



### Draft Minutes

(These draft minutes have not been approved and are not the official, approved record until approved by this committee.)  
**ASHRAE TC 4.7 Building Energy Modeling - Main Meeting**  
2/3/2026 Las Vegas Winter Meeting  
4-6:30 PM PST  
Hybrid: Caesars Palace, Octavius 11 (PS) onsite,  
Link below for online  
Chair: Hyojin Kim (hyojin.kim@njit.edu)

#### [MOTION]

1. Neymark moved to approve Las Vegas, NV Meeting Agenda. Pruettt seconded. Approved 4-0-0 CNV.
2. Neymark moved to approve Phoenix, AZ Minutes. Pruettt seconded. Approved 4-0-0 CNV.
3. Neymark moved to approve the removal of the term “and environmental” from the TC 4.7 scope statement. Baltazar seconded. Motion passed 4-0-0 CNV.
4. Neymark moved to approve continuation of the TC. Baltazar Seconded. Motion passed 5-0-0 CV.

#### [ACTION]

1. Chair to include feedback on the TC subcommittee meeting format change in the activity form.
2. [Action Item from 2025 Orlando] Jeff Haberl and Ralph Muehleisen get together for historical papers of the TC 4.7 group.

#### JOIN MEETING REMOTELY

[https://teams.microsoft.com/l/meetup-join/19%3ameeting\\_ZWU4YmQ5NjUtYTJmOS00Mjc2LWI1NzEtM2VhYjdmNTI2ZmQ1%40thread.v2/0?context=%7b%22Tid%22%3a%220cfca185-25f7-49e3-8ae7-704d5326e285%22%2c%22Oid%22%3a%22f7c57e31-4772-40b2-8487-e1874634f92a%22%7d](https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZWU4YmQ5NjUtYTJmOS00Mjc2LWI1NzEtM2VhYjdmNTI2ZmQ1%40thread.v2/0?context=%7b%22Tid%22%3a%220cfca185-25f7-49e3-8ae7-704d5326e285%22%2c%22Oid%22%3a%22f7c57e31-4772-40b2-8487-e1874634f92a%22%7d)

[4:00 \[15 min\] Call to Order, Introductions & Welcome to New Attendees \(H. Kim\)](#)

[4:15 \[1 min\] Review Code of Ethics Commitment \(H. Kim\)](#)

[4:16 \[4 min\] Call of Voting Members \(Pruett\)](#)

[4:20 \[5 min\] Approve Agenda & Past Minutes \(H. Kim\)](#)

[4:25 \[5 min\] Announcements/Liaisons \(H. Kim\)](#)

[4:30 \[10 min\] TC 4.7 Title & Scope Update \(H. Kim\)](#)

[4:40 \[2 min\] Basecamp \(H. Kim\)](#)

[4:42 \[5 min\] Membership \(H. Kim\)](#)

[4:47 \[8 min\] Website \(Fine\)](#)

[4:55 \[70 min\] Subcommittee Reports](#)

[4:55 \[15 min\] Standards \(Neymark\)](#)

[5:10 \[10 min\] Honors, Awards, and History \(Muehleisen\)](#)

[5:20 \[5 min\] Handbook \(Im\)](#)

[5:25 \[10 min\] Program \(J. Kim\)](#)

[5:35 \[10 min\] Research \(McDowell\)](#)

[5:45 \[10 min\] Physics-Based Modeling \(Judkoff\)](#)

[5:55 \[10 min\] Data-Driven Modeling \(Sharma\)](#)

[6:05 \[10 min\] Related Activities Reports](#)

[6:15 \[15 min\] New Business](#)

[6:30 Adjourn](#)

[Appendix A: Upcoming Meetings](#)

[Appendix B: Resources](#)

[Appendix C: Future Program Tracks](#)

## 4:00 [15 min] Call to Order, Introductions & Welcome to Attendees (H. Kim)

- Hyojin Kim, Chair
- John Pruett, Vice-Chair
- Juan Carlos Baltazar, Secretary
- Piljae Im, Handbook Subcommittee Chair
- Jeannie Kim, Program Subcommittee Chair
- Tim McDowell, Research Subcommittee Chair
- Joel Neymark, Standards Subcommittee Chair
- Jamie Fine, Webmaster
- Ron Judkoff, Physics-Based Modeling (PBM) Subcommittee Chair
- Himanshu Sharma, Data-Driven Modeling (DDM) Subcommittee Chair
- Ralph Muehleisen, Honors, Awards, and History Subcommittee Chair
- Jeannie Kim, Web/Hybrid Meeting Guru
- Virtual Attendee Sign-In Form: [Google Form](#)

## 4:15 [1 min] Review Code of Ethics Commitment (H. Kim)

In ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, inclusiveness and respect for others, which exemplify our core values of excellence, commitment, integrity, collaboration, volunteerism and diversity, and shall avoid all real or perceived conflicts of interest. Our culture is one of inclusiveness, acknowledging the inherent value and dignity of each individual. We celebrate diverse and inclusive communities, understanding that doing so fuels better, more creative and more thoughtful ideas, solutions and strategies for the Society and the communities our Society serves. We respect and welcome all. (See full Code of Ethics: <https://www.ashrae.org/about/governance/code-of-ethics>)

## 4:16 [4 min] Call of Voting Members (Pruett)

Present?	Last	First	Term Ends	Company	Email
x	Park	Cheol-Soo	2029	Seoul National University	cheolsoo.park@snu.ac.kr
x	Baltazar	Juan Carlos	2028	Texas A&M University	juan-carlosbaltazar@tamu.edu
	DeGraw	Jason	2027	ORNL	jason.degraw@gmail.com
	Fontanini	Anthony	2026	NREL	anthony.fontanini@nrel.gov
x	Kim	Hyojin	2026	NJIT	hyojin.kim@njit.edu
	Kim	Jeannie	2027	Argonne National Lab	jihyun.kim@anl.gov
x	Neymark	Joel	2028	J. Neymark & Associates	neymarkj@msn.com
x	Pruett	John	2026	ZMM	jap@zmm.com
	Taylor	Russell	2028	Carrier	rdt.vma131@gmail.com

A quorum was met by majority attendance (5 of 9 members).

## 4:20 [5 min] Approve Agenda & Past Minutes (H. Kim)

[2025 Phoenix Annual Minutes](#)

**[Motion 1] Neymark moved to approve Las Vegas, NV Meeting Agenda. Pruett seconded. Approved 4-0-0 CNV.**

**[Motion 2] Neymark moved to approve Phoenix, AZ Minutes. Pruett seconded. Approved 4-0-0 CNV.**

## 4:25 [5 min] Announcements/Liaisons (H. Kim)

- Electronic ballot results (December 12 to 15) for the approval of co-sponsorship of the WS-1986 “Developing and Validating Bi-Directional Semantic Mappings between ASHRAE Standard 223P and IFC”: Moved by H. Kim, seconded by Pruett, and approved with a vote of 7-0-0-1-CNV (In favor - Against - Abstaining - Not Present).
  - TAC Section 4 (Kyle Gluesenkamp) – **Not attended.**
  - Research (Davide Ziviani) – **Not attended.**
  - Handbook (Bob McFarlane) – **Not attended.**
  - TC Subcommittee Meeting Format Change Feedback
    - In-person subcommittee meetings were observed to be more interactive. In the absence of in-person subcommittee meetings, opportunities for new or early-career members to interact with senior members are more limited.
    - There are new challenges in effectively organizing and improving subcommittee activities within the limited timeframe of one month prior to the conference dates, particularly due to scheduling conflicts and late or inconsistent communication of meeting information.
- [Action 1] Chair to include feedback on the TC subcommittee meeting format change in the activity form.**
- TC input for Research Advisory Panel (RAP) on ASHRAE Research Strategic Plan: [Survey](#)

## 4:30 [10 min] TC 4.7 Title & Scope Update (H. Kim)

- As approved by TC 4.7 at the 2025 Phoenix Annual Meeting:
  - Title: TC 4.7 Building Energy Modeling
  - Scope: TC 4.7 identifies, evaluates, develops, and recommends procedures for calculating energy and environmental performance of the built environment.
- TAC Feedback: Title change approved; scope change not approved
  - The term “environmental” is too broad as it can mean many different things across various fields: e.g., indoor environment (environmental control, etc.), vs. outdoor environment (environmental impact, etc.).
    - TC 4.7 does not directly identify, evaluate, develop, or recommend procedures for environmental performance; TC 4.7 addresses environmental performance only in terms of its relationship to energy use or consumption.
  - The scope must be specific and accurate to clearly convey its meaning to a general audience, including new ASHRAE members, to avoid confusion. Please review the scopes of TCs with “environment\*” in the title:

- TC 4.10 Indoor Environmental Modeling: “TC 4.10 is concerned with developing methods and procedures for predicting indoor environmental conditions including airflow, air quality and thermal environment.”
- TC 7.6 Building Energy Performance: “TC 7.6 is concerned with the estimation, measurement, analysis, benchmarking, and management of whole building and building systems energy and water performance.”
- TC 2.1 Physiology and Human Environment: “TC 2.1 is concerned with the relationship of man's living environment, as altered by air-conditioning, heating and ventilating systems, to his comfort, health, and productivity.”
- TC 2.8 Building Environmental Impacts and Sustainability: “TC 2.8 is concerned with the environmental, social and economic impacts of buildings, including effects on ecosystem sustainability and the well-being of building occupants.”

**[Motion 3] Neymark moved to approve the removal of the term “and environmental” from the TC 4.7 scope statement. Baltazar seconded. Motion passed 4-0-0 CNV.**

## 4:40 [2 min] Basecamp (H. Kim)

All correspondence through [Basecamp](#). Copyrighted materials (e.g., Handbook chapter drafts or committee roster) are posted for member use only. Contact Chair to be added.

## 4:42 [5 min] Membership (H. Kim)

- Changes in TC 4.7 Leadership
  - Handbook: Baltazar → Im (July 2025)
- Voting Members
  - Voting Members:
    - Park (Non-Quorum) rolled on in July 2025
    - Fontanini and H. Kim rolling off in June 2026
    - Pruett renewal through June 2028
- Corresponding Membership
  - Attendance sheet has been updated:
    - “Not on Roster”, you have not applied to join the TC (or name on attendance sheet doesn’t align with the roster)
    - If you’ve been attending regularly, and would like to be promoted to CM, indicate on the attendance sheet, or contact the Chair

## 4:47 [8 min] Website (Fine)

Chair coordinated with Jamie Fine to update the website.

## 4:55 [70 min] Subcommittee Reports

## 4:55 [15 min] Standards (Neymark)

### General

- TC 4.7 is cognizant TC for the following five Standards, with details below:
  - SSPCs 140, 205, 209, 232
  - SPC 229P

### **140-2023 (ANSI/ASHRAE): *Method of Test for Evaluating Building Performance Simulation***

**Software** (McDowell) – McDowell reporting [description of std from previous meetings]

- 140 is collection of test suites that function as a “P.E. exam” (core competency tests) for software along with acceptance criteria for a subset of cases. The test suites cover commonly modeled aspects of building thermal fabric and HVAC equipment.
- 140-2023-A: Extended time-series acceptance criteria based on selected daily hourly outputs from the thermal fabric (Section 7) tests: Addendum is published since Aug 29.
- 140-2023-B: ETNA thermal fabric steady-state empirical validation tests: 140’s first empirical validation test suite. Addendum completed publication/public (P/PR) review Oct 6 with no comments. Publication galley reviews in progress; look for publication Feb/Mar.
- 140-2023-C: Update to Normative Annex A3 acceptance criteria ranges for more recent versions of reference software. SSPC 140 approval for P/PR review begun Feb 2; online ballot to be distributed to the PC
- 140-2023-D: Acceptance criteria for ETNA test suite. Neymark to address PC comments and submit draft to 140 Chair for online PC ballot for P/PR submittal in Feb.
- 2026 is a continuous maintenance (CM) revision year – the CM revision will include all of above addenda (C, D publication also expected in time) integrated with existing Standard 140-2023 content.

[Reported from previous meetings or other updates by Stds SubC Chair]

- Standard 140 (including Acceptance Criteria) promulgation (Glazer, McDowell)
  - 90.1 ECB: 90.1 Addendum *at* (update of 140 citation) published March 2025
  - References of 140-2023 by IECC, CEC (Title 24), NECB (Canada) published, reported by Glazer 2/2/26.
  - IBPSA-US National BEM Certification Portal is live with 7 programs posted; up from 5 last Jun <https://www.ibpsa.us/resources/national-bem-certification-program/>

### **205-2023 (ANSI/ASHRAE): *Representation of Performance Data for HVAC&R and Other Facility***

**Equipment** (Barnaby/Kruis) – Kruis reporting

- Objective is to adapt machine readable schema information from a common base source; this promotes consistency of data content/format.
- Emphasis is applying performance maps to models, rather than on performance curves
- Currently has standardized data models for water-cooled chillers, DX refrigeration, electric, fans, motors and drives, etc (there are 7 equipment types total)
- Approved for publication this cycle:
  - Addendum d generalizes the RS0001 representation specification to cover liquid-cooled, air-cooled and evaporatively-cooled chillers.
- 3 addenda in progress:
  - Data collection for heat pumps (compressor side)
  - Performance map characterization (lookup variables)
  - Conformance with 232-2024 (see below)

- Liaising with ASHRAE 90.4 (data center efficiency). 90.4 is interested in standardized performance data for chillers and the chilled water plant generally.

### **209-2024 (ANSI/ASHRAE/IBPSA): *Building Performance Simulation Process***

(Glazer/Crawley/Kolderup) – Neymark’s report from IBPSA-World items

- Title updated for the 2024 version
- 13 topical Working Groups (e.g., facades, quality assurance, etc)
- To be published addenda (completed public review) revise following sections:
  - a: Modeling Cycle #4, HVAC System Selection Modeling
  - b: Modeling Cycle #5 to clarify how it applies in overall modeling cycle process
  - c: Modeling Cycle #6, multi-cycle design optimization process
- **Action Item (JN): For Austin, contact Glazer for brief meeting summary.**

### **229P: *Protocols for Evaluating Ruleset Application in Building Performance Models***

(Goel/Glazer) – Kruis reporting

- Defines protocols for developing compliance models
- A checking tool for 90.1 modeling, intended to be updated as rule bases change (e.g., for baseline and proposed models). The standard defines a schema that can be read for the purpose of ruleset checking
- Working groups for: schema ruleset model report (RMR); ruleset checking; terminology
- Progress:
  - Comments addressed and voted on 2<sup>nd</sup> full P/PR draft.
  - There will be a 3<sup>rd</sup> ISC public review on a smaller piece of the standard related to reporting paths.

### **232-2024 (ASHRAE/IBPSA): *Common Content and Specifications for Building Data Schemas***

(McDowell)

- Defines data structures (rules) and conventions that would be used for BPS models, but not defining data models themselves. This draws/evolved from 205, which describes data models. 232 prescribes a single method for how to describe data models.
- Areas of focus include time-series and time-stamp schema
- Published Autumn 2024. SSPC status approved in January 2025.
- Update: The PC will be addressing comments received since publication.

[Reported with IBPSA-World activities]

**IBPSA Standards Committee** (Crawley) – Neymark reporting

- IBPSA co-sponsors all above standards (140, 205, 209, 229, 232)
- Approves process after ASHRAE StdsC approvals, standards actions come to IBPSA StdsC
- This cycle:
  - Approved 3 addenda to 209-2024 pub in January (see above).
  - Approved roster changes: SSPC 205, SSPC 209, SPC 229p
  - Approved 205-2023 Addendum d pub (see above)
  - Approved 140-2023 Addendum a pub (see above)
- SSPC 169 : “Weather Data for Building Design Standards” is working on IBPSA co-sponsorship.

## 5:10 [10 min] Honors, Awards, and History (Muehleisen)

- [Service to ASHRAE Research Award](#): Renominated Jeff Haberl.
- [George B. Hightower Technical Achievement Award](#): Leadership team recommends nominating Ralph Muehleisen (last year deadline: December 1).

**[Action 2] [Action Item from 2025 Orlando] Jeff Haberl and Ralph Muehleisen get together for historical papers of the TC 4.7 group.**

## 5:20 [5 min] Handbook (Im)

Baltazar reported that the subcommittee has continued working on reviewing topics that will be added to the 2029 version.

## 5:25 [10 min] Program (J. Kim)

Program proposals for the Annual Meeting in Austin, TX are due on February 25.  
One seminar was approved for LV conference and is scheduled for Wednesday February 4.  
Three sessions are planned for Austin, TX Annual Conference.  
One session is planned on empirical validation of Standard 140 for Chicago 2027.

## 5:35 [10 min] Research (McDowell)

It was informed that there is \$4M fund available for research projects. In the most recent funding cycle, only one project was accepted. All research projects will require publications in STBE journal.

Projects in the pipeline:

- 1816-RP working out glitches on data collected.
- 1857-RP has a slow start due to a GAR selection. It may need a no-cost extension.
- 1821-RP was returned due to no progress in development.
- 1947-RP has kicked off, and their PMS meeting is planned for March. It is delayed due to the PI's relocation.
- 1990-RP Joe Wang completed the WS and will pass it to Ron Jukoff.
- 1988-RP is reported to be in good shape.
- 1986-RP WS has been submitted; no further information available.
- 1939-RP WS has been accepted; TC 4.2/4.7 co-sponsorship

## 5:45 [10 min] Physics-Based Modeling (Judkoff)

H. Kim chaired the meeting in the absence of the PBM Chair. She reported that the meeting notes are available on Basecamp, with 20 attendees present.

Topics under discussion included:

- Toolkit 2 – all files are stored on GitHub.
- Modeling of demand in quasi-steady state conditions.
- Heat pump test set for Standard 140.
- VRF systems
- Atrium performance

- Convective coefficients
- Calibrated ground heat transfer modeling for BEM

## 5:55 [10 min] Data-Driven Modeling (Sharma)

Pruett chaired the meeting in the absence of the DDM Chair. Topics under discussion included:

- Inverse modeling using PCA
- Toolkit to include altitude for calibration of high-rise buildings

## 6:05 [10 min] Related Activities Reports

- TC 4.1: Load Calculation Data and Procedures
  - Project on people thermal load
  - Peak heating loads
- TC 4.2: Climatic Information
  - Updated climate design tables
  - RTAR for the new revision of the data
  - Two WS submitted:
    - Abbreviated weather files
    - Design day comparison with historical records
- Other TCs?
- Standard 90.1: Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings
  - Working on the 2027 version.
- Guideline 14: Measurement of Energy, Demand and Water Savings
  - Working on terminology
  - Developing guidance on long-term M&V
  - Water/energy Nexus
- Other Standards/Guidelines?
- MTG.RES (DeGraw)
- [IBPSA-USA](#)
  - Career Convention in February
  - SimBuild 2026 in Minneapolis on May 20-22
- [IBPSA-World](#)
  - Continue co-sponsorship of the standards of this TC
  - Co-sponsorship of Standard 169
  - Building Simulation 2027 in Vienna
  - Project 2 is ongoing
- [CaIBEM](#)
- Modelica North America
- ASHRAE Conference for Integrated Design, Construction & Operations (CIDCO)
- Others?

## 6:15 [15 min] New Business

- Annual vote to continue as a TC

[Motion 4] Neymark moved to approve continuation of the TC. Baltazar Seconded. Motion passed 5-0-0 CV.

## 6:30 Adjourn

## Appendix A: Upcoming Meetings

- June 27 to July 1, 2026 – Austin, TX
- Jan. 23 to 27, 2027 – Chicago, IL
- June 12 to 16, 2027 – New Orleans, LA
- Feb. 5 to 9, 2028 – Orlando, FL
- June 24 to 28, 2028 – St. Louis, MO

## Appendix B: Resources

- ASHRAE's Research Proposal Process:
  - <https://www.ashrae.org/file%20library/technical%20resources/research/ashrae-research-flowchart-r6.pdf>
- ASHRAE Acronym Guide:
  - [https://www.ashrae.org/file%20library/about/marketing/final\\_ashrae-acronyms.pdf](https://www.ashrae.org/file%20library/about/marketing/final_ashrae-acronyms.pdf)
  - Common Acronyms:
    - Research:
      - RTAR: Research Topic Acceptance Request
      - PTAR: Publication Topic Acceptance Request
      - WS: Work Statement
      - RP: Research Project
      - RAC: Research Administration Committee
    - Program:
      - CEC: Conferences and Expositions Committee
    - Standards:
      - SPC: Standard Project Committee
      - SSPC: Standing Standard Project Committee
      - SPLS: Standards Project Liaison Subcommittee (of Standards Committee)
    - MOP: Manual of Procedures
    - SH: Section Head
    - YEA: Young Engineers in ASHRAE
- 4.7 Committee Home Page:
  - <http://tc0407.ashraetcs.org/>
- 4.7 BaseCamp Page:
  - <https://3.basecamp.com/3106353/projects/8174587>

## Appendix C: Future Program Tracks

- June 27 to July 1, 2026 – Austin, TX: <https://www.ashrae.org/conferences/2026-annual-conference-austin/2026-annual-conference-technical-program>
- Wednesday, February 25, 2026 | Debate, Panel, Seminar, Forum, Workshop, and Debate Proposals Due.