



AGENDA

ASHRAE TC 3.1—Refrigerants and Secondary Coolants¹
American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
Hyatt Renaissance, Pike 3 Conference Room
Long Beach, CA
Monday, June 26, 2017, 4:15 – 6:30 p.m.

1. CALL TO ORDER (0:08) [allotted time indicated in parentheses]

Introduction of members and guests

ACTION: Quorum determination.

2. AGENDA REVIEW (0:02)

ACTION: Revise/approve the meeting agenda.

3. MINUTES OF THE LAST MEETING (0:02)

Draft minutes of the January 30, 2016 meeting in Las Vegas were distributed by e-mail to committee members and posted on the TC web page; they are also attached to this agenda.

ACTION: Revise/approve minutes.

4. ROSTER REVIEW AND ANNOUNCEMENTS (0:05)

Voting Members for this meeting (committee terms expire June 30 of year listed):²

Stephen Kujak, Trane, Chair/ (2018)
Kevin Connor, Dow Chemical, Handbook Subcommittee Chair (2020)
Ganesan (Sonny) Sundaresan, Consultant, (2017)
Debra Kennoy, Arkema (2019), Standards Subcommittee Chair
Barbara Minor, Chemours (2019), MTG Low GWP Liaison
Marc Scancarrello, Emerson (2019)
Sean Cunningham, Mexichem Fluor, Webmaster (2020)
Bob Richard, Honeywell (2020)
Knut Petry, Carrier (non-quorum) (2020)
Kenji Takizawa, AIST (non-quorum) (2020)

Other committee officers (non-voting):

Christopher Seeton, Shrieve Chemical, Vice Chair/Program Subcommittee Chair
Ken Schultz, Trane, Research Subcommittee Chair
Warren Clough, Carrier, Secretary

¹ TC 3.1 is concerned with all properties and functions of refrigerants and secondary coolants, including commercial and experimental materials.

² Members may retrieve the complete committee roster from the AHSRAE website:
log on to ASHRAE.org and sign in with your member info (from the “Join or Login” tab at top of page)
the line “Welcome, [your name]” will appear at the very top of the page; click on “My Account”
this brings up your “ASHRAE Member Profile”
click on “Committees” tab (left side of page); this brings up “My Active Committees”
a line with “T-TAC-TC03.01” should appear; click the “roster” link to download a pdf

Liaisons:

Steve Kujak, Trane, RAC Liaison
Michael Vaughn, ASHRAE Staff Liaison
Niels Bidstrup, Grundfoss Management , Standards Liaison
Jay Kohler, Johnson Controls, TAC Section Head
Sheila Hayter, NREL, Handbook Liaison
Michael Bilderbeck, Pickering Firm, TAC Chair
James Bochat, Commissioning Concepts, ALI/PDC

5. RESEARCH SUBCOMMITTEE (1:30 total) (Ken Schultz)

5.1 Report from Research Subcommittee Chairs Meeting (0:05)

5.2 Ongoing Research Projects—Status Reports (0:20)

ITEM	ACTION NEEDED	Recent Notes
1507-RP BINARY REFRIGERANT FLAME BOUNDARY CONCENTRATIONS	TC NEEDS TO FORMALLY APPROVE DRAFT FINAL REPORT RECEIVED IN JUN. 2016 OR AN UPDATED DRAFT BY VOTE AND PROVIDE COMPLETED DISPOSITION OF ASHRAE RESEARCH RESULTS FORM TO MORTS TO CLOSE-OUT PROJECT. <i>TC3.1 Action: None, Report approved, work complete</i>	[170430] Email ballot to approve final report initiated. [170604] Compiled vote as 8-0-0-2; submitted final report to MORTS.
1717-RP IMPROVE ACCURACY AND REPRODUCIBILITY OF ASTM-E681 TEST METHODS FOR FLAMMABILITY LIMIT MEASUREMENT OF 2L FLAMMABLE REFRIGERANTS	FUNDED EXTENSION IN THE AMOUNT OF \$72,485 AND SIX MONTHS OF ADDITIONAL TIME WAS APPROVED BY BOD IN JUNE 2016. Project to complete 3/31/17 <i>TC3.1 Action: PMS to make recommendation to TC 3.1 on recommendation on final report</i>	Work is on schedule and will be completed by March 2017. [170421] Draft final report submitted to PMS.

5.3 ASHRAE/AHRI/DOE Collaboration on Flammable Refrigerants Research (0:20)

Three ASHRAE lead projects have been developed to work statement phase and funded by ASHRAE. Here is an update on all projects

ITEM	ACTION NEEDED	Recent Notes
1806-RP FLAMMABLE REFRIGERANTS POST-IGNITION SIMULATION AND RISK ASSESSMENT UPDATE	Contractor – Gexcon – Work progressing PES Schultz (chair), Omar Abdelaziz, Minor, Linteris, Phil Johnson, Takizawa, Wang. RAC members: Kujak and Khankari <i>TC3.1 Action: None, for information only</i>	[170103] Contract has been negotiated and signed. [170118] Online kick-off mtg held w/PMS and PI. [170129] PI/PMS meeting held in Las Vegas. [170428] PMS approved cost change proposal to calibrate/verify flashing liquid sub-model in CFD code. [170604] MT -> TechC -> BoD approval.

1807-TRP GUIDELINES FOR FLAMMABLE REFRIGERANT HANDLING, TRANSPORTING, STORING AND EQUIPMENT SERVICING, INSTALLATION AND DISMANTLING	Contractor Navigant Consulting – Work progressing PMS: Fricke (chair), Randy Cooper, Satheesh Kulankara, Mooris, Kashif Nawaz, Wang. <i>TC3.1 Action: None, for information only</i>	[170129] MTG voted to approve PES recommendation for contractor. [170208] RAC approved recommended contractor. [170301] Contract start date.
1808-TRP-C SERVICING AND INSTALLING EQUIPMENT USING FLAMMABLE REFRIGERANTS: ASSESSMENT OF FIELD-MADE MECHANICAL JOINTS	Contractor – Creative Thermal Solutions – Work progressing PMS: Fricke (chair), X Wang, P Geoghegan, D Halel, P Johnson, K Nawaz, M Scancarello, <i>TC3.1 Action: None, for information only</i>	[170112] RFP posted to ASHRAE Research website 10-Jan; proposals due 20-Feb. [170214] Proposal deadline extended to 27-Feb. [170407] MTG.LowGWP voted to approve recommended contractor; passed to RAC. [170426] Contract in negotiation. RAC asked for more detailed test matrix to ensure getting value for additional funds requested (\$120K total); PMS and PI working on this.

5.4 Proposed Research Projects (0:40)

The following items are on the TC Research Plan:

Item	ACTION NEEDED	Recent Notes
1773-WS IGNITION POTENTIAL FROM ELECTRICAL DEVICES IN COMMERCIAL AND RESIDENTIAL APPLICATIONS USING 2L REFRIGERANTS	RESUBMIT WORK STATEMENT OR DROP. FIRST SUBMISSION OF WS WAS RETURNED BY RAC IN JAN. 2016. RTAR WAS ACCEPTED IN JULY 2015. TOPIC EXPIRES FROM SOCIETY RESEARCH IMPLEMENTATION JULY 1, 2019 <i>TC3.1 Action: AHRI to provide update. Reconsider additional project to compliment AHRI 8017</i>	A decision by the TC was made to put this project on hold till the completion of a related AHRI project is complete. At that time the final report of that project will be reviewed to determine the need for any additional information this project could add. [160805] Continue on hold. XudongW noted that AHRI 8017 is now scheduled for Mar2017 completion (orig Dec2016).
1791-WS HUMIDITY EFFECTS ON BURNING VELOCITY	SUBMIT WORK STATEMENT FIRST DRAFT BEFORE DECEMBER 15, 2017 OR TOPIC WILL BE REMOVED FROM DISPLAY ON PLAN. WS MUST BE SUBMITTED AND APPROVED FOR BID BY FEBRUARY 1, 2020 OR TOPIC WILL BE DROPPED PERMANENTLY BY RAC. RAC APPROVED RTAR AT 2016 WINTER MEETING. <i>TC3.1 Action: None, waiting on RAC review</i>	161209] RAC returned WS w/comments (but have not seen anything). [170130] Rec'd RAC comments. [170308] Forwarded RAC comments to WS authors.
1792-WS ASHRAE STANDARD 34 TOXICITY DATA DOCUMENTATION AND MIXTURE CALCULATION	SUBMIT WORK STATEMENT FIRST DRAFT BEFORE DECEMBER 15, 2017 OR TOPIC WILL BE REMOVED FROM DISPLAY ON PLAN. WS MUST BE SUBMITTED AND APPROVED FOR BID BY FEBRUARY 1, 2020 OR TOPIC WILL BE DROPPED PERMANENTLY BY RAC. RAC APPROVED RTAR AT 2016 WINTER MEETING. <i>TC3.1 Action: Trane made major upgrades to current calculator to fixed problems and add features.. Should TC 3.1 withdrawn this WS?</i>	[161219] Draft WS (dated 08-Nov) circulated to TC 3.1 for vote to approve and submit to RAC; response due 02-Jan. [170130, Las Vegas] Letter ballot vote to approve WS was 8-0-0-2. [170206] Ken sent WS to MORTS. [170413] WS resubmitted with proposal evaluation weighting factors added.

<p>1794-WS THE INCORPORATION OF ODORANTS IN REFRIGERANTS TO IMPROVE LEAK DETECTION</p>	<p>SUBMIT WORK STATEMENT FIRST DRAFT BEFORE AUGUST 15, 2018 OR TOPIC WILL BE REMOVED FROM DISPLAY ON PLAN. WS MUST BE SUBMITTED AND APPROVED FOR BID BY OCTOBER 1, 2020 OR TOPIC WILL BE DROPPED PERMANENTLY BY RAC. RAC APPROVED RTAR AT 2016 WINTER MEETING.</p> <p><i>TC3.1 Action: None, many need to consider having CPSC funding as primary sources and lead?</i></p>	<p>[160815] Revised RTAR submitted to MORTS. [161209] RAC accepted RTAR w/comments. [170308] Marc circulated first draft of WS to team. [170326] Rec'd final draft WS. [170430] Sent WS out for email ballot. [170512] Compiled vote on WS as 8-0-0-2; submitted WS to MORTS. [170517] Cofunding or Phase 1 by CPSC?</p>
<p>1797-WS ASSESSMENT OF THE A/B TOXICITY CLASSIFICATION USED IN STANDARD 34</p>	<p>RESUBMIT WS OR DROP. RAC RETURNED WS AFTER 2016 ANNUAL MEETING FOR FIRST TIME. RESUBMIT REVISED WS WITH LETTER EXPLAINING HOW RAC'S COMMENTS WERE ADDRESSED IN REVISION WITH NEW TC VOTE OR NOTIFY RAC THAT WS HAS BEEN DROPPED BY TC FOR FURTHER CONSIDERATION. RTAR STAGE SKIPPED - NOT ON PLAN YET.</p> <p><i>TC3.1 Action: None, for information only</i></p>	<p>Consensus that no need for revote - no change in intent, just clarification. [170113] Still working on revisions.</p>
<p>1802-WS DEFINING THE 2 / 2L FLAMMABILITY BOUNDARY IN STANDARD 34</p>	<p>SUBMIT WORK STATEMENT FIRST DRAFT BEFORE MAY 15, 2018 OR TOPIC WILL BE REMOVED FROM DISPLAY ON PLAN. WS MUST BE SUBMITTED AND APPROVED FOR BID BY JULY 1, 2020 OR TOPIC WILL BE DROPPED PERMANENTLY BY RAC. RAC APPROVED RTAR AT 2016 WINTER MEETING.</p> <p><i>TC3.1 Action: None, for information only</i></p>	<p>[170106] BMinor needs to step back as WS author; DKennoy has taken the lead. 1st draft circulated to WST. [170113] Draft WS circulated to TC for review and comment; address at Las Vegas mtg.</p>

5.5 Update of TC Research Plan (0:05)

A spreadsheet summarizing the TC research plan has been posted on the TC web page; it is under the "Research" tab at: <https://tc0301.ashraetcs.org/documents.php>. This version includes attachments, including current versions of the RTARs and WS.

6. HANDBOOK (FUNDAMENTALS) SUBCOMMITTEE (0:10) (Kevin Connor)

TC 3.1 is responsible for Chapters 29 (Refrigerants), 30 (Thermophysical Properties of Refrigerants), and 31 (Physical Properties of Secondary Coolants) in the Handbook of Fundamentals.

The 2017 revisions are complete. The next revision will be for the 2020 edition.

Chapter 29- Refrigerants (Lead—Steve Kujak)

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

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

ACTION: For information only, TC to take action as necessary. Do we need to schedule a recurring Handbook Meeting?

7. PROGRAM (0:10) (Chris Seeton)

7.1 Programs at the Long Beach meeting:

Wednesday, 8:00 – 9:30, Seminar 50— High Efficiency Commercial Refrigeration Systems with Natural Refrigerants

Sponsor: 10.7 Commercial Food and Beverage Refrigeration Equipment, Refrigeration Committee, TC8:1 Positive Displacement Compressors; TC3.1 Refrigerants and Secondary Coolants

Chair: Georgi Kazachki, Ph.D., Member, Dayton Phoenix Group, Inc., Dayton, OH

1. *Doing It All Efficiently with CO2 Refrigeration Anywhere in the World* Klaas Visser, P.E., Affiliate, KAV Consultants Pty Ltd, Kangaroo Flat, Australia
2. *Design and Performance Validation of Ultralow Charge Ammonia Cascade System for Retail Food Environment* Masood Ali, Kysor/Warren, Columbus, GA
3. *Opportunities for Utilizing Two-Phase Ejectors to Increase*

Efficiency of Commercial Refrigeration Systems Using Natural Refrigerants Stefan Elbel, Ph.D., Member, Creative Thermal Solutions and University of Illinois at Urbana-Champaign, Urbana, IL
4. Packaged Ammonia/CO2 Systems for Refrigeration Scott Mitchell, Associate Member, Southern California Edison, Irwindale, CA

There was a request from Steve Brown to co-sponsor a program in Las Vegas. TC 3.1 voted to co-sponsor but it was not published in the program. Program is called Low-GWP Alternative Refrigerants and Their Applications, Part 1 & 2

7.2 Future program plans

Proposals for Seminars, Forums, and Workshops for the Chicago meeting are due August 1, 2017. There is a refrigeration track.

January 2018—Chicago	June 2018 - Houston
Systems and Equipment	HVAC&R Systems and Equipment
Fundamentals and Applications	Fundamentals and Applications
Standards, Guidelines and Codes	District Energy and Cogeneration Plants
Earth, Wind and Fire	Safeguarding your HVACR System
Transportation IAQ and Air Conditioning	Residential: Modern Buildings in Hot, Humid Climates
Tall Buildings	Professional Skills
Modeling Throughout the Building Cycle	Research Summit
Heat Exchange Equipment	HVACR Control Freaks
Refrigerant Mini Track @ Expo	HVACR Analytics
Residential Mini Track @ Expo	

Refrigerant Mini Track@ Expo Update:

A number of conference calls were held with section 3 and MTG Low GWP Refrigerants program chairs and alternates assigned from Section 3 to come up with a plan for the refrigerant mini track to submit –sessions, titles, presenters and abstracts to CEC before Long Beach. Steve Kujak submitted a plan to CEC on June 13. Proposed plan sent with agenda

Program Ideas from Las Vegas

“How to design systems with refrigerants – “The perils and pitfalls of NOT using Guideline 6”, Steve Kujak
Leak detection technologies and sensors; potential co-sponsor with TC 3.8
Seminar on R404A replacements (TC 10.7 is leading and submitting)
Results from AREP II testing (Alternative Refrigerant Evaluation Program, organized by AHRI—Air Conditioning, Heating, and Refrigerating Institute
Workshop on A/B toxicity classification. (Wait until proposed research project is started; give an update on progress and get feedback.)

ACTION: Discuss program ideas, identify session chairs and vote on approving or co-sponsor sessions.

8. STANDARDS (0:05) (Debbie Kennoy)

TC 3.1 is the cognizant technical committee for ASHRAE Standards 34, Guideline 6, and Guideline 39 (formerly Standard 177p).

8.1 ANSI/ASHRAE Standard 34, Designation and Safety Classification of Refrigerants.

Action: Update from Debbie Kennoy

8.2 ASHRAE Guideline 6, Refrigerant Information Recommended for Product Development and Standards

The 2015 edition of this Guideline has been published and is available through the ASHRAE bookstore.

8.3 ASHRAE Guideline 39p (formerly SPC-177p), Method of Test for Measuring Fractionated Compositions of Refrigerant Blends (Bob Richard)

This MOT was converted to a Guideline. It was sent out for a 45-day public review (March 4 – May 9, 2016). No comments were received.

Action: Update from Bob Richards

9. WEB SITE (0:02) (Sean Cunningham)

ASHRAE has migrated the TC web sites to a new format, and the TC 3.1 web site is now in the new format. Our web page has the agenda for the current meeting, minutes from past meetings, slides from past presentations, and more. The new URL for the TC 3.1 web page is:

<https://tc0301.ashraetcs.org>

10. OLD BUSINESS

None

11. NEW BUSINESS

11.1 Steve Ferguson – ASHRAE Manager of Codes – Discussion of how your TC might be able to get involved with ASHRAE Standards Development, US Model Code Development, and International Standards Development.(0:10)

ASHRAE is finding that many members of ASHRAE Technical Committees may not be aware of how ASHRAE is involved with these activities. He would like to give a brief overview of what ASHRAE does, how TCs might be able to get involved, and answer any questions TC members may have.

12. NEXT MEETING

2018 ASHRAE Annual Meeting; Chicago; January 20 – June 24th, 2018.
TC 3.1 will meet Monday, January 22.

13. ADJOURN

ATTACHMENTS:

1. Draft minutes: Las Vegas
2. Research Plan:
3. Chicago MiniTrack Proposal