

**Residential Building Committee
5/7/2020 Web Meeting**

Attendance

12 Voting Members: Quorum = 7

Voting Members:		Consultants:	
Paul Francisco – Chair (2019)	X	Gayathri Vijayakumar (2020)	X
Pat Graef – Vice-Chair (2019)	X		
Steve Baden (2022)	X	Ex-Officio Members:	
Roy Crawford (2022)	X	Van Baxter – Board Ex-O	X
Pankaj Dharker (2020)	X	Dennis Knight – CO	X
Glenn Hourahan (2021)	X	Lilas Pratt – Staff Liaison	X
Bill Healy (2022)	X		
Dan Int-Hout (2020)	X	Liaisons:	
John Jones (2021)			
Richard Karg (2020)	X	Guests:	
Eric Werling (2021)	X	Stephanie Reiniche	X
Jon Winkler (2021)	X	Bill McQuade	X

Open Action Items

February 3, 2020 Orlando Winter Meeting			
1	Jon Winkler (Int Act SubC)	Contact Handbook Committee chair to explore options for identifying residential content in the handbook. Coordinate call with Francisco, Werling, Hourahan, Healy, and Karg.	On-going
✓	Lilas Pratt	Ask Conference staff how successful the virtual conference is (i.e., how many people use it). (Email sent 5/19/2020)	On-going

June 24, 2019 Kansas City Annual Meeting			
2	Lilas Pratt	Send emails to Chairs of committees that might be interested in signing up for the RBC listserve	On-going
6	Pat Graef	Update the residential presentation template (with Chris Mathis)	On-going

Meeting Notes

1. Call to Order – **Meeting convened at 2:01pm EDT**
 - a. Welcome & introductions ([Roster](#))
2. Review of Agenda

3. Review of [Action Items](#)
4. Report from Coordinating Officer
 - Van Baxter thanked the committee from ExCom and ASHRAE leadership for the committee's support to the Epidemic Task Force (ETF) and the quick response to requests for information.
5. External Activities Update (Jones/Karg)
 - a. Review of [SY 2019-20 MBOs 1.1-1.3](#)
 - Please also see the updates added to table in attachment.
 - b. Stakeholder Outreach (MBO 1.1)
 - c. Stakeholder Input Analysis Plan (MBO 1.1)
 - There are still a few outstanding calls on the initial call list. All members are encouraged to make their calls as soon as possible.
 - Paul Francisco will send out weekly emails to continue encouraging the completion of these calls.
 - d. Booth at RESNET
 - Total booth traffic was roughly 70 individuals. As per Steve Baden, visits to the booth were probably about average for all the booths.
 - A total of 49 leads were collected from the show. A follow up email went out on 3/11/2020 to 48 individuals. Nineteen of those individuals (42%) opened the email and four (9%) clicked on the link contained in the email.
 - There were no new memberships generated from the show or follow-up email.
 - Roughly half the visitors were interested in ASHRAE and/or took one of the giveaways. Individuals interested in ASHRAE asked about joining SSPC 90.1, the BCxP certification, ASHRAE Level 2 energy audits required in public housing, and Standard 100, and how ASHRAE standards are referenced in other documents.
 - A 35% discount was offered on purchases from the bookstore. The discount code was redeemed three times for a few hundred dollars' worth of merchandise.
 - Total cost for the booth (travel, materials, booth costs) was \$1660.
 - Steve Baden reported that there was a lot of positive feedback about having ASHRAE at the conference showing their interest in residential. He noted that repeating the experience next year would be beneficial for ASHRAE.
 - The most referenced standard for residential is 62.2, but usually older editions, 2007-2013. In addition, none of the above-code new construction programs that reference 62.2 require full compliance with the entire standard, so not a lot of people purchase the standard, let alone the newer editions.
 - Standard 62.2 is required by the weatherization program.
 - e. Promotion of ASHRAE standards/publications working with GAC
 - Paul Francisco will be attending the GAC meeting for the virtual Austin conference.
6. Internal Activities Update (Werling/Winkler)
 - a. Review of [SY 2019-20 MBOs 2.1-2.4](#)

- Please also see the updates added to table in attachment.
- b. Residential [Research Projects](#) (MBO 2.1)
 - Roy Crawford developed this list. Eric Werling and Roy Crawford are working on identifying the highest priority gaps to go after first.
 - c. Residential [Journal Column/Articles](#) (MBO 2.2)
 - Bill Healy is tracking the Journal contributions.
 - The first of the resurrected column was in the March 2020 issue.
 - An article on the Covid-19 has been submitted for the June issue.
 - d. [Handbook](#) Residential Content (MBO 2.3)
 - Discussion deferred.
 - e. RBC liaisons (MBO 3.1)
 - The Internal Activities Subcommittee will be using the TC/research list to identify possible liaisons moving forward. The committee needs to prioritize the appropriate TCs and approach those committees first.
 - For any TC where an RBC member is a voting member no additional liaison is required as they can report on what is happening with RBC and vice versa.
 - The committee needs to establish what an official liaison is being asked to do. Once that is completed, committee members can approach the TCs and ask to be a formal liaison from RBC.
 - Focusing on a TC who is sponsoring research relevant to residential would seem to be a good place to start. The goal for the liaison would be to offer RBC's help in terms of putting together research and setting residential research priorities for the Society.
 - The Research Administration Committee (RAC) has created a Research Advisory Panel (RAP) to develop a new research strategic plan based on ASHRAE's new strategic plan. This work is now in process.
 - Next steps: Identify liaisons by May 21 so that the chair can be contacted ahead of their virtual Austin meetings. All the virtual meetings will be open as are all ASHRAE meetings.
7. Covid-19 Response Discussion
- a. Update and Review of Activities & Status of ETF and Residential Guidance
 - The ETF task force has been appointed and has a number of teams organized by relevant topics including residential. Max Sherman is the residential lead.
 - Max Sherman has reached out to relevant residential committees to provide representatives to the residential team. Rick Karg is the representative from RBC.
 - The residential team is currently developing FAQs for the residential area. These will also help direct the team to what gaps in the guidance need to be filled in.
 - The team is working on guidance for MF building managers – it will likely be sent to the RBC for review and input.

b. Further Guidance/Research Needed

- Roy Crawford raised a question about guidance on ion generation technology. Not just what would be useful technology but also looking at what not to do because it may be harmful. This technology is a bit of a wild west without any real standards or guidelines about its use.
- Dan Int-hout asked another question about whether electrostatic filters would trap virus aerosols and particles.
- Paul Francisco pointed out that there is a need for buildings research in the area of infections disease. RBC can concentrate on how that applies to residential buildings.

c. Relevant Existing Guidance from other groups

- DOE has offered to provide funding to add infections disease guidance to the Residential IAQ guide.
- Eric Werling is working on a white paper on these issues as well.

d. Future RBC support activities

- The committee had a discussion on how residential information should be presented on the Covid-19 page. They agreed that tiered content by application would be the best way to present the information.
- Other issues for discussion include the maintenance/facilitation of documents, partnerships for guidance, and the ongoing review and identification of needed updates.
- They agreed that they should focus on developing content that could be packaged into a tiered access on the Covid-19 page.

8. Next Meetings

RBC ExCom	Monday	6/22/2020	2pm-3pm
RBC External Activities Subcommittee	Wednesday	6/24/2020	10am-12pm
RBC Internal Activities Subcommittee	Wednesday	6/24/2020	12:30-2:30pm
Residential Building Committee (RBC)	Thursday	6/25/2020	11am-2pm

9. Adjourn – **Meeting adjourned at 4:08pm EDT**

Residential Building Committee (RBC) Scope and Purpose from the Rules of the Board (ROB)

2.423.001 SCOPE AND PURPOSE

This committee shall be responsible for identifying major residential trends impacting the practice of HVAC&R, informing the ASHRAE leadership and membership of these trends and their potential impacts, and making recommendations on new activities and policies in response to these trends. In addition, this committee shall serve as a resource to the Society on activities and issues that relate to residential impacts of building technologies including but not limited to ventilation, and thermal organizations that focus on residential buildings. The committee will be responsible for implementation of the residential aspects of the Strategic Plan.

Residential Building Committee Roster & Subcommittees

2019-2020 Committee (Members Appointed)

Voting Members: Paul Francisco (Chair), Patricia Graef (Vice chair), Steve Baden, Roy Crawford, Pankaj R. Dharkar, William Healy, Glenn Hourahan, Dan Int-Hout, John Jones, Richard Karg, Eric Werling, Jon Winkler

Non-Voting Members: Gayathri Vijayakumar (consultant), Van Baxter (BOD Ex-Officio), Dennis Knight (Coordinating Officer)

Subcommittee Rosters

External Activities: Jones (chair), Karg (vice-chair), Baden, Dharkar, Vijayakumar

Internal Activities: Werling (chair), Winkler (vice-chair), Crawford, Hourahan, Healy, Int-Hout

Residential Building Committee (RBC) MBOs for SY 19-20 (May 2020 Update)

Item #	MBO	Status	Due Date	Assigned	MBO Comments
1. Outreach to stakeholders					
1.1	Determine residential gaps/needs/obstacles through engagement with priority stakeholders	On-going	12/1/2019	Ext Act	Update: 1st round outreach phone calls completed in Jan 2020. Results reviewed at Orlando Winter Meeting. Additional follow up planned for Spring 2020.
1.2	Develop value proposition to ASHRAE for participation in industry trade shows/conferences	On-going	3/1/2020	Ext Act	Update: Free booth secured for RESNET 2020. 70 Booth visits and 49 leads. A 35% discount resulted in a few hundred \$\$ of purchases from 3 individuals.
1.3	Work with GAC to promote ASHRAE standards/publications for residential buildings.	On-going	6/30/2020	ALL	Will be an on-going activity moving forward.
2. Internal Activity Coordination and Support					
2.1	Identify/coordinate, review, and monitor residential themed research projects.	On-going	6/30/2020	Int Act	Update: List of current residential related research projects compiled for discussion in Orlando
2.2	Assist with coordination of residential programs and quarterly ASHRAE Journal Residential Applications columns	On-going	6/30/2020	Int Act	Update: List of potential topics has been developed. Residential column reinitiated in March 2020. Enough material in pipeline to support column to next SY.
2.3	Work with Handbook Comm and TCs to create an approach to identify residential content.	On-going	6/30/2020	Int Act	Update: A task group from the committee will reach out to Handbook Committee chair to discuss options.
2.4	Work with CTTC to coordinate information flow to chapters.	On-going	6/30/2020	Int Act	
3. RBC Administration					
3.1	Establish liaison system with ASHRAE committees with residential interest	New	3/31/2020	RBC Excom	Update: Efforts are underway to establish liaisons directly with relevant committees

ASHRAE Committees with Scopes/Research that include Residential activity

(VM-Voting Member, CM-Corresponding Member, PCM-Provisional Corresponding member)
(Currently known Research Projects in Blue)

1.12 Moisture Management in Buildings

- RBC Members: None
- Past Conference Meeting Times = Saturday, 1-3pm
- **1844-RP** *Estimating Internal Moisture Generation Rates in New, Occupied Homes*; Ongoing

2.1 Physiology and Human Environment

- Cognizant Committee for Standards 55
- RBC Members: Dan Int-Hout (CM, Past-Chair), Glenn Hourahan (CM)
- Past Conference Meeting Times = Tuesday, 1-4pm
- **RP-1760** *Update of Clothing Database for Existing and new Western Clothing Ensemble, including Effects of Body Posture and Air Movement*; Extension, Fall 2019
- **1861-RTAR** *Thermal comfort in North American Residences*

2.3 Gaseous Air Contaminants and Gas Contaminant Removal Equipment

- RBC Members: None
- Past Conference Meeting Times = Tuesday 1-3:30pm
- **1720-RP** *Validation of Gas-Phase Air-Cleaner Performance Test Method (Standard 145.2) by Laboratory Testing of Commercially Available Filtration Devices*; New Fall 2019
- **1579-RP** *Testing and Evaluation of Ozone Removal Air Cleaning Devices for Improving IAQ*; New Fall 2019

2.4 Particulate Air Contaminants and Particulate Contaminant Removal Equipment

- Cognizant Committee for Standards 52.2
- RBC Members: Paul Francisco (VM)
- Past Conference Meeting Times = Tuesday, 3:30-6pm
- **1649-RP** *IAQ and Energy Implications of High Efficiency Filters in Residential Buildings*; Ongoing
- **1734-RP** *Reproducing a Representative Urban Atmospheric Aerosol Distribution at High Concentration in the Laboratory for Air Filter Ageing to be used in ASHRAE GPC 35P for Determining the Energy Consumption Caused by Air Filters*; Ongoing
- **1756-RP** *Evaluation of Particle Sensors for Indoor Air Quality Monitoring and Smart Building Systems*; Ongoing

4.3 Ventilation Requirements and Infiltration

- Cognizant Committee for Standards 62.2
- RBC Members: Eric Werling (CM)
- Past Conference Meeting Times = Monday, 4:15-6:30pm
- **1835-TRP** *Characterizing the Performance of Entrained Flow Stacks*; Approved Work Statement, Fall 2019
- **1823-RP** *Improved Exhaust-to-Intake Dilution (Concentration) Calculations*; Ongoing
- **1819-RP** *CO₂ Demand Controlled Ventilation in Multiple Zone VAV Systems with Multiple Recirculation Paths*; Ongoing
- **1635-RP** *Simplified Procedure for Calculating Exhaust/Intake Separation Distances*; Ongoing

4.4 Building Materials and Building Envelope Performance

- Cognizant Committee for Standards 160

- RBC Members: Bill Healy (CM)
- Past Conference Meeting Times = Monday, 2:15-4:15pm
- [1718-TRP-C, Development of a Method to Determine the Moisture Transport through Roof Shingle System Under Real Conditions](#); Possible Bidding, Spring 2020
- [1852-TRP Develop Performance Metric, Criteria, and Process to Measure and Predict Speech Privacy in High Performance Buildings](#); Bidding Fall 2019
- [1696-RP Thermal, Moisture and Air Transport Property Values for New Building and Insulating Materials](#); Ongoing
- [1759-RP Impact of Air-Flow on Thermal Performance of Air-Spaces Behind Cladding \(Phase 1 of 2\)](#); Ongoing

5.2 Duct Design

- RBC Members: None
- Past Conference Meeting Times = Tuesday, 3:30-6pm
- [1764-RP Determine the Absolute Roughness for Phenolic Duct](#); Completed 2019
- [1682-RP Study to Identify CFD Models for Use in Determining HVAC Duct Fitting Loss Coefficients](#); Completed 2017

5.3 Room Air Distribution

- RBC Members: Dan Int-Hout (CM)
- Past Conference Meeting Times = Tuesday, 1-3:30pm
- [1666-RP Experimental Evaluation of the Thermal and Ventilation Performance of Stratified Air Distribution Systems Coupled with Passive Chilled Beams](#); Ongoing
- [1741-RP Understanding Fan Coil Components and how they Related to Energy Consumption and Energy Modeling](#); Ongoing
- [1546-RP Expansion and Updating of the Air Diffusion Performance Index Method](#); Completed 2016
- [1629-RP Testing and Modeling Energy Performance of Active Chilled Beam Systems](#); Completed 2018

5.5 Air-to-Air Energy Recovery

- RBC Members: None
- Past Conference Meeting Times = Tuesday, 1-3:30pm
- [1799-TRP, Validation of Extrapolation of Performance Rating Test Results for Small Energy Recovery](#); Bidding, Fall 2019

6.1 Hydronic and Steam Equipment and Systems

- RBC Members: None
- Past Conference Meeting Times = Tuesday, 1-3:30pm

6.3 Central Forced Air Heating and Cooling Systems

- RBC Members: Roy Crawford (VM), John Winkler (VM), Eric Werling (CM)
- Past Conference Meeting Times = Tuesday, 1-3:30pm

6.6 Service Water Heating Systems

- RBC Members: Bill Healy (CM, Past-Chair)
- Past Conference Meeting Times = Monday, 4:15-6:30pm

7.5 Smart Building Systems

- RBC Members: Bill Healy (CM)
- Past Conference Meeting Times = Tuesday, 3:30pm-6pm

7.6 Building Energy Performance

- Cognizant Committee for Standards 90.1, 90.2
- RBC Members: None
- Past Conference Meeting Times = Tuesday, 1-3:30pm

8.7 Variable Refrigerant Flow (VRF)

- RBC Members: None
- Past Conference Meeting Times = Monday, 4:15pm-6:30pm

8.9 Residential Refrigerators and Food Freezers

- RBC Members: John Winkler (CM)
- Past Conference Meeting Times = Monday, 2:15-4:15pm

8.11 Unitary and Room Air Conditioners and Heat Pumps

- RBC Members: John Winkler (CM), Van Baxter (CM), Glenn Hourahan (PCM)
- Past Conference Meeting Times = Monday, 4:15pm-6:30pm
- [1824-TRP, Accounting for the Barometric Pressure Impacts on Psychrometric Performance Testing of Unitary Air-Conditioning and Heat Pump Equipment; Bidding, Fall 2019](#)
- [1721-RP Oil Return and Retention in Unitary Split System Gas Lines with HFC and HFO Refrigerants; Ongoing](#)
- [1733-RP Develop Design Criteria for Psychrometric Air Sampler and Mixer Apparatus for use in ASHRAE Test Standards; Ongoing](#)
- [1743-RP Effect of Inlet Duct and Damper Design on ASHRAE 37/116 Fan Performance and Static Pressure Measurements; Ongoing](#)
- [1785-RP Experimental Validation of Refrigerant Charge Models in Coils for Residential Split Systems; Ongoing](#)

Standard 52.2

- Cognizant Committee = TC 2.4
- RBC Members: None
- Past Conference Meeting Times = Saturday, 8-11am

Standard 55

- Cognizant Committee = TC 2.1
- RBC Members: Dan Int-Hout (VM)
- Past Conference Meeting Times = Saturday, 8:30am-3pm and Sunday, 9am-12pm

Standard 62.2

- Cognizant Committee = TC 4.3
- RBC Members: Paul Francisco (VM), Rick Karg (VM), Roy Crawford (VM), Eric Werling (VM)
- Past Conference Meeting Times = Friday, 9am-2:30pm and Saturday, 8am-3pm
- [1450-RP Transport of Contaminants from Garage Attached or Integral to Low-Rise Residential Buildings; Completed 2017](#)

Standard 90.1

- Cognizant Committee = TC 7.6
- RBC Members: None
- Past Conference Meeting Times = Saturday 8am-12pm; Sunday 9am-12pm, Monday 8am-12pm

Standard 90.2

- Cognizant Committee = TC 7.6
- RBC Members: None
- Past Conference Meeting Times = Monday, 2:15-6:15pm and Tuesday, 1-5pm

Standard 160

- Cognizant Committee = TC 4.4
- RBC Members: Eric Werling (VM)
- Past Conference Meeting Times = Tuesday, 8am-12pm

MTG.LowGWP (*suggested addition by RC*)

- Cognizant Committee = Many TC's
- RBC Members: Roy Crawford (VM), ?
- Past Conference Meeting Times ?
- **RP-1855** *Determination of the Impact of Combustion Byproducts on the Safe Use of Flammable Fluorinated Refrigerants*; New Project, Fall 2019
- **1807-RP** *Guidelines for Flammable Refrigerant Handling, Transporting, Storing and Equipment Servicing, Installation and Dismantling*; Completed 2018
- **1806-RP** *Flammable Refrigerants Post-Ignition Simulation and Risk Assessment Update*; Ongoing
- **1808-RP** *Servicing and Installing Equipment Using Flammable Refrigerants: Assessment of Field-Made Mechanical Joints*; Completed 2019

RBC

- **1821-RP** *Design Guide for Low-to-Mid-Rise Multifamily Residential Buildings*; Completed 2018
- **1861-WS** *Thermal Comfort in North American Residences*

Activity Questions/Strategy

1. What is an appropriate strategy to address MBO 2.3 that does not require significant on-going maintenance effort? Potential strategies include:
 - a. Short-term – Develop a ‘Residential Buildings’ index item (or supplement the current ‘Residential Systems’ index item, see image below)
 - b. Long-term – Develop a Residential Buildings chapter that summarizes residential-specific topics but mostly guides the reader to other handbook chapters and sources (ASHRAE and others) that contain more detail
2. How should areas within the handbooks relevant to residential buildings but not useful to residential users be identified?
 - a. Content could either be insufficient or content could be challenging to find.
3. What are residential content gaps in the current handbook chapters? What residential buildings topic areas should the handbooks cover that are currently omitted? (see below)

Handbook Residential Content Levels

Residential content categories:

- Residential-specific chapters – See *F21-Residential Cooling and Heating Loads*, *A1-Residences*
 - Sufficient content level or chapter points readers to alternative sources – See *F21-Residential Cooling and Heating Loads*
 - Insufficient (or high-level/basic) content level – See *A1-Residences*
- General chapters with include residential content
 - Residential-specific sections – See *F16-Ventilation and Infiltration*
 - Residential-specific sub-sections – See *F36-Moisture Management in Buildings*
- Chapters with negligible content level – See *F21-Duct Design*, *A45-Building Envelopes*

ASHRAE Journal – Potential Residential-focused Columns/Articles

Topic	Potential Authors	Followup Action
AEDG for Multifamily Buildings	Paul Torcellini	Check with Paul when final
Heating and Cooling Challenges in Low Load Homes	Glenn Hourahan	Glenn: Begin drafting column
Electrification in the Residential Sector		Bill: Check with Gayathri, John Jones on potential authors
Ventilation and IAQ in Multifamily Buildings	Gayathri, Lstiburek?	Paul: Check with 62.2 contact Bill: Check with Gayathri
Smart Technologies for Residential Buildings	Bethany Sparn, Eric Werling	Eric: Coordinate authorship with Bethany
Water Heating and Water Use in Residential Buildings	Bill Healy et al.	Bill: Identify willing co-authors
Meaning of resilience for residential bldg (energy and IEQ) performance?	Ryan Colker?, Alex Wilson?	Eric: Check with Ryan Colker on author possibilities
Air Filtration Approaches for Residential Dwellings	Barney Burroughs, Jeff Siegel, Brent Stephens	Decide on best candidate for authorship. Check with authors.
Envelope Advances to meet more stringent IECC requirements		Lstiburek for recommendations Bill: PNNL for recommendations

Goal: Inform members of role that ASHRAE and its members play in advancing the state of the residential building industry.

Timing: Column every 3 months starting in March 2020. For March 2020, final version to ASHRAE week of 1/27/2020. Review by RBC before that time.

Past columns and articles.

Quarterly columns (Residential Applications):

- May 2016 – Res Apps: Addressing Residential (P. Francisco, M. Sherman)
- Sep 2016 – Res Apps: Introduction to Residential IEQ (R. Bean)
- Feb 2017 – Res Apps: Health and Home Upgrades, New DOE Report (D. Jacobs, J. Wilson, E. Tohn)
- May 2017 – Res Apps: Mech Ventilations Impact on IAQ (P. Francisco, D. Jacobs, W. Rose, S. Cali)
- Apr 2018 – Res Apps: Introduction to Indoor Environmental Quality (R. Bean, G. Hourahan)
- Jul 2018 – Res Apps: Attached Garages and IAQ (Z. Merrin)
- Oct 2018 – Res Apps: ASHRAE Residential Standards: The New 90.2 (T. Weston)
- Mar 2020 – Res Apps: Progress and Challenges: Residential Ventilation Systems (M. Lubliner, I. Walker, C. Antonopoulos, C. Metzger, E. Martin)

Residential Articles (RBC coordinated):

- Nov 2016 – Residential Ventilation for Existing Buildings (R. Karg)
- Apr 2018 – NIST Net-Zero Energy Residential Test Facility: Balancing Energy and IAQ (L. Nig, D. Poppendieck, S. Dols, B. Dougherty, S. Emmerich)
- Sep 2018 – Prioritizing Thermal Comfort for Homes: A Case Study in Using Standard 55 for a Residential Building (R. Bean)

Other Residential Articles:

- Feb 2017 – Mini-Split: Two-Story Houses and Stratification (B. Rock)
- Jul 2017 – Cautionary Case Studies: Damage in MF Housing Walls with Vinyl Siding (G. Tsongas)
- Jan 2018 – Tiny Houses, Big HVAC?: Loads and Energy (B. Rock)