

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
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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. TC 10.3 DATE March 20, 2016

TC/TG/TRG TITLE Refrigerant Piping, Controls and Accessories

DATE OF MEETING January 26, 2016 LOCATION Orlando, FL

| MEMBERS PRESENT | YEAR APPTD | MEMBERS ABSENT | YEAR APPTD | EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE |
|---------------------------|------------|---------------------------|------------|--|
| Kent Anderson, Vice Chair | 2015 | Gordon Struder, Chair | 2014 | Daniel Cowan, CM |
| Wayne Borrowman | 2012 | Dan Dettmers | 2014 | Jim Caylor |
| Willis "Bill" Brayman | 2014 | Lane Loyko | 2015 | Todd Jekel, CM |
| Richard Love | 2014 | Robert Jones (Non-Quorum) | 2013 | Mary Kimlinger |
| Jim Young | 2013 | Charles Stout, Webmaster | Resigned | Tom Leighty |
| | | | | Tim Leddon |
| | | | | Sam Martin, CM |
| | | | | Robert Alan Neeley, YEA |
| | | | | Caleb Nelson, CM |
| | | | | Pat Noonan |
| | | | | Andy Pearson |
| | | | | Darrell Peil, CM |
| | | | | Charlie Petty, PCM |
| | | | | Doug Reindl, CM |
| | | | | Jason Robbins, REF Liaison/YEA |
| | | | | Bill Ronca, PCM |
| | | | | Dave Rule |
| | | | | Joe Sanchez |
| | | | | Steve Sanders, CM |
| | | | | Greg Scrivener, CM/YEA |
| | | | | Glen Steinkoenig |
| | | | | Jim Tauby, Section 10 Head |

DISTRIBUTION

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

| | |
|--|---|
| TAC Section Head: Jim Tauby | |
| TAC Chair: Thomas M. Lawrence | |
| All Committee Liaisons As Shown On TC/TG/TRG Rosters: | Gerald D. Hartford, Jr., CTTC Liaison John Shonder, RAC Liaison Cecily Grzywacz, STDS Liaison |
| Manager of Standards Manager of Research & Technical Services | Stephanie Reiniche Mike Vaughn |

Meeting Minutes

Meeting of the
ASHRAE Technical Committee (TC) 10.3, Refrigerant Piping, Controls, and Accessories
Orlando Hilton
Orlando, Florida

Tuesday, January 26, 2016; 1:00 – 3:30 pm

I. CALL TO ORDER/INTRODUCTIONS

Vice Chair Kent Anderson called the meeting to order at 1:00 pm (EST). Members and guests introduced themselves. There were 5 voting members present out of 9 total current voting members: Kent Anderson, Wayne Borrowman, Bill Brayman, Richard Love, and Jim Young. A quorum was established. An attendance sheet was circulated.

II. ADDITIONS/CHANGES TO AGENDA

There were no changes or additions to the agenda.

III. CHAIR'S REPORT

Vice Chair Anderson reported that Chair Gordon Struder was not able to attend due to weather related flight cancellations, and Secretary Eric Smith was ill and not going to be at the meeting. Dan Cowan volunteered to take minutes during the meeting.

Anderson reviewed items from the Section 10 meeting on Sunday. The George Hightower Award for outstanding TC leadership will be given to Steve Duda (TC 4.3 and TC 9.1); there were no nominations for the 2015-2016 ASHRAE Research Award. Four (4) new Multidisciplinary Task Groups (MTGs) have been established: (1) Avoided Source Energy Consumption Due to Waste Heat Recovery and Heat Pump Technologies; (2) Impact of Energy Standards and Technology on Energy Savings/Performance; (3) Indoor Swimming Pool Air Quality and Performance; and, (4) Occupant Behavior in Buildings. An updated template for TC web sites has been created and feedback/suggestions are requested – the TC 10.3 web site is using the template. The Conferences and Exposition Committee (CEC) and Technical Activities Committee (TAC) have asked for input by June 1 on the technical program submission process. Wi-Fi access is available at this meeting with the network and password. Another BETA test of the Remote Participation Meeting (RPM) is being conducted in Orlando. Upcoming deadlines are: TC Rosters for 2016-2017 are due 1/21/2016, Orlando TC Activities form is due 1/27/2016, and seminar or forum proposals for the St. Louis meeting (June 2016) are due 2/8/2016.

Other reminders from the Section 10 meeting included:

- The ASHRAE Code of Ethics was reviewed and mentioned.
- New members and guests are welcomed to the meeting, and are invited to be involved in the TC.
- TC 10.3 Subcommittees can now meet via conference calls or web meetings; requests for the meetings should be sent to Mike Vaughn, ASHRAE Manager of Research and Technology (mvaughn@ashrae.org).
- The TC web site should be kept up to date with posting of minutes and agendas.

CEC requests suggestions for future meeting track topics. There was no refrigeration track for the Orlando meeting; there is a refrigeration related track planned for the St. Louis meeting (Track 1, Advances in Refrigeration Systems and Alternative Refrigerants, with 7-10 sessions). There is no refrigeration track planned for the January 2017 meeting in Las Vegas.

Upcoming workshops, conferences and events are:

- 2016 ASHRAE annual meeting – St. Louis, MO; June 25-26, 2016.
- 2016 Purdue Compressor/Refrigeration Conference - West Lafayette, IN; July 11-14.
- 2017 ASHRAE winter meeting – Las Vegas, NV; January 28 – February 1, 2017.

IV. MEETING MINUTES APPROVAL

Draft minutes for the June 2015 (Atlanta) TC 10.3 meeting were distributed prior to the meeting.

Motion to approve the draft TC 10.3 minutes for the June 2015 meeting in Atlanta. Motion made by Jim Young, second by Bill Brayman. Motion approved 5-0-0 (CV).

V. LIAISON REPORTS

Jim Tauby, Section 10 Head, introduced himself and offered to help the TC in any way he could.

There were no reports from CTTC, research, standards or handbook liaisons.

Jason Robbins reported on ASHRAE Refrigeration (REF) Committee activities. Refrigeration programs for Orlando included: Seminar 20 - Highlights from the 24th IIR International Congress of Refrigeration, Seminar 37 - Best Practices in Manufacturing, Field Installation and Servicing Refrigeration and Air Conditioning Systems, and Seminar 65 - Compression Challenges for Low-GWP Refrigerants. Four future programs are planned for the St. Louis meeting refrigeration track and for the January/February 2017 Las Vegas meeting: Latest Advances in Magnetic Refrigeration (St. Louis), Safety Considerations for AC and Refrigeration Equipment in Developing Economies (Las Vegas), Optimization of Direct AC Systems with lower GWP refrigerants (Las Vegas), and Status of Food Cold Chain for Developing Economies (Las Vegas).

Milt Garland & Comfort Cooling Award nominations are due May 1. Andy Pearson wrote a column for the January ASHRAE Journal about Milt Garland and promoting the awards. Honors and Awards Committee and Members Council will consider a recommendation by the REF Committee to change the name of the Refrigeration Comfort Cooling Award to the Comfort Cooling Award.

REF has formed several subcommittees: ASHRAE Learning Institute (ALI), Programs, Refrigeration Handbook, Position Documents, Developing Economies and UNEP/ASHRAE Partnership. The current ASHRAE Ammonia Position Document is due for an update and revision; Dave Rule is Chair of the committee.

VI. MEMBERSHIP

Wayne Borrowman provided a membership subcommittee report. Current members whose terms expire in June 2016 are Gordon Struder and Wayne Borrowman. New voting members will include: Steve Sanders and Eric Smith, and Gordon Struder will be extended for 1 year as Chair. Move Bill Ronca from PCM to CM.

VII. HANDBOOK

Jim Young provided an update on the TC 10.3 assigned Refrigeration Handbook chapters, and distributed a report on current status [Handout A]. TC 10.3 is responsible for Chapters 1, 2, 3 & 10 of the 2014 ASHRAE Refrigeration Handbook. Revisions to current chapters will need to be ready by the January 2017 TC meeting, so the full TC can review them between February-June 2017. Final TC approval is required by the June 2017 ASHRAE meeting.

Chapter 1 (Halocarbon Refrigeration Systems).

Caleb Nelson is the lead reviewer. Not much has happened with Chapter 1 so far. The plan was to team with Charles Stout at Mueller but he has since left Mueller and is apparently no longer able to contribute. Others at Mueller have been contacted to find a replacement but with no luck. The most important part of the update is to fix the copper pipe selection table for R-410A which Caleb says he can do himself pretty quickly. However, he was hoping to get additional input from Mueller on new developments in the copper pipe technology as he believes there are some proposed changes to how the pipe ratings are figured, etc. A lot of this is still fresh or not yet final and so we could be a bit early still in trying to get some of this in concrete in the handbook. Caleb has some projects going on that will be the first to utilize some of the latest UL approved high pressure copper products, so he will be able to speak at a high level to these new products and developments that allow for higher pressures with R-410A and also with CO₂. He intends to add some of this to the Handbook chapter.

Chapter 2 (Ammonia Refrigeration Systems).

Todd Jekel is the lead reviewer. Chapter 2 has been distributed to the reviewers and is currently being reviewed by the following: Compressors - Bruce Griffith, Condensers - Jim Caylor/Richard Love/Gordon Struder, Evaporators - Gordon Struder, Piping- Charles Stout/Gordon Struder, Systems- Greg Scrivener, Liquid Recirculation Systems - Jim Caylor

The lead reviewer has comments from a couple of the reviewers and will work to get the comments and proposed changes into the chapter with track changes.

Chapter 3 (Carbon Dioxide Refrigeration Systems).

Andy Pearson is the lead reviewer. The Chapter 3 report is that very little has happened. The main comment that came back from the reviewers was that they wanted to see pipe sizing tables added for CO₂ as are currently in the ammonia chapter. Andy has given this task to one of the young engineers at his employer and he has nearly completed it so they can be added in at an appropriate point. All the other comments received were less specific and more generic: Andy said at the start of this that it is unlikely that he will be able to create new text for the chapter so if someone makes a proposal and provides first draft text he can do something with it, but so far there have only been general comments and no specific proposals. When he has the tables finished he plans to put them into a first draft of the new chapter and circulate it. He is happy to include anything else (after giving it a review himself) that anyone else gives him as well.

Chapter 10 (Insulation Systems for Refrigerant Piping).

Jim Young is the lead reviewer. A thorough chapter review and update is almost finished. This was done over the course of ~6 phone conferences in the last three years. Many changes were proposed by various persons. All of these have been considered and many of them incorporated. The last few proposed changes were discussed at a phone conference in Jan, 2016. The modifications based on this will be discussed at a phone conference in Feb-March, 2016. A modified chapter for the TC 10.3 to review is expected to be available prior to the June 2016 meeting, and a vote on this chapter should be considered for the meeting.

VIII. RESEARCH

Todd Jekel, TC Research Chair, reported on current TC 10.3 research projects.

1327-RP (Flow Regime and Pressure Drop Determination for Two-Phase Ammonia Upward Flow in Various Riser Sizes).

Doug Reindl, PMS Chair, provided an update on the project. A draft final report is done. The contractor, DTI, has agreed to provide a technical paper and a realistic date for presentation is at the Las Vegas meeting (January 2017).

1569-RP (CFD Study of Hydraulic Shock in Two-Phase Anhydrous Ammonia).

Sam Martin, PMS member, reported on 1569-RP. A remote PMS internet project review meeting was held earlier today, and it worked well. The project includes advanced state-of-the-art research on CFD modeling of two-phase flow in ammonia piping. It was taking ~1 week of computational time per simulation run, but that is now reduced down to ~2 days. The CFD model matches most of the test data results from a prior ASHRAE research project (970-RP), although the model does not match several of the tests because potential homogenous and wall condensation effects are either not being captured, or being taken into account by the model assumptions. This project may need more funding support to extend the work done by the

contractor beyond the original scope of work, and perhaps co-sponsorship from ASHRAE committees interested in water/steam piping shock is possible. Todd Jekel commented that we need to focus on the piping practices to avoid shock events, and the CFD model developed by this research project needs to be focused toward that end. A proposal for an ASHRAE cost extension will be developed by the PMS and submitted to the TC for approval.

1513-WS (Liquid/Vapor Separating Velocities for Industrial Refrigeration Systems).

Todd Jekel indicated there was no report. An RTAR was accepted by RAC in October 2008. A Work Statement (WS) was prepared and submitted in 2010, and it was returned with comments by RAC in February 2011. A revised WS was not completed, and the WS has been dropped from the ASHRAE research plan. Todd indicated he will try to resubmit the WS.

1646-RP (Measurements of Pipe Insulation Thermal Conductivity).

Jim Young reported that a Final Report by Oklahoma State University for 1646-RP has been submitted and was approved. TC 1.8 was the sponsoring committee. The report is available and ready for download (by ASHRAE members), or for purchase.

1703-RTAR (Performance of Vapor Retarder Systems Used on Mechanical Systems).

Jim Young, PMS member for TC 10.3, provided a report on 1703-RP. TC 1.8 is the sponsor, and TC 10.3 is a cosponsor along with TC 4.4. An RTAR for the project was approved by RAC in July 2015, with comments. A Work Statement draft is due by May 2017. Jim commented that the goal of the project is how to develop real world vapor retarder systems.

1721-WS (Oil Return and Retention in Split System Gas Lines with HFC and HFO Refrigerants).

Todd Jekel noted that we need to check on status of the project. [NOTE: The project is sponsored by TC 8.11, and TC 10.3 and TC 3.4 are cosponsors. An RTAR was accepted by RAC with comments in November 2013. A draft WS was submitted in July 2015, and returned with comments by RAC in November 2015. Deadline for WS resubmission is October 2017].

IX. PROGRAM

Dan Dettmers, Program Chair, was not present to provide a report. A summary of Section 10 program ideas from a June 2015 brainstorming session was distributed [Handout B] and discussed.

The idea of a Back to Basics session on piping (“Overcoming Piping Limitations?”) was discussed. Potential topics/speakers for 3-4 presentations were suggested on:

- Aluminum materials
- Piping for new refrigerants
- VRF piping, methods and possible pitfalls
- CO2 and pressure requirements
- Safety standards and piping materials, e.g. applying ASME B31.5
- What about glide

Possible speakers – Greg Scrivener, Caleb Nelson, Bruce Griffith

Motion to approve TC 10.3 development and sponsorship of a Back to Basics piping session for a future meeting. Motion made by Wayne Borrowman, second by Richard Love. Motion approved 4-0-0 (CNV).

X. STANDARDS ACTIVITIES

Todd Jekel reported that there is no chair for the Standards Subcommittee. He will check with Bruce Griffiths to see if he will do it for next year. Greg Scrivener reported that an 80% rewrite of ASHRAE-15 is almost done, with possible approval for public review in St. Louis by SSPC-15. Addendum has been issued on stop valves. They are removing the current 6” size exemption for pressure vessels to comply with ASME Section VIII. Standard 34 has received a number of new refrigerant and blend applications for approval (e.g., HFO’s).

XI. WEBSITE

No report. Charles Stout has resigned, due to a change in jobs. Need web Chair/coordinator.

XII. NEW BUSINESS

Bruce Griffith will be appointed as Standards Subcommittee Chair for 2016-2017.

XIII. ADJOURNMENT

Motion to adjourn was made by Jim Young, with second by Richard Love.

The meeting was adjourned at 3:00 PM (EST).

Next Meeting: St. Louis, Tuesday, June 28, 2016, 1:00 – 3:00 p.m.

Handouts from the meeting

Handout A – ASHRAE TC10.3 Handbook Revision Status.

Handout B – Summary of Section 10 Mass Program Brainstorming Session (Program-a-palloza), Atlanta GA, June 28, 2015.