

ASHRAE TC 10.1
Custom Engineered Refrigeration Systems
2014 Annual (Summer) Meeting Minutes

2:15 P.M.
Monday, June 30, 2014
WSCC (Washington State Convention Center) Room 614 (6th Floor)
Seattle, WA

Action Items

- A. **All Members:** Standing offer to contact Dennis Dorman or Marty Timm about Standard 15 membership. They are in need of Designer, End User or General to balance the committee membership.
 - B. **Dan Dettmers:** Explore and coordinate possibility of doing a Refrigeration “Lightning” seminar. 10 speakers with 3 minutes to present on a topic.
 - C. **All members:** Call for members to get started on the TC’s Handbook review for the next cycle by contacting Levi Haupt.
 - D. **All Members:** Call to keep the pressure on shepherding the research ideas through the ASHRAE process. Minutes of Section 10 research meeting attached with these minutes. **Don Fenton** will contact by email the committee members to review and prioritize the research ideas that are of interest to the TC 10.1. Top 5 will be discussed in a conference call between meetings.
 - E. **All Members:** Call for the TC to increase refrigeration programs in future ASHRAE meetings.
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1. Meeting called to order at 2:14pm by Don Fenton (Chair)
 2. Introduction of Members and Guests
 3. Establishing Quorum
Sluga, Pearson (International), **Scrivener, Vallort, Caylor, Smith, Young, Dettmers, Fenton (Chair)**. Bold indicates presence. Quorum established.
 4. Approval of New York Meeting Minutes (Smith moved, Young seconded, 4-0-0 CNV [prior to Vallort & Dettmers attendance])
 5. Report on Section Head Meeting (Fenton)
 - Outstanding TC Award is being developed by ASHRAE
 - Training opportunities for new TC officers
 - Hightower Award nominations due 9/1/2014
 - ASHRAE Service Award nominations due 9/30/2014
 - Please update your ASHRAE Bio on ASHRAE website

- Letter acknowledging service to ASHRAE to employer is available if needed
- Teleconference service for ASHRAE business available

6. Liaison Reports

- A. Research – John Shonder
- B. Low GWP Multidisciplinary Task Group (MTG) – Doug Scott
Nothing to report
- C. Handbook – Dan Dettmers
New option for online handbook option for members now

7. Committee Reports:

- A. Handbook – Open
Handbook just went out to members. Need a Handbook chair for the next cycle.
Levi Haupt offered to fill position.
- B. Research – Tom Wolgamont
 - a. Research Summit minutes are included with the minutes from this meeting.
 - b. 1569-PES (Loyko) was rebid this Spring (were due 5/15/2014). TC 10,1 is co-sponsor with 10.3 taking the lead. Six (6) bids were received and a contractor was selected for recommendation.
 - c. 1602-RP (Fenton, PMS Chair) is progressing well. End date is 9/1/2014 and it is likely that a no cost time extension will be needed. Fenton will ask the PI to submit the ASHRAE reports required by the contract.
 - d. 1634-RP contract is signed and project started in March. PMS met at this meeting.
 - e. 1514-WS on thermal heat recovery has fallen off RAC's list and will be reworked and resubmitted.
- C. Standards – Bruce Griffith
Standard 15 & 34 report is included with the minutes from this meeting
- D. Programs – Dan Dettmers
 - a. Seattle – June 2014 (this meeting)
None
 - b. Chicago – January 2015
 - No Refrigeration track
 - Brewery tour. History of Brewing seminar to tie in. Dan has ideas for speakers.
 - Technical tour of CO₂-ammonia cascade at Walgreen's is a go.
Possibility to have a seminar on the topic to tie in with the tour. Dan to contact Caleb Nelson.

c. Atlanta, GA – June 2015

- Paper on lessons learned in food and beverage CO₂ systems. Marty Timm. Possible to use as part of the seminar in Chicago.

E. Webpage – Ryan Hoest

Up to date. Appreciation for Ryan's quick response was noted.

F. Membership – Don Fenton

Post this meeting (End Year): Wolgamont (2017), Borrowman (2017), Griffith (2018), Jekel (2018), Love (2018, International), Pearson (2016, International), Fenton (2015), Scrivener (2017), Smith (2015), Vallort (2015), Young (2016)

Haupt to be Handbook Committee chair, all other offices unchanged

G. ALI Coordinator – Dan Dettmers

No report

8. Old Business

A. Report on Refrigeration Commissioning Guide (Doug Scott)

Published and available in the bookstore. Seminar 39 at this meeting Tuesday 3:15pm.

9. New Business

A. See "Action Item" list on page 1

10. Announcements

A. The next meeting will be in Chicago, IL on January 23-27, 2015

11. Adjourned the meeting at 3:48 pm (Smith moved, Wolgamont seconded, 5-0-0 CNV [Vallort absent])

TC 10.1

June 30, 2014

Seattle, WA

~~SSPC 15 - Denver Summer Meeting - June 23rd 2013~~

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Minutes from the Section 10 Mass Research Meeting

Sunday, June 30, 2014

Seattle, WA

1. Introductions conducted and signup sheet passed around. See attached attendee list.
2. Current WS, RTAR and other research from Section 10 reviewed, including those recently dropped/rejected.
 - a. Items that were listed as dropped included:
 - i. 1513 – liquid vapor separation dropped due to “lack of TC interest”; lots of discussion, TC 10.3 still interested in pursuing topic.
 - ii. 1434 – Doorway infiltration: TC 10.8 discussed and restructured it during their meeting. With approval from TC 10.5, 10.8 will take over WS and resubmit with a request for a new number.
 - iii. Charge minimization from 10.7. Status unclear.
 - iv. 1722 – optimizing air curtains for refrigerated display cases – resubmit or drop – 10.7 to resubmit.
3. Brainstorm new ideas. Those TC’s that should be interested in the idea will be listed in bold at the front of the idea, though this does not preclude other TC’s from pursuing the idea.

10.6: interested in blast pressure/time duration characteristics of the 2L refrigerants (not just ammonia) in a cargo container or similar structure.

10.5, 10.6, 10.2: Benchmarking energy use for various targeted applications/structures.

TC 10.1: Developing methodology to do an hourly load calculation simulation for refrigerated facilities or enhance existing products. Certain problems exist that must be addressed prior to undertaking this task including: defining the gaps in knowledge base, methodology to determine more than just peak load.

Discussion of gaps that need to be addressed:

Understanding how the equipment works from hour to hour not just at peak conditions. Modeling tools must be available to adjust from catalog conditions to compensate for part load conditions, fouled conditions, adjusting operating pressures, etc. Some have seen that they often run at 60% of catalog rating

Research working towards models for energy simulation. Develop the concepts for programmers to use to build the software.

Optimized control strategies for operation of the systems and how those could be modeled.

Strategies for inputting all the information for proper modeling.

System response to thermodynamic loads.

Proper modeling of loads including transmission and infiltration modeling calculation methods.

In general, component models to use to eventually build a system model.

Once system model is put together, heat recovery calculation and other “fun” stuff can be calculated.

This group or TC 10.1 needs to do a gap analysis to identify the gaps and then develop a number of smaller RTAR's to start knocking them out. Part of the gap analysis has to include polling the designers to see what they currently use, what they need and what they would want to use.

10.1, 10.5, 10.7: Optimizing control strategies for optimal operation.

10.1, 10.7: Safety factors and derating concepts....

1. Safety factors and de-rating concepts
 - a. Field conditions – applied vs. catalog
 - b. Fouling
 - c. Part load
 - d. Off design
 - e. Commercialization
 - f. Rating standards -- applicability

10.2, 10.5, 10.7: Study of occupant loads and people comfort/productivity.

10.5, 10.6: Cold storage floating...need more research on effects on food storage. I.e. 12 hour ice cream floating studies. Ice crystal migration...Flywheel thermal mass,

10.1, 8.6: Reducing water consumption of evaporative condenser. Examine hour to hour energy and water consumption throughout the year under varying conditions. Improve sustainability reporting.

10.1, 8.6: Air vs. evaporative condensing in various climates: which is better from the standpoint of kWh, water, etc.? Inclusion of derate factors in the analysis.

10.5: Optimizing blast freezing systems. (URP submitted once, but RAC killed it.)

10.2, 10.2, 10.5, 10.7: How do we use a desiccant in any given refrigeration system/refrigerated facility. Sizing for desirable defrost rate of blast freezer. Are we saving energy on the refrigeration cycle by using the desiccant? Proper sizing for loading dock protection. Proper

sizing for ice rink applications. Something similar to the report that is just wrapping up from 10.7 on energy savings potential of desiccants in supermarket.

10.1, 10.7: System level simulation/measurement of cascade vs. compound system efficiency. Only commercial systems? Industrial systems?

10.1, 10.7, 10.5: Modeling/experimental development of commercial compressors to get the real operating efficiency instead of just the 65 saturated return temperature. Or maybe do it for a few compressors, get together a methodology, publish it and hope it spurs manufacturers to do it for all of theirs? Basically a mass flow test for varying suction pressures for different compressors and different refrigerants. Southern Cal Edison has done something like this in their lab.

10.1, 10.7, 10.5: Degradation analysis of compressor performance to include so the compressors can be analyzed for expected performance under real world conditions.

10.8: Will Stoeker and Ron Cole did defrost efficiency years ago but is that still relevant today? Study that and some new configurations including what happens to the moisture that flies off the coil during defrost cycle.

10.1: Sizing valves for proper hot gas defrost.

10.1: Resultant loads on the space as a result of defrost.

10.1: Study effects of placement of the valves and other operational factors. Also how to get a fair comparison for the various defrost methods/set ups.

10.1: Study of electric defrost as its being used more with CO2.

10.1: Study of the energy utilization of the given defrost method.

10.5: Effect of temperature fluctuation on packaged product and moisture migration inside the packaging.

10.5, 10.8: Economic insulation thickness for refrigerated warehouses (simulation). Run it around the country. Look at varying temperatures and other conditions.

10.5, 10.8: Study of benefits of airside design, airflow throughout a warehouse, evaporator placement.

10.8: Method for determining sensible heat ratio for evaporator coil.

10.5, 10.7: Need to determine proper air circulation, regardless of load, to get proper circulation of air throughout the room.

10.5, 10.6: Look at effect of air speed control on air distribution and temperature uniformity. Effects on product quality. Tie this back to demand control load shifting. Look at ducted vs throw...throw across clean ceiling vs. obstructions (beams, lights)

10.5: Load calculation for standard height vs. high rise freezers/coolers. Normal vs. automated warehouses.

10.1, 10.3: Use of CO2 in supermarkets...often use instrument grade CO2 instead of beverage grade but no one can tell us why beverage grade refrigerant is or isn't acceptable.

10.1, 10.3: CO2 pressure relief valves, best practices. Some pipe each one to the roof. Others manifold them together and then run that to the roof.

10.1, 10.3: DOE has put energy efficiency numbers on refrigeration fixtures so the manufacturers raise suction temperatures but they butt up against USDA minimums. Thus, the suction is brought down but this raises defrost and other operational issues. Need to define these problems either to change existing regulations or determine method to reduce problems.

4. Next steps:

- a. Dan Dettmers to clean up these minutes and distribute them to all participants and TC chairs.
- b. TC's to review ideas and incorporate those of interest into their Research Programs.
- c. Next Winter meeting (Chicago): Repeat this process but brainstorming for program ideas. Start a collaborative process to possibly offer conference paper session or other submissions.
- d. Next Summer meeting (Atlanta): Hold mass research meeting. Bring input from the TC's. Break meeting into smaller groups for the purpose of drafting RTAR's and/or WS's for delivery back to the TC's. Invite some RAC members to help author RTAR's, give us buzz words and understand the purpose so they can champion them when they come before RAC.

5. Attendees:

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Standards Report for TC 10.1

Seattle 2014 (June 30, 2014)

Submitted by: Bruce Griffith

ASHRAE Standard 15:

- SSPC 15 met on Sunday from 8 am until 5 pm. The morning session was dedicated for working groups.
- The chair gave an update concerning an ANSI audit of ASHRAE. According to ANSI rules, Change Maintenance Proposals that are accepted for further study must be completed within 13 months. SSPC 15 had several that exceeded that timeframe. Each one was addressed at the meeting and either rejected or moved forward to public review.
- The committee continues to work on a re-write of the Standard. The main purpose of the re-write is to structure the standard in mandatory (code) language, eliminate redundancy and develop a logical format.
- The 2013 version of Standard 15 and 34 is published and in the bookstore.
- Summary of change proposals:
 - Design Pressure for Carbon Dioxide (9.2.6) – proposal to reduce design pressure from 20% to 10% for transcritical applications. Additional work required.
 - Discharge Relief Line Sizing (Table 3) – proposal to expand for higher pressures and tubing and move to normative appendix E. Additional work required.
 - Setting of pressure limiting device (9.9.2) – subcommittee formed to modify this section. There was some discussion around the relevance of positive versus non-positive displacement compressors and the 90% setting. Additional work is required.
 - Pressure relief protection for evaporators (9.4.4) – A subcommittee worked on this section; changed evaporators to heat exchanger coils and modified some other wording. The committee approved the changes and it will be sent for public review.

ASHRAE Standard 34:

- SSPC 34 is reviewing a proposal to reduce the burning velocity limit for 2L refrigerants from 10 cm/sec to 5 cm/sec. This will be voted on at the Seattle committee meeting Monday evening.
- There was an effort to look at the entire toxicity classification and possibly add a third class (C). The subcommittee agreed to stay with two classes.
- The flammability subcommittee is developing a research work statement for test setup for class 2 refrigerants. The proposed outcome will be beneficial for labs by providing a test guideline (standard).
- The committee continues to receive requests for new refrigerants. There are four new applications to review at the Seattle meeting.