

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

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

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.**

**These minutes have been approved by this committee.**

TC/TG/TRG NO TC 3.1

Date June 29 2015

TC/TG/TRG TITLE Refrigerants and Secondary Coolants

DATE OF MEETING June 29, 2015

LOCATION Atlanta, GA

<b>MEMBERS PRESENT</b>	<b>YEAR APPTD</b>	<b>MEMBERS ABSENT</b>	<b>YEAR APPTD</b>
Mark McLinden (Chair) – voting	2014	Alice Riemer (non-quorum)	2012
Steve Kujak (Vice Chair/Research) – voting	2014	Sean Cunningham (Webmaster) – voting	2013
Warren Clough (Secretary) – voting	2014		
Chris Seeton (Program) – voting	2012		
Kevin Connor (Handbook) – voting	2011		
Ganesan (Sonny) Sundaresan – voting	2014		
Felix Flohr (non-quorum)	2012		
<b>Other Officers &amp; Related</b>			
Dave Wilson (Standards)	2012		

<b>Corresponding Members and Guests</b>		
Debra Kennoy (CM)	Julie Majurin (CM)	Valerie Baish
Amir Jokar (CM)	Bruce Griffith	Georgi Kazachki
Eric Smith	Osami Kataoka (CM)	
Barbara Minor (CM)	Knut Petry (CM)	
Sebastian Herrmann	Kenji Takizawa (CM)	
Stephen Spletzer (CM)	Tom Leck	
Drew Welch	Larry Burns	
Scott Wujek (CM)	Mary Opalka	
Sam Cantrell (CM)	Mark Spatz (RAC liason)	
Marc Scancarello (CM)	Jay Kohler (TAC Section Head)	
Hewitt Gaudin	Roberto Urego	

### **KEY CONTACTS**

SPLS Liaison*	Janice Peterson
TAC Chair:	Eric Adams
TAC Section Head:	Jay Kohler
All Committee Liaisons As Shown On TC/TG/TRG Rosters:	RAC Research: Mark Spatz Standards: Malcolm Knight Handbook: Sheila Hayter Chapter Technology Transfer: Stephen Piccolo ALI/PDC: Darin Nutter
Manager Of Standards*	Stephanie Reiniche
Manager Of Research & Technical Services	Michael R. Vaughn

\*receives a copy of the TC 3.1 meeting minutes

## MEETING MINUTES

### 1. CALL TO ORDER (M. McLinden, Chair)

- A. Chair called the meeting to order at 4:17 PM and attendees introduced themselves.
- B. Establishment of a quorum – 7 voting members were present.

Voting members for this meeting:

Warren Clough – present  
Kevin Connor – present  
Sean Cunningham – not present  
Felix Flohr – present (non-quorum)  
Steve Kujak - present  
Mark McLinden – present  
Alice Riemer – not present (non-quorum)  
Chris Seeton – present  
Sonny Sundaresan – present

### 2. AGENDA REVIEW

No revisions or corrections were noted on the agenda.

*Motion to approve draft minutes was made by Kevin Connor and seconded by Sonny Sundaresan.  
Motion passed: 7 / 0 / 0 / CV. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*

### 3. APPROVAL OF SEATTLE, JUNE 2014 MEETING MINUTES

No corrections were noted on the minutes.

*Motion to approve draft minutes was made by Kevin Connor and seconded by Sonny Sundaresan.  
Motion passed: 7 / 0 / 0 / CV. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*

### 4. CHAIRMAN'S ANNOUNCEMENTS (M. McLinden, Chair)

#### A. Section 3 Meeting Report

- Everyone was reminded of the ASHRAE Code and Ethics
- New e-mail aliases are being implemented. For example, the TC 3.1 chair can be reached at [TC0301@ashrae.net](mailto:TC0301@ashrae.net) and the Section 3 TAC head at [SH3@ashrae.net](mailto:SH3@ashrae.net). When persons roll off the same alias will then go to the new person in that position. A full list can be downloaded from: <https://www.ashrae.org/standards-research--technology/technical-committees>
- All members are requested to update their ASHRAE bios, including a new item for employment discipline.
- Starting at the summer 2016 meeting, all speakers will be required to provide a "potential source bias" as one of the required slides in their presentation. This generated significant discussion at the TC chair's breakfast.
- Provisional Corresponding Members can join from the ASHRAE website for up to a two year term. Chair can change a provisional corresponding members a corresponding member.
- Survey from AHRTI on the use of flammable refrigerants; TC members were requested out a survey by July 10<sup>th</sup>. The mission of the AHRI Flammable Refrigerants Subcommittee is to determine gaps in existing flammable refrigerant research and develop a roadmap with priorities and a timeline to complete the critical research toward the safe use of flammable refrigerants with a focus on 2L refrigerants. Through this effort, the Subcommittee will facilitate key research, deliver scientific findings, and produce publicly available and technically sound references to support code and standard activities related to the use of flammable refrigerants.

C. Roster Review

Summary of TC3.1 membership and changes, effective July 1<sup>st</sup> 2016

<u>Position</u>	<u>Members</u>
Chair	Dr Mark O McLinden, PhD (V)
Vice Chair	Mr Stephen Kujak (V)
Secretary	Mr Warren Clough (V)
Research Subcommittee Chair	Mr Stephen Kujak (V)
Standards Subcommittee Chair	Dr David P Wilson, PhD (NV)
Program Subcommittee Chair	Dr Christopher J Seeton (V)
Handbook Subcommittee Chair	Mr Kevin C Connor (NV)
Webmaster	Mr Sean Cunningham (NV)
Voting member	Debra Kennoy (V)
Voting member	Sonny Sundararesan (V)
Voting member	Barbara Minor (V)
Voting member	Marc Scancarello (V)
Member Non-Quorum	Mr Felix Flohr (V)
Member Non-Quorum	Mrs Alice Riemer (V)

Kevin Connor and Sean Cunningham roll off as members, but keep their positions as Handbook Chair and Webmaster. New members are Debbie Kennoy, Barbara Minor, and Marc Scancarello.

5. RESEARCH (Steve Kujak)

A. Report from Research Subcommittee Chairs Meeting

- Across ASHRAE, there are currently 61 active research projects totaling \$10M, 11 completed, 11 new projects approved, 13 tentative research projects released for bid, and no projects held due to funding.
- Milestones charts with associated costs are now required throughout the project. It should be included in the work statement proposal. Questionnaire will be sent to the PMS Chair for review it to see if contractor has met the objectives for a milestone. It will be tied to the payment. If the scope and funding changes it will have to go to RAC for review.
- You can skip the RTAR and go directly to a Work Statement if you want to take the risk.
- Web based RTAR training starting in June 2016.

B. Status of current research projects

**1507-RP**, Binary Refrigerant Flame Boundary Concentrations; contractor: Safety Consulting Engineers; PI: Andrew Kusmeirz. Robert Richard and Debbie Kennoy are working with the contractor to jointly write the final report; Tom Leck also volunteered to help. A skeleton report has been prepared. The goal is to have the report finished by the Orlando meeting for TC approval.

**1584-RP**, Assessment of Alternative Approaches to Predicting the Burning Velocity of Refrigerants; contractor: Northeastern University; PI: Hameed Metghalchi. *This project has been completed and the final report has been approved by the TC. A technical presentation will be given at Seminar 44; Tuesday, 9:45 a.m. This will close out the project.*

**1717-RP**, Improve Accuracy and Reproducibility of ASTM E-681 Flammability Test Method for Flammability Limit Measurement of 2L Flammable Refrigerants

*A contract was awarded by ASHRAE on March 3, 2015 to the University of Maryland, with Peter Sunderland as the P.I. The PMS consists of Debbie Kennoy (lead), Sean Cunningham, Scott MacLeod, Barbara Minor, Robert Richard, and Xudong Wang. The PMS held a phone conference with the P.I. on April 30, 2015.*

**1773-TRP**: "Ignition Potential from Electrical Devices in Commercial and Residential Applications using 2L Refrigerants;" RTAR team: Warren Clough (Lead), Marc Scancarello, Sonny Sundaresan, Barbara Minor, Eric Smith. *STATUS: The TC approved this RTAR by letter ballot [vote was 9/0/0/9]*

(CV)], and it was submitted to Mike Vaughn, ASHRAE Manager of Research and Technical Services on April 28. It was approved by RAC at Atlanta, and a number was assigned.

The next step is to prepare a work statement, and a draft WS was circulated to the TC prior to the Atlanta meeting. Co-funding from AHRTI will be pursued, and Xudong Wang will bring this up at the next AHRTI meeting. Work statement team: W. Clough (Lead), M. Scancarello, E. Smith, K. Takizawa, B. Minor, R. Richards.

**Work Statement:** “Risk Assessment Investigations to Develop Alternative Acute Toxicity Classification Approaches to the A or B Chronic Toxicity Classification of Refrigerants used by ASHRAE 34.” Suggestion from Standard 34 Toxicity Subcommittee; work statement prepared by Debbie Kennoy, George Rusch, Gary Jepson, Chris Seeton, Steve Kujak. Draft is attached to these minutes. This WS was approved by the TC at a previous meeting, and it will be submitted to RAC by Steve Kujak. Team: S. Kujak, D. Kennoy, G. Rusch, G. Jepson, C. Seeton.

RTAR: “Humidity effects on burning velocity,” RTAR Team: Debbie Kennoy (lead), Robert Richards, Julie Majurin, Tom Leck, Els Baert; a draft is attached to these minutes.

RTAR is complete. This work was requested by SSPC 34/ISO 817 Flammability sub-committee.

**ACTION:** Motion to approve the RTAR on “Humidity Effects on Burning Velocity.”

*Motion was made by Steve Kujak was made by Steve Kujak and seconded by Sonny Sundaresan.  
Motion passed: 7/0/0/[CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*

RTAR: “ASHRAE 34 Toxicity data documentation and mixture calculation,” proposal by Robert Richard; draft is attached to these minutes.

SSPC 34 has a spreadsheet to calculate toxicity data and move it to a more robust environment. Sonny Sundaresan is taking the lead. RTAR is complete. Sundaresan and Mark Spatz want to review it. Sundaresan wants to get it in for vote before the next meeting. Distribution to the members and letter ballot would need to be completed by August 1<sup>st</sup> to be considered by RAC this Fall.

#### C. Proposed RTARs and Ideas

Proposed RTAR: “Distribution of Water between Vapor and Liquid phases of low-GWP Refrigerants.” TC 3.3 is lead on this RTAR; asking for TC 3.1 to co-sponsor. Brad Bogess to lead this effort. Need to expand the Scope followed by an RTAR.

Possible idea: Detection of flammable refrigerant leaks using odorants. Suggestion was to conduct a literature search first. Mark Scancarello will lead this effort. Julie Majurin will gather prior work in this area.

#### D. ASHRAE Research Liaison Report

Mark Spatz reinforced the importance of the milestones that now need to be added to the work statements.

### 5. HANDBOOK (Kevin Connor)

The next revision will be for the 2017 edition.

Three Chapters need to be revised by June 2016.

Chapter 29- Refrigerants (Lead—Barb Minor)- pull out environmental section and have it as a stand-alone “Climate Change” chapter

Chapter 30- Thermophysical Properties of Refrigerants (Lead—Mark McLinden)

Chapter 31- Physical Properties of Secondary Coolants (Lead—Kevin Connor)

**6. PROGRAM (Chris Seeton)**

Jay Kohler (TAC Section Head)- General comments; thanked the committee for the work they are doing. You can request an e-mail go out from ASHRAE as a thank you letter to your manager.

A. Current Program Session (Atlanta 2015)

1. Tuesday, 9:45, Seminar 44—Safety and Ventilation: with presentation on TC 3.1-sponsored research: “Developing Alternative Approaches to Predicting the Laminar Burning Speed of Refrigerants Using the Minimum Ignition Energy, 1584-TRP.”
2. Wednesday, 11:00, Seminar 63—Retrofit or Not? Life-Cycle Strategy for Systems with R-22 and High-GWP Refrigerants (TC 3.1 co-sponsor).

B. Future Potential Sessions (Seminars, Forums, and Workshops)

Orlando (January 2016)

None scheduled

TC 10.7 to lead, TC 3.1 to co-sponsor following seminars:

1. “Improving the efficiency of low-GWP refrigerants in commercial equipment”
2. “Practical use of R404A alternatives in commercial applications” Resubmitted from Chicago

Future program ideas:

1. “System efficiency impacts of low-GWP refrigerants: Are we compromising with efficiency?”
2. Leak detection technologies and sensors; potential co-sponsor with TC 3.8
3. Results from AREP II testing (Alternative Refrigerant Evaluation Program, organized by AHRI—Air Conditioning, Heating, and Refrigerating Institute)
4. Workshop on A/B toxicity classification. (Wait until proposed research project is started; give an update on progress and get feedback.)

There will be a “Refrigeration” program track at the Atlanta meeting, but not at the Orlando meeting (see listing below). This generated much discussion at the Sunday morning TC Chairs meeting.

5. Program tracks Orlando and St. Louis

January 2016—Orlando	June 2016—St. Louis
Systems and Equipment	Advances in refrigeration Systems and Alternative Refrigerants
Fundamentals and Applications	Research Summit
Design Build	Fundamentals and Applications
International Design	HVAC Systems and Equipment Smart Building Systems/Remote Monitoring and Diagnostics
Standards, Guidelines and Codes	Indoor Environment: Health, Comfort, Productivity
Cutting Edge Technologies	Professional Skills Beyond Engineering

The Great Debate	Renewable Energy Systems and Net Zero Buildings
Modern Residential Systems	

- MPG looking for co-sponsoring for an event that is being planned
- Conference paper Session- High Glide, Lower GWP Refrigerants for St Louis
  - Seminar- Design of Advanced Refrigeration Air Conditioning Systems- Orlando

**ACTION:** Motion to approve *co-sponsoring a conference/seminar with MPG*  
*Motion was made by Sonny Sundaresan and seconded by Chis Seeton.*  
*Motion rejected: 3/ 3/ 1/ [CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*

Refrigerants codes and standard task force group representing refrigerant and equipment manufacturers, gov't agencies, AHRI, etc. talked with Deb Kennoy about co-sponsorship. They will do all the work. This is an independent group, Mark Menzor is the lead. It may be a good vehicle to get more technical programs into ASHRAE.

**ACTION:** Motion to co-sponsor a forum on codes and Standards for 2L in Orlando, Bob Richard Chair  
*Motion was made by Chris Seeton and seconded by Steve Kujak.*  
*Motion passed: 7/ 0/ 0/ [CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*

**ACTION:** Motion to accept a seminar titled “Highlights from the 24th IIR International Congress of Refrigeration” presenting three papers with the latest issues/developments related to low GWP refrigerants, MCHX, and heat pumps in smart energy systems,  
*Motion to was made by Chris Seeton and seconded by Sonny Sundaresan.*  
*Motion passed: 7/ 0/ 0/ [CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*

## 7. STANDARDS (Dave Wilson)

- A. ASHRAE Standard 34, *Designation and Safety Classification of Refrigerants* (D. Wilson)
  - Nine refrigerant applications were submitted for the Atlanta meeting.
  - Standards Committee approved five refrigerant addendas from the Chicago meeting.
  - Three continuous maintenance comments still being resolved with the commenter.
  - Tolerance and accuracy of properties in refrigerant applications being looked at.
  - New interest categories were approved.
- B. Guideline 6 (S. Kujak)
  - Complete and submitted. Final editorial changes are being made by ASHRAE staff, and page proofs will be sent to GPC members.
- C. SPC-177P, *MOT Fractionation Measurement of Refrigerant Blends* (R. Richard)
  - Publication/Public Review Draft submitted to ASHRAE
  - This document was originally intended to be a method of test. It has now been changed to a Guideline, and a new number will be assigned.
  - The guideline will go out for publication public review.
- D. ISO Standard 817, *Refrigerants –Designation and Safety Classification* (S. Sundaresan)
  - Published 2014.
  - Meeting tomorrow (Tuesday) from 8am-12pm. In the process of forming a maintenance agency with task force groups (Designation & Nomenclature, Flammability, Toxicity) to maintain the refrigerant property tables.
  - Working Group 8 being formed—Method of testing for burning velocity

- E. ISO Standard 5149, *Refrigeration Systems and Heat Pumps* (D. Wilson )
  - Proposals for safety distances and charge limits

**8. WEB SITE** (Sean Cunningham)

The web page is up to date, and minutes and agenda are posted. An “easier to use” web page template will be rolled out in Fall 2015.

<http://tc31.ashraetcs.org/meetings.html>

**9. OLD BUSINESS**

None

**10. NEW BUSINESS**

Sonny Sundaresan wanted to recognize Dave Wilson and Deb Kennoy for receiving the ASHRAE Distinguished Service Award

**11. MEETING ADJOURNED** at 6:10 pm.

*Motion to adjourn was made by Sonny Sundaresan and seconded by Kevin Connor.  
Motion passed: 6/ 0/ 0/ [CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*