



1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400

TC/TG/MTG/TRG MINUTES COVER SHEET

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

TC/~~TC/MTG/TRG~~ No. 6.1 DATE May 30, 2018

TC/~~TC/MTG/TRG~~ TITLE Hydronic and Steam Equipment and Systems

DATE OF MEETING January 23, 2018 LOCATION Long Beach, CA

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Jason Atkisson	2017	Niels Bidstrup (non-quorum)	2015	
Scott Fisher	2015			
Larry Konopacz	2017			
David Lee	2016			
Steve Tredinnick	2015			
Robert Walker	2015			
Thomas Neill	2014			
Michael Brusic	2017			
Thomas Cappellin	2017			
Mark Hegberg	2017			

DISTRIBUTION: All Members of TC plus the following:

TAC Section Head:	Dawen Lu
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.)	ALI/PDC – James W. Bochat Chapter Tech. Transfer – Andrew Babler Research – Omar Abdelaziz Standards – Mike O’Rourke 2020 HB Systems – Caroline Calloway 2021 HB Fundamentals – Stephanie Mages
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

1. Call to Order:

Chair Atkisson called the meeting to order at 1:02pm. Chair Atkisson welcomed all in attendance and self-introductions were made. An attendance sheet was passed and signed by those in attendance. A roll call of voting members was conducted, and a quorum was present with 9 of 10 voting members. One additional voting member arrived late.

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. Code of Ethics:

Chair Atkisson reminded all those in attendance of the ASHRAE Code of Ethics –

“As members of ASHRAE or participants in ASHRAE committees, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct.

The full Code of Ethics can be found at: <https://www.ashrae.org/about/governance/code-of-ethics>

3. Setting of the Agenda:

The Chair passed out an updated Agenda. Motion by Fisher, second by Cappellin to approve the Agenda. Approved 8-0-1 CNV.

4. Approval of Las Vegas Meeting Minutes:

Motion by Walker, second by Fisher to approve the past meeting minutes. Motion passed 8-0-1 CNV.

5. Recognition of Liaisons:

Chair Atkisson recognized those liaisons in attendance and gave them an opportunity to address the TC.

A. Handbook – Liaison(s) not present

B. Research – Liaison present – Omar Abdelaziz

i. Mr. Abdelaziz formally welcomed Jessica Mangler as the new Research sub-committee chair for the TC.

ii. RAC is looking for an update on RP1196. The project was led by researcher at Iowa State who has since retired. The TC reported that the project was waiting for the completion of Standard 155 to be published in order to be completed.

iii. RTAR 1766 was dropped by the TC.

iv. RAC has added an additional submission deadline of March 15th

v. Moving forward, the RP Chair, Sub-Chair of PMS Chair must complete the new disposition of research review form.

C. Chapter Technology Transfer Committee (CTTC) – Liaison not present

D. TAC Section Head – Section head not present

E. TAC Chairman – Chairman not present

6. Chair's Report

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

- A. 2017-18 Awards to TC Members
 - i. George B. Hightower Award Recipient – Art Hallstrom, TC 1.6
 - ii. ASHRAE Research Award Recipient – Brian Silvetti, TC 6.9
- B. RAC is prioritizing requests for research topics in the Residential Sector
- C. Conferences and Expositions Committee (CEC) is requesting ideas for program tracks for Kansas City meeting (2019 Annual)
- D. The Professional Development Committee (PDC) is seeking ideas for new ASHRAE Learning Institute (ALI) courses
- E. ASHRAE will be celebrating its 125th Anniversary in the 2019-2020 Society Year. The Historical Committee is looking for papers on technologies and topics that occurred between the years of 1920-2000. The topic can be specific or broad, the goal is to help document our history. To submit a paper, visit <https://mc.manuscriptcentral.com/ashrae>
- F. CEC program statistics were reviewed. CEC continues to struggle with presenters uploading presentations on-time. For Chicago, 22 of the 24 presentations that were not uploaded prior to the start of the meeting were for programs sponsored by TCs.
- G. Publications Committee announced a few new tools that are available
 - i. 90.1 Portal is the newest. It provides a red-lined version of 90.1-2016 compared to 90.1-2013. A free preview of the portal is available until March 15, 2018.
 - ii. ASHRAE Technology Portal. Free to all ASHRAE members and includes all journal articles, research reports and research reports, among other things

7. Sub-Committee Reports

- A. Programs: David Lee (Chair). Subcommittee meeting minutes of January 22, 2018 are attached.
- B. Research: Jessica Mangler (Chair). Report provided as part of the Liaison Report.
- C. Handbook: Tricia Bruenn (Chair). Subcommittee meeting minutes of January 21, 2018, are attached.

Reminder that when you are using the Authoring Portal, you must use Internet Explorer.

There was discussion during the meeting regarding Equation 3 in Chapter 22 of the 2017 Fundamentals as the equation references the wrong symbol for density. The current equation identifies the symbol for roughness.

Mark Hegberg made a motion to edit Equation 3 in Chapter 22 of the 2017 Fundamentals to correct the equation to substitute the density symbol for roughness symbol. Motion seconded by S. Fisher. Approved 9-0-1 CNV.

Chair Atkisson reminded everyone that when they are reviewing the handbook chapters to try and do it from the perspective of a YEA member. What information would they be looking for?

- D. Chilled Water Plant Sub Committee: Steve Tredinnick (Chair). The sub-committee meeting was held on January 21, 2018.

The new handbook chapter is now on the ASHRAE Authoring Portal. It will not be completed in time for the 2020 Systems and Equipment release. Most of the content currently provided in the chapter has been provided by Steve. Steve requested that anyone interested in providing content to see him.

- E. Membership: Robert Walker (Chair). Chair Walker reminded all in attendance to sign the sign-in sheet(s).

- F. Standards: Mike O'Rourke (Chair). Chair O'Rourke was not in attendance.

Frank Myers reported on Std. 90.1. ACEEE is issuing a draft proposal that all boilers must be condensing type. Potential changes regarding pumps is also being discussed with the Mechanical Subcommittee.

Frank Myers reported on SPC 155. The committee anticipates that a draft of the standard be ready for submittal to SPLS in the next 4-6 weeks. AHRI Research is testing boilers to previous drafts of the standard and providing feedback to the SPC, which has been incorporated in the latest draft.

- G. Web: Mike Trantham (Webmaster). Webmaster Trantham reports the website is up to date.

8. Liaison Reports from other TC's and Organizations.

- A. TC 7.7 – Testing & Balancing
- i. Reviewing Standard 111: Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation and Air-Conditioning Systems
 - ii. Reviewing GPC 11: Field Testing of HVAC Controls Components

9. Old Business:

- A. SPC 208 – Method of Test for Determining Hydronic System Balance Valve Capacity. Mark Hegberg reported that the standard will be out for public review soon.

10. New Business:

- A. Requests from Membership: Chair Atkisson noted that he had received the following questions/comments from ASHRAE membership and asked if there were any members present whom could or would like to respond to the received questions/comments.
- i. Mr. Terry Spiro of East Perth, Western Australia is looking for information from our members on vertical pipe risers to better inform content he has developed related to the design and application of bracketing for piping systems. The intent is to provide direction to HVAC/mechanical professionals in order to sufficiently size bracketing systems, without overdesigning them.
 - ii. Mr. Jaya Mukhopadhyay, PhD, of Montana State University is the Principal Investigator (PI) for ASHRAE Research Project 1650 – Training Requirements for Sustainable, High-Performance Building Operations. He is looking for Facility Managers who would be willing to participate in a survey as part of the research project.

11. Meeting Adjournment:

Motion by Hegberg, second by Neill to adjourn the meeting. Motion passed 9-0-1 CNV.

Submitted by,

Jennifer Leach
TC 6.1 Secretary



Shaping Tomorrow's
Built Environment Today

TC Sign-in Sheet

Meeting Info: TC 6.1 EQUIPMENT & SYSTEMS Date: 1-23-18

Name	Affiliation	E-mail	Member (Voting, Corresponding, or Guest?)	YEA Member? (Yes/No)
STAR KUTIN	XYLEM	STAR.KUTIN@XYLEMINC.COM	CM	N
LARRY KONOPACZ	XYLEM BELG	LARRY.KONOPACZ@XYLEMINC.COM	VM	N
Tricia M Bruenn	Belimo	tricia16@msn.com	CM	N
Rex Scare	Armstrong	Rexscarmintl.com	CM	N
BOB WALKER	BELIMO	robert.walker@us.belimo.com	VM	N
ANDREW KOPPEL	UPVOR	andrew.koppel@upvor.com	CM	N
Jacob Sevelius	UPVOR	Jacob.Sevelius@upvor.com	CM	Y
Justin Westmoreland	AESC	jwestmoreland@aesc-inc.com	CM	Y
Frank Myers	The Myers Group, LLC	fmyers@ix.netcom.com	CM	N
Steve Tredinnick	Burns + McDonnell	stredinnick@burnsmcd.com	VM	N

Name	Affiliation	E-mail	Member (Voting, Corresponding, or Guest?)	YEA Member? (Yes/No)
JASON ATKISSON	AEI	jatkisson@aieeng.com	CHAIR VM	No
JEN LEACH	P-K	pennstjen@yahoo.com	SECRETARY CM	NO
Mark Heberling	HFA	mheberling@comcast.net	VM	Sub...
Tom Cappellin	Cappellin Consulting Services	tcappellin@msn.com	VM	NO
DON PRATHER	ACCA	donald.prather@acca.org	Corresponding CM	NO
DAVID USE	ARMSTRONG FLUID TECHNOLOGY	dlee@armstrongfluidtechnology.com	VM	No
JESSICA MANGLER	AEI	jmangler@aieeng.com	Research CM	Y
Aybur Yilmaz	AHRI	ayilmaz@ahri.org	CM	Y
John Bore	HVI	engj@hvi.org	Guest	No
Phillips Stephens	West-McGraw	pstephens@west-mcgraw.com	Guest	No

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Name	Affiliation	E-mail	Member (Voting, Corresponding, or Guest?)	YEA Member? (Yes/No)
TED DUFFY	LAARS	TED.DUFFY@gmail.com	GUEST-PLEASE ADD AS PCM	Y
JEFF REINHOLD	PLANS MECHANICAL	JREINHOLD@cablenet.net	GUEST	N
ART GIESLER	FERMAPPE	ART.GIESLER@APT.MT	CM	N
MICK SCHWEDLER	TRANU	mschwedler@trane	CM	N
Daniel Chudocke	Mulcahy Co.	dchudocke@mulcahyco.com	CM	N
CHRIS HAWES	INTERTER	CHRIS.HAWES@INTERTER	G	N
THOMAS NEILL	MESTEK	Tneill@mestek.com	VM	N
Mike TranTham	IMI	Mike.TranTham@imihydrac.com	PCM	N
Nick Allen	McClure ENGR.	nallen@mcclureeng.com	PCM	N
Scott Fisher	Rie Finzel	SFisher@ic@gmail.com	VM	N

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TC 6.1 Program Subcommittee Meeting - Minutes:

Jan 22, 2018

Attendees:

David Lee, Armstrong Fluid Technology – Program Subcommittee Chair

Larry Konopacz – Xylem

Bob Walker, Belimo

Jason Atkisson, AEI

Rex Scare, Armstrong International

Jessica Mangler, AEI

Tricia M. Bruenn, Belimo

Scott Fisher, State Farm – Retired

Jim Kendzel, American Supply Association

Stephanie Mages, AECOM

Minutes:

- 1 seminar submitted and approved for Chicago conference; 4 other seminars co-sponsored and approved
- Program chairs need to ensure their speakers post presentations by deadlines. This was a reported issue at last 2 conferences.
- Proposed seminars for Houston conference (see below for key dates):
 - Tom Butcher – Solid Oxide Fuel Cell Cogen
 - Low Delta T on Chilled Water Systems - Steve Tredinnick, Tricia B, Barry Bridges TC1.4
 - (*Conference Paper : co sponsor TC 6.10*) Energy, Cost and CO2 Savings Analyses of Reversible, Hybrid and Heating-Only Liquid Fuel Fired Absorption Heat Pumps in the Northeastern United States - Chris Keinath, Tom Butcher, Michael Garrabrant
- Atlanta conference will be ASHRAE's 125th anniversary, looking for topics on technologies from 1920-2000, e.g. milestones, who did it?, how it impacted us?

Key Dates for Houston conference:

- | | |
|---------------------------|---|
| • August 28, 2017 | Conference Paper Abstracts Due |
| • December 8, 2017 | Conference Papers due |
| • February 9, 2018 | Seminar, Forum, Panel, Debate and Workshop proposals are due |
| • February 9, 2018 | Revised Conference Papers/Final Technical Papers Due |
| • February 19, 2018 | Revised Conference Papers/Final Technical Papers Due |
| • March 19, 2018 | Seminar, Forum, Workshop Accept/Reject Notifications |
| • April 30, 2018 | Web site opens for presentation uploads |
| • June 1, 2018 | All presentations due online |

To submit a Seminar:

<http://submissions.miramsmart.com/ASHRAEHouston2018/Splash.aspx>

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- Proposed seminars for Atlanta conference:
 - Common System Options and Misapplications – Jen Leach to chair, Jason and Mick as speakers
 - Building Integrated Renewables and Natural Systems - geothermal pumping, Larry to resubmit Long Beach program
 - The Engineer's Role In Architecture - have Theresa Weston (DuPont) speak, Steve Tredinnick

Key dates for Atlanta conference:

- TBA

Other:

- Best approaches to getting programs approved. Technical papers are given 1st priority followed by Conference papers. Technical papers do not go through CEC. Seminars are the most competitive due to high number of submissions. If proposed program falls into one of the conference tracks (other than Fundamentals/Applications or Systems/Equipment), likelihood of acceptance is higher.

Agenda/Information for Handbook Volume/TC Meetings

2018 ASHRAE Winter Conference, Chicago

Sunday, January 21, 9:00 to 10:00 a.m.

- **Welcome and Introductions** (Handbook liaisons identify which TCs they serve)
 - **Information Items**
1. TCs with chapters for the **2019 ASHRAE Handbook—RHVAC Applications** should approve their revised chapters now or at the annual conference in Houston. All remaining 2019 *HVAC Applications* chapters are due by end July 2018. Your Handbook Committee liaison can confirm your chapter's specific due date. [NOTE: *Even if you intend no changes to your chapter(s)*, you must confirm this to your Handbook liaison and complete and submit the Chapter Approval Checklist as well as written permissions to reuse material copyrighted by others.] For ASHRAE Handbook Online, TC-approved features or out-of-cycle revisions can be submitted at any time.
 2. To submit your chapter revisions and checklist with all applicable items by email to your Handbook Committee liaison, please also **copy Handbook Editor Mark Owen** (mowen@ashrae.org) and **Managing Editor Heather Kennedy** (hkennedy@ashrae.org) on your email submission, as a safeguard against revisions being lost because of email bounces, etc. If you use the ASHRAE Authoring Portal, notify the editors and your liaison of chapter completion as detailed in the instructions.
 3. Go to [ASHRAE Handbook Central](#) (click on the Handbook link under the Resources and Publications tab on the ASHRAE home page, then click on the link to Handbook Central) for easy access to
 - **ASHRAE Authoring Portal**, the officially approved collaborative authoring tool for developing Handbook content. This optional, online tool allows multiple designated authors to write and/or revise Handbook chapters in Word without needing to email large files or obtain new software. A PowerPoint presentation about the Portal is available on Handbook Central. Use your regular ASHRAE Member login information to access the Portal and your file(s). (**See next page.**)
 - **Important Handbook guidance documents** for Handbook content development
 4. **ASHRAE Handbook Online** (a free member benefit option) incorporates in its base subscription all the chapters in all four current Handbook volumes plus extra content. TCs have the opportunity to obtain or develop extra content or features and submit them for their chapters. Remember that simple spreadsheets or checklists are often the most helpful to users. Related *ASHRAE Journal* articles and case studies make good supplemental content. TC-approved features or out-of-cycle revisions can be submitted at any time. Guidelines are available on Handbook Central.
 5. The new **ASHRAE Technology Portal** hosts ASHRAE Journal Articles and ASHRAE Research Reports along with ASHRAE Transactions and Conference Papers and ASHRAE Conference Seminars. ASHRAE members have free access to download PDFs of ASHRAE Journal Articles and Research Reports. Other content is available to Members and nonmembers by subscription. The portal can be a great resource for finding ASHRAE references to cite for content in your chapters.
 6. **ASHRAE Terminology** is a free online glossary of more than 3700 terms related to the built environment, with a focus on HVAC&R and related topics. This resource can help your publication development efforts if they call for definitions of terms. Your input can also improve ASHRAE Terminology (maintained by TC 1.6) by checking for accuracy and omissions. Check it out at www.ashrae.org/ASHRAETerms.
 7. **Revision histories** of every chapter are available from your Handbook liaison. Compiled by Handbook editorial staff, these records show the level of revision each chapter received in the last several cycles.
 8. Be sure to schedule and officially request time and meeting space for your **Handbook Subcommittee meeting** for the 2018 Annual Conference in Houston, and let your Handbook liaison know of changes (your liaison's contact information should be on your TC roster; if not, please contact Handbook Editor Mark Owen at 678-539-1187 or email: mowen@ashrae.org). Alternatively, Technology staff can also set up conferences for TCs to work on Handbook revisions. (** Contact TAC or TC Chair to set up on-line meeting.)
- **Questions and Answers**
 - **Liaison/TC Consultation**

ASHRAE Webpage (Jan 2018)

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[ASHRAE Authoring Portal](#)
An online tool for collaborative content development.

 [ASHRAE Authoring Portal Introduction Presentation \(.pptx\)](#) (June 2017)



General Notes:

- Handbook Subcommittee met on January 21, 2018 from 5:00-6:00 PM.

TC 6.1 Handbook SubCommittee Meeting Sunday 5:00 PM- 6:00 PM

Name	Affiliation	E-mail	Member Status	YEA Member?
Steve Tredinnick	Burns & McDonnell	stredinnick@burnsmcd.com	VM	No
Larry Konopacz	Xylem, B&G	Larry.Konopacz@xylem.com	Vice-Chair	No
Stan Kutin	Xylem, B&G	Stan.Kutin@xylem.com	CM	No
Scott Fisher	Retired	sfishbmi@gmail.com	VM	No
Tricia M. Bruenn	Belimo	tricia16@msn.com	CM	No
Jason Atkisson	Affiliated Engineers	jatkisson@aeieng.com	Chair	No
Bob Walker	Belimo	robert.walker@us.belimo.com	VM	No
Rex Scare	Armstrong	rexs@armstronginternational.com	CM	No
Caroline Calloway	AERCO	ccalloway@aerco.com	Handbook Liason	No
Tom Neill	Mestek	tneill@mestek.com	VM	No
David Lee	Armstrong Fluid Technology	dlee@armstrongfluidtechnology.com	VM	No
Dawen Lu	Lu & Smith Engineers	dlu6838@gmail.com	Guest	No
Eric Rosenberg	Grumman/Butkus Associates	erosenberg@grummanbutkus.com	PCM	No
Randy Hassler	McClure Engineering	rhassler@mcclureeng.com	Guest	No
Niels Bidstrup	Grundfos	nbidstrup@grundfos.com	CM	No

- 2020 Systems Chapters are in REVISION Status. Chapters are due for vote/approval in 2019. (See below schedule.)
- Please check to see if you are able to access the chapter in the portal if you have signed up as a reviewer. If you are interested in reviewing and did not yet, please contact Tricia M. Bruenn at tricia16@msn.com
- It is important to add real life examples into the chapters, and also to verify references. A list of permanent “permissions” will be put on the Authoring Portal within the next few months for our reference.
- Please see list of reviewers below. You will receive an email by end of February to confirm your commitment to reviewing.
- Goal is to have some chapters reviewed and ready for discussion for 1.5 hour Handbook work session in June at Houston meeting.

2020 Systems Chapters Due Dates

Chapter No	Short Title	TC	Liaison	MS Due Date
11	Steam	06.01	Calloway	03/14/19
13	Hydronic Htg & Cooling	06.01	Calloway	03/28/19
14	Condenser Water Sys.	06.01	Calloway	04/11/19
15	Med./High-Temp. Water Htg	06.01	Calloway	04/25/19
28	Unit Ventilators	05.08	Sill	05/23/19
28	Unit Ventilators	06.01	Calloway	05/23/19
32	Boilers	06.01	Calloway	05/09/19
36	Hydronic Heat Dist.	06.01	Calloway	06/06/19
44	Centrif. Pumps	06.01	Calloway	05/16/19
46	Pipes, Tubes, Fittings	06.01	Calloway	06/13/19
47	Valves	06.01	Calloway	06/20/19
48	Heat Exchangers	06.01	Calloway	07/04/19
9898	Chilled-Water Plants	06.01	Calloway	07/31/19

Questions answered since the Chicago Meeting (to be addressed in Houston):

- **ORNL:** Permission to reprint is not required. It's a U.S. government facility, and generally publications by the U.S. government are OK without explicit permission, as long as we cite the source.
- *Chapter 46:* If the TC wants to delete this chapter in favor of Fundamentals Ch. 22, we can do that. Per the Authors and Revisers Guide (attached, section 5), we just need a record of the vote to delete from 6.1's Handbook subcommittee, then one from the whole TC, and it can go to the Handbook Committee for finalization. I (Heather Kennedy) do have a note for 2017 Fundamentals Ch. 22 that it has added information from the Systems chapter, but no notes or emails I can find explicitly confirming that the TC wanted to delete the Systems pipe chapter altogether. **(Will vote in Houston.)**
- *Chapter 28:* This chapter has been shared jointly by TCs 5.8 and 6.1 since at least 1996; 6.1 is listed as responsible for the sections on unit ventilators and unit heaters, and 5.8 was assigned to the makeup air units section. Since this sharing of the chapter predates my coming (Heather Kennedy) to ASHRAE, I'm not sure what precisely the rationale was for not having separate chapters each held by a single TC. **(Will vote if needed in Houston.)**

Revision Status: will discuss in Houston.

Volume	TC	Chapter No	1996S	2000S	2004S	2008S	2012S	2016Sy	Mean
HVAC Systems and Equipment	06.01	11	0	0	0	0	2	1	0.50
HVAC Systems and Equipment	06.01	13	1	1	0	2	0	1	0.83
HVAC Systems and Equipment	06.01	14	0	3	0	0	2	2	1.17
HVAC Systems and Equipment	06.01	15	0	0	0	0	2	0	0.33
HVAC Systems and Equipment	06.01	28	2	0	1	0	1	2	1.00
HVAC Systems and Equipment	06.01	32	1	2	0	2	2	1	1.33
HVAC Systems and Equipment	06.01	36	1	1	0	0	1	2	0.83
HVAC Systems and Equipment	06.01	44	3	2	0	0	2	2	1.50
HVAC Systems and Equipment	06.01	46	1	1	0	0	1	0	0.50
HVAC Systems and Equipment	06.01	47	2	1	0	0	0	3	1.00
HVAC Systems and Equipment	06.01	48		4	0	1	0	2	1.40

Where:

0 =	no changes
1 =	update/minimal changes
2 =	standard revision (5-50% of chapter)
3 =	major revision (>50% of chapter)
4 =	new/rewritten

2020 Systems and Equipment Handbook

List of Chapters and Reviewers

Reviewers as of 01/2018		
Chapter 11- Steam Systems	Name	E-Mail
Lead Author	Rex Scare	rexs@armstronginternational.com
Reviewer	Jason Atkisson	jatkisson@aeieng.com
Reviewer	Stan Kutin	Stan.Kutin@xyleminc.com
Reviewer	Kevin Summers	KJSummer@gmail.com
Reviewer	Nick Allen	nallen@mcclureeng.com
Reviewer		
Chapter 13 - Hydronic Heating and Cooling System Design	Name	E-Mail
Lead Author	Mick Schwedler	mschwedler@trane.com
Reviewer	Jason Atkisson	jatkisson@aeieng.com
Reviewer	Larry Konopacz	Larry.Konopacz@xyleminc.com
Reviewer	Aaron Stotko	aaron.stotko@uponer.com
Reviewer	Viral Dharaiya	viral.dharaiya@haysfluidcontrols.com
Reviewer	Ryan Mallory	Ryan.Mallory@uponer.com
Reviewer	Evans J. Lizardos	evans.lizardos@leapc.com
Reviewer	Mark Hegberg	mhegberg@comcast.net
Chapter 14 - Condenser Water Systems	Name	E-Mail
Lead Author	Steve Tredinnick	stredinnick@burnsmcd.com
Reviewer	Mike Trantham	mike.trantham@imihydronic.com
Reviewer	Eric J. Rosenberg	erosenberg@grummanbutkus.com
Reviewer		
Reviewer		
Reviewer		
Chapter 32 - Boilers	Name	E-Mail
Lead Author	Jennifer Leach	jleach@harsco.com
Reviewer	Tom Neill	tneill@mestek.com
Reviewer	Don Prather	donald.prather@acca.org
Reviewer	Medhi Doura	mdoura@lochivar.com
Reviewer	Kevin Summers	KJSummer@gmail.com
Reviewer	Ted Duffy	tduffy@laars.com

2020 Systems and Equipment Handbook List of Chapters and Reviewers (cont.)

Chapter 36 - Hydronic Heat Distributing and Radiators	Name	E-Mail
Lead Author	Tom Neill	tneill@mestek.com
Reviewer	Ryan Mallory	Ryan.Mallory@uponer.com
Reviewer	Aaron Stotko	aaron.stotko@uponer.com
Reviewer	Mike Trantham	mike.trantham@imihydronic.com
Reviewer		-
Reviewer		

Chapter 44 - Centrifugal Pumps	Name	E-Mail
Lead Author	Neils Bidstrup	nbidstrup@grundfos.com
Reviewer	David Lee	dlee@armstrongfluidtechnology.com
Reviewer	Larry Konopacz	Larry.Konopacz@xyleminc.com
Reviewer	Mark Hegberg	mhegberg@comcast.net
Reviewer		
Reviewer		

Chapter 47 - Valves	Name	E-Mail
Lead Author	Tricia M. Bruenn	tricia16@msn.com
Reviewer	Stan Kutin	Stan.Kutin@xyleminc.com
Reviewer	Scott Fisher	sfishbmi@gmail.com
Reviewer	Mark Hegberg	mhegberg@comcast.net
Reviewer	Bob Walker	robert.walker@us.belimo.com
Reviewer	Mike Trantham	mike.trantham@imihydronic.com
Reviewer	Viral Dharaiya	viral.dharaiya@haysfluidcontrols.com
Reviewer	Hooman Daneshmand	hooman.daneshmand@gmail.com
Reviewer	Eric J. Rosenberg	erosenberg@grummanbutkus.com

Chapter 48 - Heat Exchangers	Name	E-Mail
Lead Author	Scott Fisher	sfishbmi@gmail.com
Reviewer	Stan Kutin	Stan.Kutin@xyleminc.com
Reviewer	John Glunt	jglunt@b-g.com
Reviewer	Zeljko Terzic*	zterzic@armstrongfluidtechnology.com
Reviewer		
Reviewer		

* May need access. See David Lee.

End of Report.

Submitted by Tricia M. Bruenn at tricia16@msn.com

Please contact me with any questions.

Thank You and See you all in Houston!