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# 1791 Tullie Circle, N.E./Atlanta, GA 30329

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**DRAFT**

# 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/TG/MTG/TRG No. TC8.2 DATE June 28, 2022

TC/TG/MTG/TRG TITLE Centrifugal Machines

8y

DATE OF MEETING June 28, 2022 LOCATION In Person Toronto /Virtual - Zoom

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| --- | --- | --- | --- | --- | --- | --- |
| MEMBERS PRESENT | YEAR APPTD | MEMBERS ABSENT | | YEAR APPTD | EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE | |
| Ray Good, Chair | 2019 | K. Kontomaris (VMNQ) | | 2021 | Drew Turner, Vice Chair | |
| Scott MacBain | 2019 |  | |  | Trent Hunt, Secretary | |
| Dan Kemper | 2020 |  | |  | Mark Rogan | |
| Chris Miller | 2021 |  | |  | Michael Stark | |
| Michael Perevozchikov | 2019 |  | |  | Phil Johnson | |
| Brandon Gill | 2021 |  | |  | Justin Prosser | |
| Nicholas Zupp | 2021 |  | |  | Darryl Showalter | |
|  |  |  | |  | Matt Cambio | |
|  |  |  | |  | Tiffany Abruzzo | |
|  |  |  | |  | Tom Watson | |
|  |  |  | |  | Jaime Yeh | |
|  |  |  | |  | Paul Kozlov | |
|  |  |  | |  | Aida Rezaci | |
|  |  |  | |  | Antoine Bou Abboud | |
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| **DISTRIBUTION: *All Members of TC/TG/MTG/TRG plus the following:*** | | | | | | |
| TAC Section Head: Charlie Henck | | | | SH8@ashrae.net | | |
| All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.) | | | | See ASHRAE email alias list for needed addresses. | | |
| Mike Vaughn,  Manager Of Research & Technical Services | | | | MORTS@ashrae.net | | |

Note: These draft minutes have not been approved and not the official, approved record until approved by the TC.

### MINUTES

1. Call to Order at 1:04 PM (EST) Ray Good
2. Introduction of Attendees, Liaisons, Officers and Guests

7 of 7 voting members in attendance, Quorum achieved (initially was 5 of 7)

1. Code of ethics review
2. Agenda review – No changes
3. TC Scope – Centrifugal compressors and chillers

Vote to Continue, Merge, or Dissolve

Motion to Re-Affirm TC8.2 Tech Committee – Chris Miller, Motion/Michael P 2nd (Passed 5, 0, 0, CNV)

1. Approved Minutes Winter Mtg, Las Vegas – Scott MacBain, Motion/Michael P 2nd (Pass 4, 0, 1, CNV)
2. Standards Phillip Johnson
   1. TC 8.2 is the cognizant TC for:
      1. ASHRAE Standard 30-2019 Method of Testing Liquid Chillers
         1. [TC 8.2 is lead; TC 8.5 is co-cognizant]
      2. ASHRAE Standard 184-2020 Method of Test for Field Performance of Liquid-Chilling Systems
      3. ASHRAE Standard 225-2020 Method for Performance Testing Centrifugal Refrigerant Compressors and Condensing Units
   2. TC 8.2 also monitors activity for the following standards of interest to members:
      1. ASHRAE Guideline 22-2012 Instrumentation for Monitoring Central Chilled-Water Plant Eff
         1. [TC 9.1 is cognizant]
      2. ASHRAE Standard 23-2022 Methods for Performance Testing Positive Displacement Refrigerant Compressors and Compressor Units
         1. [TC 8.1 is cognizant]
      3. ASHRAE Standard 90.1-2019 Energy Standard for Buildings Except Low-Rise Residential Bldgs
         1. [TC 7.6 is cognizant]
      4. AHRI Standards 550/590|551/591-2020 Performance Rating of Water-chilling and Heat Pump Water‑heating Packages using the Vapor Compression Cycle
      5. AHRI Standard 1520-2022 Performance Rating of Centrifugal Refrigerant Compressors
      6. ISO TC 86 / SC 4 Testing and rating of refrigerant compressors
   3. Standard 30-2019
      1. ***Addendum a***. Published in May 2020. Mainly clean-up including a requirement to test based on defined operating mode set points.
      2. ***Addendum b***. Published in April 2020. Mainly clean-up including clarification of Δpadj. Republished to add missing calibration workbook (.xlsx).
      3. ***Addendum c***. Addition of adiabatic, free-cooling, and 4-pipe chillers by introduction of hybrid operating modes. APR1 Nov 2020. PPR1 public review expected in 2022.
      4. ***Addendum d***. Review of steady-state criteria. APR1 Nov 2020. PPR1 public review expected in 2022.
      5. ***Addendum e***. Harmonization with AHRI 550/590, Section 4. Addition of air sampling arrays. PPR1 public review expected in 2022.
      6. ***Addendum f***. Inclusion of AHRI 550/590, water pressure drop calculation tool. PPR1 public review closes July 17, 2022.
   4. Standard 30-2022 will consolidate of 2019 version with Addenda a, b, and f.
   5. Membership: Prosser rolling off, Zupp rolling on as new chair.
   6. No action required by TC 8.2.
   7. ASHRAE Standard 184-2020
      1. Standard 184-2016 was published under periodic maintenance (5‑year cycle) by SPC 184.
      2. Disbanded in 2019 after December 2018 publication of ***Addendum a*** to Standard 184-2016.
      3. In Orlando (January 2020) TC 8.2 voted to recommend reaffirmation of the standard. Recommendation was approved by SPLS & StdC, then ASHRAE staff merged the content of ***Addendum a*** into the standard and published as a new edition.
      4. Standard 184-2020 was published in November under periodic maintenance.
      5. TC 8.2 needs to decide if and when to form another committee, if there is interest to revise the standard (e.g. additional work on the uncertainty calculator spreadsheet workbook). 5-year cycle would need to publish next edition by 2025, deadline to decide “withdraw, reaffirm, or revise” will be 2024 but can act earlier.
   8. ASHRAE Standard 225-2020
      1. Standard 225-2020 was published under periodic maintenance (5‑year cycle) SPC 225. SPC 225 has been disbanded.
      2. TC 8.2 will need to decide if and when to form another committee to revise the standard. 5-year cycle would need to publish next edition by 2025, deadline to decide “withdraw, reaffirm, or revise” will be 2024 but can act earlier.
   9. ASHRAE Guideline 22-2012
      1. Guideline 22-2012 was published with editorial updates to references as revision to 2008 edition.
      2. GPC 22 formed in 2016 and drafted an update. PPR1 during 2021 (Jul16-Aug30), received 26 comments from 5 commenters. Comment responses sent to commenters, draft revisions in process. Anticipate a PPR2 (perhaps PPR2 ISC) during 2022 to resolve comments.
      3. Expect publication by end of 2022.
   10. ASHRAE Standard 23
       1. Standard 23.1-2019 published “Methods of Testing for Performance Rating Positive Displacement Refrigerant Compressors and Condensing Units That Operate at Subcritical Temperatures of the Refrigerant”
       2. Standard 23.2-2019 published “Methods of Test for Rating the Performance of Positive Displacement Compressors that Operate at Supercritical Pressures of the Refrigerants”
       3. Standard 23-2022 published “Methods for Performance Testing Positive Displacement Refrigerant Compressors and Compressor Units” combines and supersedes 23.1 & 23.2.
       4. There remains potential for either a future merger of 23 and 225, or perhaps harmonization activities.
   11. ASHRAE Standard 90.1-2019
       1. Standard 90.1-2019 published + numerous published addenda = 2022 edition (soon)
          1. <https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/addenda-to-standard-90-1-2019>
       2. ***Addendum w*** published 2021-Feb. Revisions to chiller sizing requirements for use in Appendix G baseline building design.
       3. ***Addendum x*** published 2021-Dec (released 2022-Feb). Revisions to Kadj used for establishing minimum efficiency requirements for centrifugal chillers at non-standard rating conditions.
       4. ***Addendum y*** published 2021-Dec. Revisions to add minimum efficiency tables for heat pump and heat recovery chillers.
       5. ***Addendum cj*** published 2022-Apr. Fixes errors in Path A chiller cooling efficiency and capacity ranges in Table 6.8.1-16 in the 75~400 ton range.
       6. ***Addendum cn*** pending publication (no PPR), add informative notes to each pertinent element within mandatory and prescriptive sections 6.4 and 6.5, indicating that Guideline 36 has related detailed sequences.
   12. AHRI Standards 550/590|551/591
       1. **AHRI 550/590 (I-P) and 551/591 (SI) – 2020, *Performance Rating of Water-Chilling and Heat Pump Water‑Heating Packages Using the Vapor Compression Cycle***
          1. 2020 Editions of both standards are published as AHRI Standards, ANSI approval in process (status ?). Include reference to ASHRAE 30 for method of test.
          2. Project charter scope of revisions for next edition includes the following items:
             1. Review tolerances and incorporate units with variable flow
             2. Continue to work toward harmonizing section 4 with ASHRAE 30
             3. Review uncertainty analysis reporting requirements
             4. Adiabatic cooled condensers
             5. Heat Pump Part-Load Metrics
             6. Review of rounding throughout documents
             7. Review Standard Rating Conditions
             8. Regional part load metrics
   13. AHRI Standard 1520
       1. **AHRI Standard 1520-2022, *Performance Rating of Centrifugal Refrigerant Compressors***
          1. This standard will provide a rating method for centrifugal compressors and a calculation method to compare centrifugal compressors with positive displacement compressors.
       2. Reference to ASHRAE 225, *Methods for Performance Testing Centrifugal Refrigerant Compressors and Condensing Units*
       3. Similar format to AHRI 540, *Performance Rating of Positive Displacement Refrigerant Compressors and Compressor Units*
       4. AHRI Compressor Standards Technical Committee will maintain the standard (responsible for a total of 7 standards including 1520).
   14. ISO/TC 86/SC 4
       1. TC 86: Refrigeration and air-conditioning
          1. SC 4: Testing and Rating of refrigerant compressors
             1. WG2 – **positive displacement** compressor standard

Focus is emerging markets

* + - * 1. WG3 – **centrifugal** compressor standard

Draft is based on AHRI 1520 and JB/T 12843

* + - * 1. WG4 – ISO 917 to be updated as a method of test for compressors

Scope: both positive displacement **and** centrifugal compressors

1. Section Chair Report Charlie Henck (filled in for Kevin Mercer)
   1. Programs due by July 9, 2022
   2. New Rosters due by July 1, 2022
2. MTG.Low GWP: Phil Johnson
   1. The MTG met 2022-Jun-26 and will meet again Wed Jun 29.
   2. Program Subcommittee. Seeking programs from TCs for co‑sponsorship.
   3. Codes & Standards Subcommittee meets Tue Jun 28 (now). Updated a chapter talking points document and a 2-page summary on transition to 2L refrigerants.
   4. Research Subcommittee met 2022-Jun-13, current activity at the PMS level.
   5. Research projects on-going include RP-1806 and RP-1855. Monitoring a few projects sponsored by other TCs.
   6. RP-1806 “Flammable Refrigerants Post-Ignition Simulation and Risk Assessment Update”
      1. Start date: Jan-2017.
      2. Slow progress. PMS received revised Task 1 interim report Jan-2022.
      3. Original scope included updating AHRI risk assessments for 2L refrigerants in 5 types of equipment, including chillers (centrifugal & screw, machinery room).
      4. Project has re-allocated the budget (more to Task 1) and not yet clear what scope will be reduced (or if more funding will be requested to complete original scope).
      5. PMS will soon receive a pilot study that completes the Task 2 and Task 3 work for just a small subset of the original scope (reach-in coolers). Results will determine go/no-go/redirect for remainder of the project
   7. RP-1855 “Determination of the Impact of Combustion Byproducts on the Safe Use of Flammable Fluorinated Refrigerants”
      1. Start date: Jan-2020
      2. Slow progress to finalize the report. PMS sent second round of requested revisions to contractor Dec-2021. Contractor sent revised report Mar-2022. PMS final review in process.
   8. More detailed report document available for the meeting minutes.
   9. Reconfirm the representatives from TC 8.2 (Primary: Phil Johnson, Alternate #1: Laurent Abbas, Alternate #2: Ray Good).
3. Research: Darry Showalter
   1. Research S/C Chair Breakfast notes of interest
      1. Research Chairs breakfast is scheduled for February 11th. Nothing to report today.
   2. Current Activities
      1. Research Subcommittee online meeting was held with Handbook & Program on June 7th, 2021
   3. Project Status
      1. 1716 - Oil concentration of field-installed liquid chillers with flooded type evaporators.
         1. Went out for bid but no bidders
         2. Looking for 3 good suggestions from this group as to what bidders might be able to do this.
         3. Need to resubmit with new list of bidders
      2. 1793 - Development of Method of Test for Motor Component Thermal Conductivity
         1. Planning to resubmit
         2. TC8.1 is taking the lead on this one and will resubmit from the comments.
      3. 1879 – Foamability properties of LGWP Refrigerant and Oil Mixtures
         1. Sponsored by TC3.4 and Co-Sponsored by TC8.1
   4. Future Activities
      1. HVAC components and low-GWP refrigerants – drop ins and changes that might be necessitated in components
         1. Possible move this to a seminar as most manufacturers likely have this.
      2. Low flow in tubes – Possibly a Seminar as well.
      3. Decarb and heating mode how to get larger heat pumps
4. Programs: Mark Rogan
   1. Combined TC 8.02/8.01 Program Subcommittee Report
   2. 2022 Summer Meeting, Toronto, ON now a combination of In Person and Virtual
   3. Subcommittee Meeting: June 20th, 12:00 am -2:00 pm EST
   4. Attendees: Mark Rogan, Drew Turner, Matt Cambio, Daryl Showalter, Justin Prosser, Margaret Matheson, Michael Perevozchikov, Davide Ziviani, Ray Good, Craig Bradshaw, Kris Crosby, Chris Seeton, Dan Kemper, Erik Anderson, Alex Schmig, Georgi Kazachki, Tiffany Abuzzo, Jamie Yeh, Hotian Liu, SA Sharif, Phil Johnson, John Neel, Eric Berg, Rupal Choksi, Brian Reynolds, Tom Watson
   5. Toronto Meeting Update: Program Approved: 1 for 1 Co-Sponsored with TC 8.1 for this meeting
   6. Seminar 40 – Chiller-Heater Systems Enabled by Compressors and Ice: Haotian Liu, Ph.D. is chair of seminar. Sponsored by TC8.1 and cosponsored by TC8.2 and 6.9(Thermal Storage). Presenters: Drew Turner(Danfoss), Paul Kozlov(GeoClima), Charlie Marino(AKF Group), Mark MacCracken(Calmac Corp). Wednesday June 29th from 8:00-9:30 EST
   7. Future Programs – Winter Meeting Atlanta Feb. 4th- 8th, 2023
      1. Atlanta recommendations: Continue developing the Danger of Decoupling Efficiency and Decarbonization program for submission by the August 9th deadline. New title discussed.
      2. The Danger Risk of Decoupling Efficiency and Decarbonization: Drew Turner made this suggestion. Possible Track 5(IAQ, Energy Use, Comfort and Health of Sustainable Buildings) We need a chair and speakers.
      3. Back to the Basics: Air-Cooled vs Water-Cooled Chillers: Most likely a Track 2(HVAC&R Systems and Equipment) We need a chair and speakers
   8. Future Program Ideas – Beyond Atlanta
      1. Standard 225 MOT for Centrifugal Compressors – Proposal is to wait until AHRI 1520P is released and commented on. Perhaps 2023 even though it seems the revised standard should be released soon.
      2. Steam Turbines Applications in Centrifugal Chillers
      3. District Cooling Plants; What effect will R-123 retiring have on systems: Co-Sponsor with District Cooling TC
      4. Low Flow Tube Study – Proposal was to develop a program along side the Research Project by the same name
      5. What Impact has 90.1-2019 had on Design Practices regarding a 15° ΔT?
      6. Electrification of Heating Chapter 2: Industrial and Healthcare Markets as well as Hybrid Applications – Possible Track 5 (Cold Climate Building System Design, Operation, and Resilience)
   9. Next Meeting - Subcommittee will meet via conference call in early January 2023.
   10. 2023 ASHRAE Winter Meeting Atlanta:
       1. Important dates:
       2. Aug. 9th Program Proposals Due
       3. Oct. 10th Program accept/reject notifications
       4. Program submission deadline TBD
5. Handbook Scott MacBain
   1. TC 8.1: Refrigeration: Chapter 8 - Factory Dehydrating, Charging & Testing
      1. 2026 Next Revision
   2. TC 8.1 & 8.2: 2024 HVAC Systems & Equipment: Chapter 38 and 43 (due May/July 2023)
      1. Davide Ziviani, Craig Bradshaw, Michael Perevozchikov, Rick Heiden, Scott MacBain, Fred Betz, Drew Turner, Trent Hunt, Steve Duda
      2. Confirm document access on authoring portal: https://authoring.ashrae.org/
      3. Contact Chris Walter (CWalter@ashrae.org) if any issues with Microsoft login
      4. Status at ASHRAE is carryover from January. Timing for their upload of 38 & 43 to portal delayed from March, May, July: Latest Est. TBD TODAY (6/23)!



1. RAC Report Chris Seaton
   1. No report
2. Membership Drew Turner
   1. TC leadership changes – Added Tiffany Bates Abruzzo as Secretary of committee.
   2. Final modifications to TC membership –
      1. Deleted – 13
      2. Delayed submitting final based on confirming Secretary and (if necessary) replacing current role
   3. 21-22 Roster Rollover - Current 2021-2022 roster for your TC, TG or MTG is in effect until after this meeting
   4. How to Import Your TC Roster Information into MS-Outlook - <http://www.ashrae.org/TCs>
3. Webmaster Dan Kemper
   1. General updates and maintenance
      1. Meeting time, agenda and links posted
      2. Winter 2022 draft minutes posted
   2. ASHRAE website administration interface changed
      1. Much easier to make changes and more user friendly
   3. Please send slides from 2022 seminars so they can be added to the presentations section of the website
4. Honor and Awards Ray Good (filled in for Rick Heiden)
   1. THE GEORGE B. HIGHTOWER AWARD
      1. The purpose of the award is to recognize each year an individual for his/her excellence in volunteer service to the area of FG or MTG technical leadership and contribution, which includes all FGs and MTG activities except for research and standards
   2. THE SERVICE TO ASHRAE RESEARCH AWARD
      1. The purpose of the award is to recognize each year an individual for his/her excellence in volunteer service to the area of Society research. The award will serve to heighten general membership awareness of, and interest in, research activities at the Functional Group level.
   3. THE STANDARDS ACHIEVEMENT AWARD  Pursuing for a TC member
      1. The purpose of the award is to recognize excellence in volunteer service to the area of Standards
5. Chairs breakfast Drew Turner
   1. TC Chairs Breakfast Recording - <https://3.basecamp.com/3106353/buckets/15520814/uploads/5071295342>
   2. TCs, TGs, TRGs, and MTGs reorganized into functional groups
   3. Larry Smith - Focus on online meeting formats –
      1. Hybrids/online out of necessity; hybrid needs to continue
      2. Camera on to be active participant; in-person discipline with online format
      3. Suggestion to meet 4-6 times annually in virtual format (??)
      4. ASHRAE Communications Committee created this virtual meeting best practices document
   4. CEC – Vikrant Aute
   5. Decarbonization video (20-30mins)
   6. Decarbonization taskforce – Kent Peterson (Engaging TCs and subject matter experts)
6. Old business Ray Good
   1. Nothing New
7. New business Ray Good
   1. Welcome Tifany Bates as new TC8.2 Secretary
   2. Doodle Pool for Meeting in Atlanta to be sent out. Options:
      1. Monday 2:30 to 4:30 pm
      2. Tuesday 1:00 to 3 pm
8. Adjourn – 3:02 PM EST