".

9. New Business:

- A. Chair Keen thanked the committee for their quick response to the various e-mails asking for comments over the past six months.
- B. Chair Keen invited the guests attending the meeting to become involved with the work of TC 6.1.
- C. Chair Keen thanked everyone for their time and commitment to the work of the committee.
- D. Robert Bean thanked the committee for the efforts of the snow ice melt program (TC6.5) in San Antonio.

10. Meeting Adjournment:

Motion by Jason Atkisson, seconded by Tricia Bruenn, to adjourn the meeting.
Meeting adjourned at 3:14pm.

Submitted by,
Bob Walker.
TC 6.1 Secretary

**DALLAS MEETING MINUTES
PROGRAMS SUBCOMMITTEE**

ASHRAE TC 6.1 “HYDRONICS AND STEAM HEATING EQUIPMENT AND SYSTEMS”

- A. Meeting called will be called to order at 2:15 pm, 28 Jan 2013 at Dallas, by Mike McDermott
- B. Members and Visitors projected attendance

	Name	Position
1.	Mike McDermott	Programs Subcommittee Chair
2.	Julia Keen	Chair
3.	Rex Scare	Member
4.	Niels Bidstrup	Member
5.	Scott Fisher	Corresponding Member
6.	Tricia M. Bruenn	Vice Chair
7.	Bob Walker	Secretary
8.	Rex Scare	Handbook Committee Chair
9.	Tom Cappellin	Research Subcommittee Chair
10.	Jason Atkisson	Web Master
11.	Edward Tsui	Corresponding Member
12.	Hooman Daneshmand	Corresponding Member
13.	Ramez Afify	Member
14.	Hans Hanson	Corresponding Member
15.	Jeff Boldt	Visitor

- C. Current and future programs will be discussed.
 - 1. We have two (2) programs that were presented in Dallas.

Development of Fundamentals for HVAC Design and Modeling

Track: HVAC&R Systems & Equipment

Room: Dallas A3

Chair: Daniel Fisher, Ph.D., P.E., Fellow ASHRAE, Oklahoma State University, Stillwater, OK

Fundamental research is paramount for the development of predictive models and design for HVAC systems. Novel methods for determining fundamental information required for such design and modeling are presented.

Learning Objectives: 1. Understand the special care required for the low speeds and subtle buoyancy effects encountered in hospital operating rooms. 2. Learn how the MRT is typically measured and the problems encountered in measuring MRT. 3. Discuss the conclusions resulting from a study regarding of the effect of lubricant on the distribution ratio of moisture between the vapor and liquid phases of a refrigerant or “K value”. 4. Describe situations when bypass orifices are used to reduce pressure in fluid flow.

4. Pumping System Bypass Orifice Testing and Analysis (DA-13-010)

Greg Towsley, Arturo Benaventez and Ronald L. Dougherty, Ph.D., P.E., (1)Grundfos Pumps Corp., Olathe, KS, USA, Olathe, KS, (2)ConocoPhillips, Tananger, Norway, (3)Department of Mechanical Engineering, University of Kansas, Lawrence, KS

Bypass orifices are used to reduce pressure in fluid flow for a variety of situations, specifically wherein variable flow rates are not available. As compared to studies regarding venturis, square-edged orifices and similar devices, much less is known about performance of orifice configured similar to pipe nipples, or “nipple orifices”. Thus, in most cases, the system designer chooses a nipple orifice based on assumed losses, which have a discharge coefficient of about 0.6. However, it is important in such situations to have additional information in order to optimally design these systems for minimum energy consumption. Herein, data and design information is presented for pressure drop as a function of flow rate for nipple orifices ranging from 1/8 inch to 7/8 inch (3.2 mm to 22.2 mm) diameter in pipes ranging from nominal 1/2 inch to 1 1/2 inch (12.7 mm to

38.1 mm) diameter. Curve fits accuracy for the data are given are within $\pm 25\%$ for flow rates above 20 gpm (4.54 m³/hr), and range as high as $\pm 40\%$ for lower flow rates. Discharge coefficients are also presented as a function of Reynolds Number. It is shown that there appears to be no clear trend in the data as a function of Reynolds Number. However, multiplying Reynolds Number by factors of diameter ratio and orifice diameter yields a trend that could be used in nipple orifice system design. Discharge coefficients can be predicted reasonably well, with the general error for all orifice-line sizes studied herein being $\pm 5\%$ (with 77% confidence). The results presented herein can be used to develop discharge coefficient predictions with other errors and confidence levels. For future work, more data is needed on large orifices-line combinations. Needed then are theoretical studies to understand the basis for modifying pressure drop and/or Reynolds Number by functions of diameter ratio and/or orifice and line diameters. This and future work will then be able to provide basic data to develop modeling and software tools to allow the optimum orifice to be selected to minimize energy waste. In addition, future effort should be focused on the comparison of variable speed pump system design, not needing flow restrictors like nipple orifices, with constant speed pump system design, with some type of flow restrictor.

SEMINAR 3 (BASIC)

Fundamental Pump Selection and Control

Track: HVAC Fundamentals and Applications

Room: Dallas C

Sponsor: 06.01 Hydronic and Steam Equipment and Systems

Chair: Julia Keen, Ph.D., P.E., Member, Kansas State University, Manhattan, KS

This seminar provides a quick review of common centrifugal pump types installed in HVAC systems and how they are selected, operated and controlled. It describes how to read and interpret manufacturers pump curves for a wealth of information.

Learning Objectives: 1. Describe how a centrifugal pump operates to create flow and head. 2. Identify the common types of pumps used in HVAC Systems. 3. Describe the difference between open loop and closed loop pumping systems. 4. Explain how to construct system curves and utilize them for proper pump selection. 5. Describe key selection criteria for proper pump selection. 6. Describe how variable speed pumps operates in HVAC systems.

1. Centrifugal Pumping and Pump Types

Reddy Palicharla, Aurora Pump/Pentair Water, North Aurora, IL

This presentation gives an overview of the centrifugal pump types used in HVAC systems. It shows how to select and size the right pump for a certain application and duty and how to select and size the motor. It explains the basic centrifugal pump curves describing the relation between flow, head, power and efficiency and explains importance of Net Positive Suction Head Required (NPSHR). Furthermore this presentation shows how to optimize pump performance and save energy by trimming the impeller.

2. Pump Selection for Open and Closed Loop Systems

Larry Konopacz, Xylem Bell & Gossett, Morton Grove, IL

In HVAC systems both open and closed loop systems exists. This presentation show the basic principles behind pumping in open and closed loop systems. It explains how to construct system and underscore the importance of an accurate system analysis and the impact it has on proper pump selection. It explains the difference between static pressure and differential pressure and the related systems curves. It shows the importance of dealing with vapor pressure and avoiding cavitation in the pump. Furthermore it explains how to select and size pumps running in parallel for a certain duty point.

3. Differential Pressure Controlled Pumps

Niels Bidstrup, Ph.D., Grundfos Management A/S, Bjerringbro, Denmark, Bjerringbro, Denmark

Differential pressure controlled pumps are widely used in large HVAC applications in commercial building. The purpose is to reduce energy consumption and improve control performance of actuators in the system. These pumps are typically controlled via pressure sensors situated near the pump or somewhere else in the distribution system. In small commercial buildings and residential buildings fixed speed pumps are typically used instead due to easier installation and cost. For these systems the same benefits can be achieved by using pumps with built-in differential pressure control. This presentation explains how these pumps are operated and controlled.

2. Feedback from CEC on rejected programs
3. See attachment 1 look ahead spread sheet for future programs.
4. For detailed information on how the above programs as to be assembled and submitted visit ASHRAE's web site for information and direction.
5. Meeting minutes from forum in San Antonio are included as attachment 2.

D. Adjournment of subcommittee at 4:15 pm.

TC -6.1 Programs Look Ahead - Dallas 2013 Meeting

Year	2013	2013
Date	Jan 26-30	June 22-28
City	Dallas	Denver
Tracks	www.ashrae.org/dallas/	www.ashare.org/denver/
1	HVAC & R Systems and Equipment	HVAC & R Systems and Equipment
2	HVAC & R Fundamentals and Applications	HVAC & R Fundamentals and Applications
3	Standards, Guidelines and Codes	Research
4	Energy Conservation	Integrated Project Delivery
5	Refrigeration	Energy Modeling
6	Large Building Design	Mile High Efficiency & Equip
7	Facility Management: Ops, Tech and Energy Improv	Renewable & Alt Energy Sources
8	Special Interest Track	
Technical Paper	Paper: April 16, 2012 Pump System Bypass Orifice Testing and Analysis-Greg Towsley - Tech Paper Session 3	Paper: September 24, 2012
Conference Paper	Abstract: March 19, 2012; Paper: July 9, 2012	Abstract: Sept. 24, 2012; Paper: Feb. 25, 2013
Seminar	Proposal: August 13, 2012 Fundamental Pump Seelction and Control - Julia Keen/Neils Bidstrup/Larry Konopacz/Reddy Palicharla - Seminar 3 (Basic)	Proposal: February 11, 2013 Chilled water systems for YEA members: What the Gen Xers and baby boomers have done wrong (Jason/Mick Schwendler)
Forum	Proposal: August 13, 2012	Proposal: February 11, 2013 Chiller Plant Contol Fundamentals and Optimization - Ed Tsui Building owners to share stories about Hydronic HVAC Systems - What works and doesn't work - Mike/Bill Coad

RESEARCH SUBCOMMITTEE REPORT
ASHRAE TC 6.1 "Hydronic & Steam Heating Equipment & Systems"
ASHRAE WINTER CONFERENCE – Dallas, TX
Monday, January 28, 2013
Thomas E. Cappellin – Chair

Notes from Research Subcommittee Chair's Breakfast:

1. Herman Behls, P.E., FASHRAE was presented with ASHRAE's "Service to ASHRAE Research" award.
 - a. Nominated by TC 5.2 "Duct Design" committee.
 - b. Mr. Behls joined ASHRAE in 1965.
 - c. During the past 5 years, Mr. Behls:
 - i. Authored 3 RTARS and 5 Work Statements (WSs).
 - ii. Was PES/PMS Chair for TC 5.2 research projects.
 - iii. Was Research Chair for TC 5.2 for 10+ years.
 - iv. Lead effort to complete RP-1180 "Duct Design Guide" using TC volunteers after project was terminated with contractor.
2. ASHRAE's Current Projects:
 - a. 62 active RPs having total value >\$ 12 million.
 - b. Since June, 2012:
 - i. 8 projects were completed.
 - ii. 10 ne projects were started.
 - iii. 6 Tentative Research Projects (TRPs) were released for bid.
3. WS and RTAR Status as of Dallas Meeting:
 - a. RAC evaluated 3 RTARs (1675 – rejected, 1629 – conditional accept, & 1692 - returned).
 - b. RAC evaluated 4 WSs (1498 – returned, 1609 – conditional accept, 1629 – returned, & 1682 – returned).
 - c. There are 7 potential TRPs ready for bid in spring 2013.
 - d. There are currently no WSs waiting to be released.
4. Why do RTAR's get returned?
 - a. Most common reasons:
 - i. Idea not appropriate for ASHRAE funding.
 - ii. Not adequate references to past work or existing literature.
 - iii. Not clear how project will "advance" the state-of-the-art.
 - iv. Budget does not seem in line with work to be completed.
 - b. Research SC Chairs strongly encouraged to get feedback from Research Liaison during their breakfast meeting
5. RTAR and WS requirements are being updated:
 - a. RAC is very serious in trying to reduce the effort of TCs in preparing RTARs and WSs.
 - b. RAC is working on making revisions to both RTAR and WS submission format.
 - c. "Acceptance of RTAR is no guarantee that WS will be funded."
6. 9 Unsolicited Research Proposals (URPs) are currently under review by RAC for funding with assistance of TC/TG/SSPCs.
 - a. 6 have been rejected – 3 others remain under review.
 - b. URPs keep increasing (there were 5 submitted in 2012).

- c. Some PIs and TCs may consider this method as a short cut, however this URP route is considered only acceptable in exceptional cases (RAC will clarify this in the near future).
 - d. Generally, there are 3 types of URPs: Extension of completed ASHRAE completed research, revision of a special publication, and for new research.
 - e. URPs must be sponsored by a TC.
 - f. The shortcut method may not be acceptable if the relevant TC is not supportive.
 - g. RAC advises that an URP be converted into a WS, in cooperation with the TC.
7. Grants-In-Aid Update:
- a. Each grant will be in the amount of \$10,000.00.
 - b. A letter announcing the availability of ASHRAE Grants-In-Aid for Graduate students was sent to over 300 colleges in October, 2012.
 - c. 63 candidates applied for a grant. 21 were selected by the Research Planning Subcommittee (RPS). During the previous year, 65 applications were submitted and 21 were selected for a grant.
 - d. RPS is working to revise wording and guidelines for future Grant programs.
8. Ricardo J. Da Silva Lima (Ecole Polytechnique Federale de Lausanne, Switzerland) was presented with ASHRAE's "Homer Adams" award.
- a. Award is meant for deserving graduate students who participated in an ASHRAE sponsored RP. This was RP-1444 "Heat Transfer and Two-phase Flows."
9. Dr. Panagiota Karava (Purdue University) was presented with ASHRAE's "New Investigator" award.
- a. 7 persons were nominated for this award in 2012. There were 5 nominations during the previous year.
10. ASHRAE plans to award Innovative Research Grants (IRGs).
- a. 2012 was the first time that IRGs were open for bids. 18 pre-proposals were received; 5 were invited to submit full proposals; none were awarded.
 - b. Language, guidelines, and timeline were modified for the 2nd round.
 - c. RAC discussed the 18 pre-proposals during their meeting in Dallas.
11. ASHRAE's Research Strategic Plan 2010-2015 is the most current and should be used for reference.
- a. New plans will be on an 8-year update cycle.
 - b. A new committee will be formed to prepare the next plan in July, 2015. This should be a driver to identify directions of RTARs and WSS.
 - c. RAC strongly encourages the submission of holistic research projects such as "sustainability."
12. ASHRAE is planning a Denver seminar/forum entitled "How Can I Participate in the ASHRAE Research Program?"
13. Nominations to be considered for RAC Membership should be E-mailed to Mike Vaughn (mvaughn@ashrae.org). Self-nominations are welcome.
14. TCs are encouraged to generate more research.
- a. The number of RTARs (3) and WSS (4) for RAC to evaluate was quite low which may cause a shortage of promising research projects in the near future.
 - b. It takes between 1-2 years before a WS is accepted and a Tentative Research Proposal is ready for bidding.

- c. If insufficient proposals are received during 2012-2013 ASHRAE may run out of projects.
15. TC Research Subcommittees are urged to work with their Section Liaisons when preparing RTARs and WSs.
- a. The Liaison should read the RTARs and WSs before they are submitted to RAC. This should be done at least a week prior to RAC's submission deadline.
 - b. The Liaison is able to provide answers to the process requirements and help interpret RAC's comments and the Research Manual.
16. Research Liaison Names for each Section:
- 1 – Arthur Giesler
 - 2 – David John
 - 3 – Mark Spatz
 - 4 – Srinivas Garimella
 - 5 – Piotr Domanski
 - 6 – Stephen Hancock
 - 7 – Phillip Haves
 - 8 – David Yashar
 - 9 - Kishore Khankari
 - 10 – Pradeep Bansai
17. RAC considers that a research project having an estimated budget of \$50K will normally represent a period of six months to complete.
18. If a research project's budget is estimated to exceed \$250K it will require full ASHRAE Board approval. It may be better to split the project into two smaller parts that complement each other but are not redundant.
19. If a proposed research project will enable an update to the Handbook or Standard, it may receive a more favorable grading from RAC.
20. If a research project is considered high priority, and needs to be advanced as quickly as possible, it may be submitted in Work Statement format and bypass the RTAR process. This procedure may speed up acceptance from RAC

NOTES FROM RESEARCH SUBCOMMITTEE MEETING:

1. Scott Fisher RTAR:

Scott has finalized a draft version of his RTAR titled "Comparison of Computational Methods of Flexibility Analysis to Computer Modeling to Determine Thermally Developed L-Bend and U-Bend Anchor Forces."

The results will be used to update the anchor force equations presently provided in the 2012 version of Systems Handbook Chapter 45.

This RTAR was unanimously accepted by the Research Subcommittee during the San Antonio meeting and also unanimously approved by the full TC 6.1 Committee voting members during the Dallas meeting.

RAC has tagged this RTAR with tracking number 1695. This number is to be used going forward in correspondence and inquiries regarding this project.

2. TC 6.1 voting members have previously voted to not co-sponsor a Work Statement request from TC 1.4 "Control Theory and Application" titled "Control Valve Selection for Improved Controllability." However, TC 1.4 has requested TC 6.1 Secretary Bob Walker to advise TC 6.1's research subcommittee to re-consider their request and mutually coordinate a revision to the WS's intent and format. TC 6.1's Research Subcommittee will review a newly prepared request from TC 1.4 when it is received.
3. Mehdi Shahrestani (University of Reading in the U.K.) has previously (San Antonio Annual Meeting) requested TC 6.1 to consider a research project titled "Developing a New Model for Dynamic Simulation of Hydronic Systems." Mehdi's research project deals with developing a computational method of comparing simulations of constant flow hydronic systems to variable flow systems, including all components (pumps, control valves, balancing valves, heating/cooling coils, pipes and fittings). The research project is intended to provide an accurate modeling and precise performance evaluation of Hydronic systems.

Mr. Mehdi will prepare an RTAR for review by TC6.1 research subcommittee during the Denver Annual meeting.

4. A request has been submitted by TC 5.3 "Room Air Distribution," for TC 6.1 to co-sponsor an RTAR that addresses best controllability of fan-coil unit control valves (modulating and 2-position) and how to accurately document coil control valve fluid pressure drops that can be field measured and verified.

TC 6.1 is presently waiting for a written request from TC 5.3 that provides more detail pertaining to intent and format of this proposed RTAR.

5. Justin Westmorland has volunteered to author a proposed RTAR titled "Steam System versus Heating Hot Water Efficiency Comparison." This research project would include site energy and power plant source energy together to produce a total energy and CO² comparison. The resulting comparison may be helpful with new "Green" design standards and Federal MACT requirements.
6. Review of additional topics for development into RTAR submittals:
 - a. Copper Tube Fitting Flow Factors and the Hydronic Coil Characteristic Modeling (Mark Hegberg).
 - b. Allowance for Aging in Steel and Iron Pipes installed in open hydronic piping systems (Scott Fisher).
 - c. Establishing good practice design for minimum and maximum copper tube fluid velocity utilized in open and closed hydronic systems. This would establish values for designers to consider in order to prevent oversizing the piping (too low velocity) or advancing wear of the internal pipe surfaces (too high velocity). This may be a project needing coordination with the Copper Tube Piping Association.
7. Motion was tendered to adjourn (and unanimously accepted) the TC 6.1 Research Subcommittee meeting.

END OF MINUTES

Attachment: Attendance Sign-in sheets – two pages.

ATTENDANCE LIST
ASHRAE TC 6.1 HYDRONIC & STEAM HEATING EQUIPMENT & SYSTEMS - "RESEARCH" SUBCOMMITTEE

3:15 - 4:15pm - January 28, 2013 - Dallas Ballroom A1 (CC1)

Name	Company and Address	Committee Position	Preferred Phone or E-mail Address
Thomas E. Cappellin	E.L. Pruitt Company Inc. 3090 Colt Road Springfield, IL 62707	Subcommittee Chair	tcappellin@msn.com
Steve Hancock	TECH RESEARCH 6200 TRAPP HWY TYLER, TX 75707	TECH RESEARCH CHAIRMAN	Steve.Hancock@teco.com
Tricia M. Buenn	Belimo 430 Old Ridgebury Rd Danbury, CT 06811	Vice-Chair	tricia16@msn.com
Bob Walker	BELIMO 1475 ST LAWRENCE CT FENTON, MI 48430	SECRETARY	robert.walker@us.belimo.com
Rex Seave	ARMSTRONG 816 MAPLE ST THREE RIVERS, MI 49093	HANDBOOK CHAIR	REX5@ARMSTRONG-INTERNATIONAL.COM
JASON ATKISSON	Affiliated Engineers 5802 Research Park Blvd. MADISON, WI 53719	Web	jatkisson@aeteng.com
Scott Fisher	State Farm Mutual Automobile Ins. Co. 112 E. Washington St Bloomington IL 61700	CM	scott.fisher.AG4J@ Statefarm.com
RAMEZ AFIFY	EHP Consulting enjney PLLC 60 EAST ST 7th fl New York NY 10016	member	RAG EHPNEP.COM

ATTENDANCE LIST

ASHRAE TC 6.1 HYDRONIC & STEAM HEATING EQUIPMENT & SYSTEMS - "RESEARCH" SUBCOMMITTEE

3:15 - 4:15pm - January 28, 2013 - Dallas Ballroom A1 (CC1)

Name	Company and Address	Committee Position	Preferred Phone or E-mail Address
Jeff Boldt	KJWW Engineering 802 W. Broadway, #312 Madison, WI 53713	Non-member	boldtjg@kjww.com 608-221-6709
Mike Hohenrot	Grumman Butkus 820 Kams EVANSTON, IL 60201	Program Chair	mmedermott@grummanbutkus.com 847.650.7283
Edward Tsui	Intelligent Technologies	CM	keedward@intelligent-net.com
Julia Kean	Kansas State University Manhattan KS	Chair	jkean@ksu.edu

TC6.1 Handbook Subcommittee Meeting Minutes 1/27/2013

Attendees:

Rex Scare	Scott Fisher
Bob Walker	Hans Hansen
Steve Tredinneck	Tom Neill
Mick Schwedler	Jason Atkisson
Egils Dzelzith	Tricia Bruenn
Mike McDermott	Hooman Daneshmand
Julia Keen	Ramez Afify
Niels Bidstrup	Edward Tsui
Drew Overmiller	

- San Antonio minutes approved – Motion by Jason Atkisson, 2nd by Bob Walker....motion carried.
- Forrest Yount, Handbook Liaison shared with the committee that the consolidation of Chapter 46 of Systems – Pipes, Tubes, & Fittings with Chapter 22 of Fundamentals – Pipe Sizing has been approved by ASHRAE Handbook. The combined chapters will be introduced in the 2017 edition of Fundamentals. The 2016 edition of Systems will still have the Pipes, Tubes, and Fitting chapter. In the 2020 edition, the Pipes, Tubes, and Fitting chapter will be removed.
- The consolidated chapter will be a combination of the (2) chapters, but will also include additional information where necessary.
- The TC6.1 Handbook subcommittee approved the removal of Pipes, Tubes, and Fittings from the Systems Handbook starting with the 2020 edition. Motion by Jason Atkisson, 2nd by Tom Neil....motion carried.
- Forrest also noted that ASHRAE Handbook has also approved the addition of a Chiller Chapter to be put in the Systems and Equipment Handbook.
- TC6.1 has 11 chapters in the 2016 Systems and Equipment handbook, so we need to start reviewing. A sign-up sheet listing each chapter was passed around for volunteers to sign up to be the lead author or a reviewer. (Sheet is attached)
- The chapters that require the most updating are:
 - Chapter 13 - Hydronic Heating and Cooling System Design
 - Chapter 47 – Valves
 -
- Mick Schwedler made several suggestions for changes to Chapter 13-Hydronic Heating and Cooling System Design. Mick walked the group through his suggested changes. Discussion took place on some suggestions. Mick will revise per comments from the group.
- Discussion took place on whether control valves should stay in Chapter 47 – Valves or be removed and inserted in TC1.4's chapter - Controls in the Fundamentals Handbook. The committee decided to keep control valves in Chapter 47 – Valves, but to include input from TC1.4. Bob Walker will recommend to TC1.4 that they discuss control valves minimally in their chapter, but refer users to Systems and Equipment, Chapter 47 – Valves. TC1.4 members will be asked to review Chapter 47 and comment.
- All future handbook revisions should include the following:
 - At least one practical design example
 - Sustainability example and/or calculation
 - Ask international members for input from their perspective.
- Meeting adjourned at 6:40 pm

2016 Systems and Equipment Handbook

Chapter 11 – Steam Systems

Lead Author	<u>Ramez Afify</u>
Reviewer	<u>Jason Atkisson</u>
Reviewer	<u>Mike McDermott</u>
Reviewer	_____
Reviewer	_____

Chapter 13 – Hydronic Heating and Cooling System Design

Lead Author	<u>Mick Schwedler</u>	
Reviewer	<u>Hooman Daneshmand</u>	<u>Hailey Mick</u>
Reviewer	<u>Steve Tredinnick</u>	<u>Robert Bean</u>
Reviewer	<u>Hans Hansen</u>	<u>David Lee</u>
Reviewer	<u>Tricia Bruenn</u>	<u>Larry Konopacz</u>
Reviewer	<u>Bob Walker</u>	
Reviewer	<u>Edward Tsui</u>	

Chapter 14 – Condenser Water Systems

Lead Author	<u>Steve Tredinnick</u>
Reviewer	<u>Mick Schwedler</u>
Reviewer	<u>Mike McDermott</u>
Reviewer	<u>Gary Harbison</u>
Reviewer	<u>Trevor Houck</u>

Chapter 15 – Medium and High Temperature Water heating system

Lead Author _____
Reviewer Jason Atkisson
Reviewer Edward Tsui
Reviewer Trevor Houck
Reviewer _____

Chapter 28 – Unit Ventilators, Unit Heaters and Makeup Air Units

Lead Author _____
Reviewer Tricia Bruenn
Reviewer Hailey Mick
Reviewer _____
Reviewer _____

Chapter 32 – Boilers

Lead Author Evans Lizardos
Reviewer Tom Neill
Reviewer Gary Harbison
Reviewer _____
Reviewer _____

Chapter 36 – Hydronic Heat Distributing Units and Radiators

Lead Author _____
Reviewer Tom Neill
Reviewer Edward Tsui
Reviewer Robert Bean
Reviewer _____

Chapter 44 – Centrifugal Pumps

Lead Author	<u>Niels Bidstrup</u>	
Reviewer	<u>John Glunt</u>	<u>David Lee</u>
Reviewer	<u>Gary Harbison</u>	<u>Jennifer McGrath</u>
Reviewer	<u>Egils Dzelzith</u>	<u>Larry Konopacz</u>
Reviewer	<u>Kim Cross</u>	

Chapter 47 – Valves

Lead Author	<u>Robert Walker/Tricia Bruenn</u>
Reviewer	<u>Hooman Daneshmand</u>
Reviewer	<u>Edward Tsui</u>
Reviewer	<u>Larry Konopacz</u>
Reviewer	<u>Hailey Mick</u>
Reviewer	<u>Ken Luther</u>

Chapter 48 – Heat Exchangers

Lead Author	<u>Scott Fisher</u>
Reviewer	<u>Gary Harbison</u>
Reviewer	<u>John Glunt</u>
Reviewer	<u>Hailey Mick</u>
Reviewer	<u>Trevor Houck</u>

Combining Chapter 46 – Pipes, Tubes, and Fittings with Fundamentals Chapter 22 – Pipe Sizing

Lead Author	<u></u>
Reviewer	<u>Julia Keen</u>
Reviewer	<u>Edward Tsui</u>
Reviewer	<u>Jennifer McGrath</u>
Reviewer	<u>Mike McDermott</u>

TC6.1 Chilled Water Plant Subcommittee Meeting Minutes 1/27/2013

Attendees:

Rex Scare	Scott Fisher
Bob Walker	Hans Hansen
Steve Tredinneck	Niels Bidstrup
Jason Atkisson	Edward Tsui
Egils Dzelzith	Tricia Bruenn
Mike McDermott	Hooman Daneshmand

1. Meeting started at 6:40 PM. After attendee introductions, the topic of the specific duties of the sub-committee was broached. Tredinnick asked the question as to what should the goals of the committee be and what should we focus on? Should we focus on programs? Research? Or the development of a Chilled Water Plant Design Chapter? All in attendance agreed that while we should not ignore involving the sub-committee with other facets, our primary focus for the near term should be the creation of a new handbook chapter addressing chilled water plant design.
2. An outline for a new chapter on Chilled Water Plant Design was submitted at the 2012 Winter Meeting in Chicago to the Society Handbook Committee. The HB Committee discussed the viability of the new chapter during the 2012 Summer Annual Meeting in San Antonio and tabled the issue since many of the members were confused as to the justification behind the chapter. After some emails back and forth, the between the summer annual meeting and the Dallas meeting, the issue was resurrected for discussion. At the Handbook Committee meeting for the Dallas conference, TC Chair Julia Keen was requested to attend the Handbook Committee meeting where she fielded questions as well as explained the reasons behind the Chapter development. Ultimately, the committee decided the new chapter was warranted and can be included in the 2016 edition of the Systems. Tredinnick commended Chair Keen's effort in convincing HB Committee as to the viability of the chapter.
 - a. In order to make the 2016 Handbook, the chapter must be complete and voted on at the 2016 Winter meeting which means it should be completed prior to the end of the 2015 calendar year. The intent of the Chapter was to give the young engineer or designer a step by step process and decision tree to assist them in selecting equipment and laying out a typical chiller plant. The ASHRAE HQ building would be used as a basis for loads and would be increased in the number of floors in order to get a building cooling load in the range of ~400 tons.
 - b. Mick Schwedler of Trane and Niels Bidstrup from Grundfos had previously offered their services for authoring specific sections of the Chapter as notated on the outline. Furthermore, after the meeting, Steve Severini from Newcomb & Boyd and Andy Price from Affiliated Engineers volunteered to assist in writing the chapter.
 - c. Tredinnick had some obligations for TC 6.2 to complete and then could start contacting individuals for assistance by Mid-March 2013.
3. Meeting was adjourned at 7:00 PM.