

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

1791 Tullie Circle, N.E., Atlanta, GA 30329
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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.**

These minutes have been approved by this committee.

TC/TG/TRG NO TC 3.1

Date January 25 2016

TC/TG/TRG TITLE Refrigerants and Secondary Coolants

DATE OF MEETING Jan 25, 2016

LOCATION Orlando, FL

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD
Mark McLinden (Chair) – voting	2014		
Steve Kujak (Vice Chair/Research) – voting	2014		
Warren Clough (Secretary) – voting	2014		
Chris Seeton (Program) – voting	2012		
Ganesan (Sonny) Sundaresan – voting	2014		
Felix Flohr (non-quorum)- voting	2012		
Barbara Minor- voting	2015		
Marc Scancarello- voting	2015		
Debra Kennoy- voting	2015		
Alice Riemer (non-quorum)- voting	2012		
Other Officers & Related			
Kevin Connor (Handbook)	2011		
Dave Wilson (Standards)	2012		
Sean Cunningham (Webmaster)	2013		

Corresponding Members and Guests		
Chungcheng Piao (CM)	Julie Majurin (CM)	Valerie Baish
Yasuhiko Matsuoka	David Halbrooks	Amy Paul (CM)
Robert Low	Osami Kataoka (CM)	Joshua Hughes
Kostas Kontomaris	Knut Petry (CM)	Earl Clark (CM)
Sebastian Herrmann	Kenji Takizawa (CM)	William Kopko
Stephen Spletzer (CM)	Tom Leck (CM)	Robert Richard (CM)
Evan Laganis	Jiro Inove	Ivan Rydkin
Eugene Chen	Keiidi Ohnishi	Hidekazu Okamoto
Ken Shultz	Mark Spatz (RAC liason)	Dongsik Jin
Tatsuro Kobayashi	Jay Kohler (TAC Section Head)	Motoki Shinohara
Sheila Hayter	Takashi Shibanuma	Elaine Leung

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 4:19 PM and attendees introduced themselves.
- B. Establishment of a quorum – 10 voting members were present.

Voting members for this meeting:

Mark McLinden – present
Steve Kujak - present
Warren Clough – present
Chris Seeton – present
Sonny Sundaresan – present
Debra Kennoy- present
Barbara Minor- present
Marc Scancarello- present
Felix Flohr – present (non-quorum)
Alice Riemer – present (non-quorum)

2. AGENDA REVIEW

No revisions or corrections were noted on the agenda.

3. APPROVAL OF SEATTLE, JUNE 2014 MEETING MINUTES

One correction noted was future programs for St. Louis was incorrectly dated as January 2016. It should be titled as June 2016.

Motion to approve draft minutes with the correction noted above was made by Sonny Sundaresan and seconded by Debra Kennoy.

Motion passed: 10 / 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 attached.
- B. Roster Review
Summary of TC3.1 membership and changes, effective July 1st 2016

<u>Position</u>	<u>Members</u>
Chair	Stephen Kujak (V)
Vice Chair	Christopher J Seeton (V)
Secretary	Mr Warren Clough (V)
Research Subcommittee Chair	Mr Stephen Kujak (V)
Standards Subcommittee Chair	Debra Kennoy (V)
Program Subcommittee Chair	Dr Christopher J Seeton (V)
Handbook Subcommittee Chair	Mr Kevin C Connor (V)
Webmaster	Mr Sean Cunningham (V)
Voting member	Sonny Sundaresan (V)
Voting member	Barbara Minor (V)
Voting member	Marc Scancarello (V)
Member Non-Quorum	Knut Petry (V)
Member Non-Quorum	Kenji Takizawa (V)

Chris Seeton agreed to be Vice Chair starting July 2016. Looking for Research, Program, and Handbook Chairs. Xudong Wang from AHRI was suggested for Research because of all the activity with AHRI on flammable refrigerants.

Section 3 Liaison Jay Kohler provided an update- Keep up the good work. If one comes on to a new position, there are several resources to tap into. Check the ASHRAE website for additional training.

5. RESEARCH (Steve Kujak)

A. Report from Research Subcommittee Chairs Meeting

- Strategic plan extended to 2018
- Training material is located on the website for preparing RTARS and Work Statements.
- AHRI has developed a Roadmap for low-GWP refrigerants research. A Flammability research committee formed. ASHRAE needs to support this research. AHRI is looking for additional funding.
- ASHRAE now has established a “New Investigator Award.” Selection is based on ability and potential as a researcher for contributing to the viability of ASHRAE’s engineering effort.
- Nine RTAR’s were reviewed by RAC, four were rejected.
- Must provide reasons for abstentions and respond to Comments on votes.

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. Final report is ~70% complete and should be finished by St Louis.

Action: Kusmeirz, Richard, and Kennoy continue to work on report

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. Investigator is underway with this research, and the PMS has had quarterly teleconferences with the PI and his team. Expected completion is Fall 2016 followed by a presentation in June 2017. This work is proceeding nicely.

Action: PMS continues to monitor progress

Proposed Work Statement 1773: “Ignition Potential from Electrical Devices in Commercial and Residential Applications using 2L Refrigerants”

Team: Warren Clough (Lead), Marc Scancarello, Barbara Minor, Eric Smith, K. Takizawa, R. Richards. The TC approved an RTAR for this project 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, 2015. It was approved by RAC at Atlanta, June 2015. The TC approved a work statement by letter ballot [vote was 9/1/0/10 (CV)], and it was submitted to Mike Vaughn, ASHRAE Manager of Research and Technical Services on December 9, 2015. Mark Spatz recommended we list recommended bidders on the cover sheet, add intermediate deliverables to the tasks, define more quantifiable description to the tasks, and to respond to the one commenter with the negative vote. It was also suggested to consider parallel work by AHRI and incorporate it into the work statement as appropriate. This document will need to be re-voted, on the assumption that substantive changes would be made to the work statement.

Action: WS team (Clough, lead) to revise and submit to TC chair for circulation to the committee and letter ballot

RTAR 1791: "Humidity effects on burning velocity"

Team: Debbie Kennoy (lead), Robert Richards, Julie Majurin, Tom Leck, Els Baert.

This RTAR was approved by the TC at the Atlanta meeting [vote was 7/0/0 (CV)] and submitted to Mike Vaughn, ASHRAE Manager of Research and Technical Services on November 9, 2015. RAC approved with comments at this Orlando meeting. Work Statement is going to be started. Goal is to complete for TC ballot vote by Feb 28 for RAC meeting in April.

Action: RTAR team (Kennoy, lead) to develop work statement and submit to TC chair for circulation to the committee and letter ballot

RTAR-1792: "ASHRAE 34 Toxicity data documentation and mixture calculation"

The TC approved this RTAR by letter ballot [vote was 10/0/0/10 (CV)], and it was submitted to Mike Vaughn, ASHRAE Manager of Research and Technical Services on December 9, 2015. RAC approved with comments at this Orlando meeting. Work Statement is going to be started. Goal is to complete by April for June RAC meeting.

Action: RTAR team (Richard, lead) to develop work statement and submit to TC chair for circulation to the committee and letter ballot

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.

This was discussed at the Seattle meeting (June 2014). The Seattle meeting minutes indicated that the work statement had been prepared and submitted to RAC, but, the draft document was only provided to the RAC liaison for feedback. It was never put to a TC vote and, thus, was never formally put on the RAC agenda. This idea went directly to a Work Statement. Toxicologists from SSPC 34 were on the committee. Kujak provided an overview of the objectives. SSPC 34 Toxicologists feel this is the right approach to take. Need proposed bidders on the cover sheet. Toxicologist will be contacted on possible bidders for this work.

Motion was made to approve the work statement as written by Chris Seeton and seconded by Debra Kennoy.

Motion passed: 10/ 0/ 0/ [CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])

Action: WS team to prepare cover sheet (including suggested bidders) and submit to RAC by Feb 29 for the spring meeting of RAC

C. Proposed RTARs and Ideas

Proposed RTAR: "Defining the 2/2L Flammability Boundary in Standard 34"

A draft RTAR has been prepared by Debbie Kennoy (lead). This topic aims to resolve a continuous maintenance item submitted to SSPC 34 which proposed changing the burning velocity defining the 2/2L boundary from 10 cm/s to a lower value. RTAR was written and is ready for a vote. We don't have the rationale clearly stated for selecting 10 cm/sec. The value came from ISO 817. This RTAR is responding to a SSPC 34 comment and also to have a technically sound basis for the selected value. Suggested to look at the science behind this work and not set the boundary; i.e., the selected contractor should not set the limit. Remove the 4th objective and shorten the title. Need to add funding level and duration- \$125,000, 12 months. For Objective 3, expand boundaries, 5cm/sec, 7cm/sec, 10cm/sec or "higher"....

*Motion was made to accept this RTAR as modified by Chris Seeton and seconded by Sonny Sundaresan
Motion passed: 10/ 0/ 0/ [CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])*

Proposed RTAR: “The Incorporation of Odorants in Flammable Refrigerants to Improve Leak Detection and Safety”

A draft RTAR has been prepared by Marc Scancarello (lead). He is looking for feedback on the RTAR. Goal is to have a letter ballot in time for consideration by RAC at their June meeting. Volunteers to help: Valerie Baish, Julie Majurin, Earl Clark

Action: RTAR team (Scancarello, lead) to revise RTAR and submit to TC chair by early April for circulation to the committee and letter ballot

Update of Research Suggestions-
Effects of Lubricant on the Flammability of Refrigerants
Understanding of the Efficiency of Energy Transfer from Ignition Sources to Refrigerants Gases- Bob Richards, Kenji Takizawa, and Greg Linteris will write an RTAR to be discussed at St. Louis.

Action: RTAR team to prepare RTAR for discussion at St. Louis meeting

Electrical Properties for New Refrigerants- A suggestion from Julie Majurin.

D. ASHRAE Research Liaison Report

No additional information

6. HANDBOOK (Kevin Connor)

The next revision will be for the 2017 edition.

Chapter 29- Refrigerants (Lead—Barbara Minor)

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

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

Revised Chapters 29 and 31 will go out for letter ballot. Need to be approved by June. In Chapter 30, R-1233zd(E) should be added to the handbook, but do not add R-1234yf/R-134a (R-513A).

Handbook Liaison noted the deadlines:

Chapter 29- May 3rd 2016.

Chapter 31- May 24th 2016

Chapter 30- June 14th 2016.

Following the meeting the TC 2.5 (Global Climate Change) Handbook Chair reported that their proposed chapter on “Climate Change” will not appear in the 2017 Fundamentals. Thus, the data on environmental properties of refrigerants that had been deleted from Chapter 29 will have to be reinserted.

Action: chapter lead authors finalize revisions and submit to TC chair for circulation to the committee and letter ballot

Collaborative File sharing website will be available for the next revision. Training will be available.

7. PROGRAM (Chris Seeton)
Jay Kohler (TAC Section Head)

A. Current Program Session (Orlando 2016)

1. Sunday, 3:15, Seminar 20, “Highlights from the 24th IIR International Congress of Refrigeration”
2. Wednesday, 8:00, Seminar 61, “Improving the Efficiency of Low-GWP Commercial Refrigeration Systems,” co-sponsored with 10.07.

B. Session (Seminars, Forums, and Workshops) St. Louis (June 2016) or Las Vegas (Jan 2017)

There is a track titled, “Advances in Refrigeration Systems and Alternative Refrigerants”

Submitting for St. Louis

A. “System efficiency impacts of low-GWP refrigerants: Are we compromising with efficiency?”

Four potential speakers came forward. Title and abstract are due 2/8. Chris Seeton agreed to chair this seminar.

New title-“System Efficiency Impacts of Low-GWP Refrigerants: Is This Our Fall from Grace?”

Motion was made to approve this session was made by Sonny Sundaresan and seconded by Steve Kujak. Motion passed: 10/ 0/ 0/ [CV]. (For / Against / Abstain / Total [Chair Voting [CV] or Chair Not Voting [CNV]])

Action: Seeton confirms participation by speakers and submits seminar package to ASHRAE by Feb 8 deadline

C. Future program idea:

1. Leak detection technologies and sensors; potential co-sponsor with TC 3.8
2. Seminar on R404A replacements (TC 10.7 is leading and submitting)
3. Results from AREP II testing (Alternative Refrigerant Evaluation Program, organized by AHRI— Air Conditioning, Heating, and Refrigerating Institute.
4. Work Workshop on A/B toxicity classification. (Wait until proposed research project is started; give an update on progress and get feedback.)

At the TC 3 breakfast meeting there was discussion with the CEC representative about wanting a refrigeration track at the winter meetings. It was unlikely that there would be a refrigeration track at every meeting, and Las Vegas will not have a refrigeration track. CEC emphasized that the great majority of submitted conference papers are accepted versus a 60% acceptance rate for seminars.

D. Program tracks St. Louis and Las Vegas

June 2016—St. Louis	January 2017- Las Vegas
Advances in refrigeration Systems and Alternative Refrigerants	Fundamentals and Applications
Research Summit	HVAC&R Systems and Equipment
Fundamentals and Applications	Water Energy Nexus
HVAC Systems and Equipment Smart Building Systems/Remote Monitoring and Diagnostics	Commercial and Industrial IAQ
Indoor Environment: Health, Comfort, Productivity	Advances in Mission Critical Design and Operation
Professional Skills beyond Engineering	Climate Change and its Effects on HVAC&R

	Design and Technology
Renewable Energy Systems and Net Zero Buildings	Energy Efficient Industrial Buildings and Life Safety
	Building Operation and Performance

8. STANDARDS (Dave Wilson)

- A. ASHRAE Standard 34, *Designation and Safety Classification of Refrigerants* (D. Wilson)
 - Nine applications from the Atlanta meeting- 3 were tabled, 3 are going to SPLS and PPR, 2 had no comments, and one had a comment challenging the flammability of R-407H.
 - Nine refrigerant applications were submitted for the Orlando meeting.
 - Feb 5 full committee conference call
- B. ASHRAE Guideline 6 (S. Kujak)
 - The 2015 edition of this Guideline has been published and is available through the ASHRAE bookstore.
- C. SPC-177P, *MOT Fractionation Measurement of Refrigerant Blends* (R. Richard)
 - This document was originally intended to be a method of test. It has now been changed to Guideline 39.
- D. ISO Standard 817, *Refrigerants –Designation and Safety Classification*
 - Published 2014.
 - Meeting January 26 (Tuesday) from 8am-12pm. The Designation & Nomenclature, Flammability, and Toxicity subcommittees continue to update the refrigerant property tables as new refrigerants are approved by ASHRAE.
- E. ISO Standard 5149, *Refrigeration Systems and Heat Pumps*
 - Proposals for safety distances and charge limits
 - Discussions start Wednesday afternoon.

9. WEB SITE (Sean Cunningham)

The web page is up to date, and minutes and agenda are posted. The new website is much more user friendly. All minute are on the site back to 2007, as well as presentations and Committee membership.

<https://tc0301.ashraetcs.org/>

10. OLD BUSINESS

None

11. NEW BUSINESS

MTG for low GWP refrigerants- like to have the TC re-affirm a representative. Ken Shultz volunteered to be an alternate.

12. MEETING ADJOURNED at 6:15 pm.

Section 3 Breakfast meeting report.



TAC SH Brkfst
Handout.W16.r1.pdf