

**AMERICAN SOCIETY OF HEATING, REFRIGERATING AND
AIR-CONDITIONING ENGINEERS, INC.
1791 Tullie Circle, NE, Atlanta, GA
404-636-8400**

**Technical Committee 4.4
Building Materials and Building Envelope Performance**

These DRAFT minutes have not been approved and are not the official, approved record until approved by this committee.

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TC/TG/TRG MINUTES COVER SHEET

(Minutes of all TC/TG/TRG Meetings are to be distributed to the individuals listed below within 60 days following the meeting.)

TC/TG/SSPC: TC 4.4

TC Title: Building Materials and Building Envelope Performance

Date of Meeting: Monday, June 24. Meeting convened at 2:30 pm EDT.

Location: Indianapolis

DISTRIBUTION

All members of TC 4.4 plus the following:

TAC Chair

Committee Liaisons

ADDITIONAL DISTRIBUTION

Manager of Standards

Manager of Research and Technical Services

1. Introductions

The Chair, Alejandra Nieto, called the meeting to order at 2:30 pm EDT, which was followed by roll call attendance from the leadership team. Announcement made that recording of meetings is prohibited.

5/10 voting members present in the room, 2 online (7/10 total), quorum achieved., Mehdi Ghobadi joined online later during the meeting for a total of 3 online (8/10). Quorum achieved.

2. Membership/Roll Call/Attendance (M. Ghobadi, Membership Chair)

Contact TC 4.4 Chair or membership chair if you are interested in being a voting member – note, to be eligible for voting status you must have been a Corresponding Member for a minimum of 2 years.

Voting Members and Officers Attended

Voting members rolling on July 1, 2024: None

Voting members rolling off Jul 1, 2024: Fitsum Tariku

<u>Name</u>	<u>Affiliation</u>	<u>Role</u>	<u>Notes</u>
Alejandra Nieto	Rockwool	Chair	online
Danko Davidovic	Huber	WebmasterSecretary	
Fitsum Tariku	BCIT		
Marcus Bianchi	NREL	Research Chair	
Mehdi Ghobadi	NRC	Membership Chair	online
Mikael Salonvaara	ORNL		
Neil Friedberg		Handbook Publications Chair	
Wahid Mahref	Ecole de Technologie Superieure	Programs Chair	online

Total Number of VM: 8/10 (0 non-quorum)

Voting Members and Officers Absent:

<u>Name</u>	<u>Affiliation</u>	<u>Role</u>	<u>Notes</u>
Hua Ge	Concordia University	Handbook Chair	
Manfred Kehrer	WJE		

Corresponding Member (CM)/Provisional Corresponding Members (PCM) Attended:

<u>Name</u>	<u>Affiliation</u>	<u>Role</u>	<u>Notes</u>
Achilles Karagiozis	NREL	CM	
Alec Cusick	Owens Corning	CM	online
Andre Desjarlais	ORNL	CM	
Anthony Fontanini	NREL	CM	

Brad Carmichael	4EA Building Science	CM	
Carsten Rode	Technical Univ. of Denmark	CM	online
Chris Schumacher	RDH	CM	
Ellen Thorpe	Coalition for Sustainable Roofing	CM	
Laverne Dalgleish	Air Barrier Association of America (ABAA)	CM	
Leslie Scheppelmann	WJE	Vice Chair, CM	
Lyle Axelarris	BPL Enclosure	PCM	online
Peter Adams	Morison Hershfield	CM	online
Sam Taylor	Building Science Consultant, retired	CM	online
Samuel Glass	USDA Forest Products Laboratory	CM	online
Shayan Mirzabeigi	Syracuse University	PCM	

Total number of CM, PCM: 15

Guests Attended

<u>Name</u>	<u>Affiliation</u>	<u>Role</u>	<u>Notes</u>
Alexander Zhivov	ERDC-CERL		
Jay Crandell	ARES Consulting/ABTG		
Jensen Zhang	Syracuse University		
Krishnan Gowri	Intertek		
Piers MacNaughton	SEEA FR		

Total number of guests: 5

3. Report from the Chair (A. Nieto, Chair)

- Shared online QR Code Sign-In option for the meetings in the future. We acknowledged there are some issues with signing process online. Patrick Marks (Section Head) promised a help to resolve the problem.
- ASHRAE policy on AI: The policy prohibits sharing any ASHRAE intellectual property (IP) without any AI tool without prior permission from ASHRAE. In addition, no use of AI tools is allowed in any work within technical committees. More updates from ASHRAE on this topic will follow.
- ASHRAE requests that the purpose, scope, and accomplishments of the technical committee be discussed in every meeting to attract members and maintain the technical committee's healthy status.
- ASHRAE also encourages Interim Meetings between regular meetings (hybrid, in-person) to increase the productivity of each committee.
- We need to confirm with ASHRAE that we need to remain a standalone TC before the winter conference.

4. Report from Section head (Patrick Marks and Kyle Gluesenkamp)

- Patrick made acknowledgment to Alejandra for her years of service!

- We discussed the question of whether the Program Chair should be copied onto correspondence.
- QR sign-in – ASHRAE will clarify if/how/when sign-ins will be distributed
- Kyle Gluesenkamp from ORNL Introduced himself to the committee.

5. Approval of minutes (D. Davidovic, Secretary)

The draft minutes from the Chicago, IL hybrid meeting in January 2024 were posted to the ASHRAE TC Website and Basecamp for review.

VOTE: Danko moved to approve, and Wahid seconded the motion to approve. No opposed, no abstentions. Motion passes (7/0/0 F/A/O).

6. Program Subcommittee Report (W.Maref, Programs Chair)

- Wahid Maref summarized previous submissions. Seven submissions have been submitted for Indianapolis, but none of them was accepted.
- The decision was made to review all of them and resubmit them again
- The deadline for submission for abstracts is August 2nd, and Wahid uploaded the document for the submission process in Basecamp.
 - Seminar 1: ASHRAE 160 Standard today and paths for future improvements on corrosion modeling (Achilles Karagiozis, Mikael, Salonvaara)
 - Seminar 2: Sam Glass, Chris Schumacher, Manfred Kehrer (Track 9 Energy Storage and Grid Resiliency)
 - Seminar 3: Thermal Bridging (Brad Carmiachel, Alejandra, Peter Adams)
 - Seminar 4: Thermal resiliency (Mehdi Ghobadi, chair, Laverne Dalgleish, Marcus Bianchi suggested someone to substitute him)
 - Seminar 5: Building envelopes retrofits towards decarbonization (Mehdi chair)
 - Seminar 6: Beat the heat (submitted by Andre Desjarlais, Elizabeth, Sarah Schneider)
 - Seminar 7: Enabling resilience through durable builder (Anthony Fontanini, 5 speakers proposed, three speakers are minimum needed and four should be maximum allowed, discussed in the room)
 - Forum 1: (Mikael Salonvaara lead), Building retrofit electrification -no action needed- just to co-sponsor
- Marcus Bianchi commented: recommended slight change for presenters, but the content is the same as what was originally proposed (Seminar 7) Replacing Anthony with Zoe Kaufman, changing the title for Seminar 3: Wahid - Seminar 3 title is: Thermal Bridging and Energy Codes - From Research to Implementation
- The requests for presentations should be submitted on Monday morning instead of Wednesday for future seminars.

TC 4.4. propose to 7 seminars in Indianapolis

VOTE: Marcus Bianchi moved to approve, Danko Davidovic seconds motion to approve. No opposed (chair not voting), no abstentions. Motion passes. 7 votes positive, 0 abstained, 0, opposed (7/0/0 F/A/O)

7. Handbook Subcommittee Report (A. Nieto Acting Handbook Chair)

- A.N. approved by letter ballot with TC members the revised chapters 25, 26, and 27 in ASHRAE Handbook Fundamentals for an update for the new edition. The submitted chapters will be uploaded to Basecamp for TC members to review.
- Lead revisors: HOF: Ch. 25 (2021-2025): Marcus Bianchi, NREL

- Few changes made to address the comments submitted over the years to make improvements of the language, some were incorporated
- TC should do a better job of continually making changes to the online version of the chapter between official hardcopy renewals.
- Markus Bianchi suggested incorporating the material on thermal bridging from Morrison Hershfield's study in a future version of the chapter; the existing language on this topic is slightly improved.
- Only three people can be named on the collaboration form

HOF: Ch. 26 (2021-2025): Hua Ge, Concordia (Alejandra Nieto reported)

- Updated the material properties tables with the information from recent research and RDH (Chris Schumacher)
- Added 2 paragraphs at the beginning of the chapter: will provide hygrothermal values for materials with low embodied carbon (to address some research proposals submitted by Andre Desjarlais), no attempts to use the information on the embodied carbon of the low-embodied carbon material in carbon sum calculations.
- Updated version document is on Basecamp

HOF: Ch. 27 (2021-2025): Mikael Salonvaara, ORNL

- Replaced the modified zone method with overall thermal zone (OTZ) calculation method for thermal bridging of metal studs based on AISI Standard S250, more accurate method for calculating the U-value in steel framed wall assemblies.

HOA: Ch. 46 (2019-2023): Peter Adams, Morrison Hershfield **-no update**

- Timeline for 2025 edition: final revision for TC approval by July 31, 2024.

8. Publications Subcommittee (N. Friedberg)

- TC interested in producing podcasts – need to get more info from ASHRAE.
- TC discussed the opportunity to make podcasts on a more regular basis covering various topics related to the building envelope and building science.
- Alejandra Nieto suggested we check with ASHRAE what the policies are for the proposed framework on podcasts.
- ASHRAE’s podcast description does not currently include wall assemblies
- Discussed potential topics for publications, primarily articles. Contact Neil with publication topics that you would like to cover. Some ideas discussed were:
 - Retrofit Guidelines
 - Spray foam and moisture
 - Ventilation
- Chris Schumacher asked the group what brought an idea on the podcast to TC and why we are doing this. Alejandra Nieto shared an ASHRAE one-page document on publications and discussed various formats. Sam Taylor discussed the format of the podcasts, how they will be handled, and if have enough resources (technical equipment), to handle this.
- Lyle Axellaris ideas for topics to be covered: Common issues/areas in ASHRAE 90.1 Chapter 5 prescriptive compliance (u-factors not done correctly, spandrel, how z-girts affect how we treat the CI calculation when there are discontinuities and irregularities)
- SSPC 160 often has presentations that are worthwhile presenting (Something to consider).
- Ellen Thorpe commented that podcasts need to be interesting since there is no visual content – they need good structure, and the content has to speak for itself, considering there are no videos and slides. She offers to help with the project management.
- Neil Freidberg, Achilles Karagiozis, potential topic for podcast, how we can test AI to assist us and help us building better envelopes and wall assemblies.

9. Research Subcommittee Report (M. Bianchi, Research Chair)

Announcements

- Reminder that the Section 4 Research Liaison (RL) is Dennis Landsberg, drlrm@aol.com
- Research Subcommittee Chair Breakfast was held June 24, 2024, at 7:00 AM EDT
 - [Detailed presentation](#) is at Basecamp
 - RAC activity:
 - 3 RTAR requests, 2 accepted with comments, 1 returned
 - 7 WS submitted, 4 conditionally accepted, 3 returned
 - 1 WS for publication, conditionally accepted
 - RAC administers five awards and grants:
 - Grant in Aid
 - New Investigator Award
 - Homer Addams Award
 - Service to ASHRAE Research (RAC is asking for nominations, none received this year): please send me ideas (submission by TC chair by September 1)

- Innovative Research Grant
- Total annual RAC expenditures by society year

SY 2019-20	\$5.05M
SY 2020-21	\$4.89M
SY 2021-22	\$5.05M
SY 2022-23	\$5.50M
SY 2023-24	\$ 5.60M
- RAC has approved to potentially release 6 TRPs for bid this fall, if ready.
- RAC funding approval limit has been increased from \$250K to \$350K due to inflation pressures post-COVID-19.
- New RAC RTAR Web Tool in Beta testing by 3 RAC members / 3 TC members is planned for July 2024.
- Be sure to show full TC approval vote on RTAR and WS forms, INCLUDING votes of listed co-sponsoring TCs.
- Include MILESTONES in WS so PMS can track and report successful research progress
- Be sure to include an attachment with all resubmitted documents that explains how RAC comments on previous documents were addressed. This includes initial WSs submitted after an RTAR accepted with comments.
- Alejandra Nieto provided additional research updates from the TC Chair Breakfast. In RTAR and WS submission please add:
 - Potential bidder information and contacts (must be aware of project and verify interest)
 - Potential co-funding sources and contacts (include letter of support, no formal committee)
 - More detailed budget lines, not a single value (RAC will develop new guidelines)
 - There is a prospective online database for WS development
- Reminder for everyone that the deadlines for RTARs, WSs, etc. submissions to the RAC:
 - March 15 – RAC Spring meeting consideration in April
 - May 15 – RAC Annual meeting consideration in June
 - August 15 – RAC Fall meeting consideration in Sept. or Oct.
 - December 15 – RAC Winter meeting consideration in January

Active Research Project Status

1857-TRP: Improved Simplified Methodology for Describing and Calculating Heat Conduction between Buildings and The Ground

- Authors: Neal Kruis and Tim McDowell (TC 4.7)
- The [draft](#) is at Basecamp.
- History:
 - W 2020 – TC 4.7 approved WS and Tim McDowell asked TC 4.1, TC 4.4, and SSPC 90.1 to consider co-sponsoring
 - Spring 2020 – TC 4.4 voted to co-sponsor (by email ballot: 8/0/0 CNV; 4 non-response)
 - Paulo Tabares represents TC 4.4 on the project.
 - Released for bids by RAC in September/October 2022.
 - [RFP](#) released in Fall 2022.
 - Awarded to the Penn State team. Primary contact: Prof. [Gregory Pavlak](#)

- The project is delayed because they are waiting for the availability of a student. The identified student is from abroad and the visa process has taken longer than expected, but Prof. Pavlak expects the visa to be issued soon. In the meantime, he has a student who is starting simulations.

Approved 1951 RTAR: Development of Material Moisture Tolerance Criteria and Evaluation Methodology for ASHRAE Standard 160 to Control Structural Property Degradation of Common Sheathing Materials

- Author: Jay Crandell
- TC 4.4 voted and approved the revised RTAR and the associated documents in June.
- SSPC 160 voted to co-sponsor it.
- Revised RTAR sent to Research Liaison for December 2023 meeting.
- Research Liaison communicated on January 21, 2024, that the RTAR was approved, and we will receive comments shortly.
- The [approved RTAR](#) is at Basecamp.
- We have received comments and Jay has revised the first draft of the Work Statement.
- Sam Glass made some comments and will discuss them with SSPC 160 during the Indianapolis meeting.
- Achilles Karagiozis feels that the WS needs to be revised. He and Wahid Maref proposed a committee to work on this work statement: André Desjarlais, Danko Davidovic, Laverne Dalgleish, Mikael Salonvaara, Sam Glass, Wahid Maref, and Achilles Karagiozis
- André Desjarlais pointed out that we always thought that mold was the lowest common denominator. We should continue to work diligently.
- Alex McGowan pointed out that the failure mechanisms mentioned by Achilles Karagiozis are a problem in the field of technical consulting, including building collapse. It would be great to have a tool to predict damage caused by moisture in buildings.
- André Desjarlais stated that it is great that there is an agreement. \$250 is not enough, but what can be done to initiate the investigation.
- Laverne Dalgleish shared that buildings in a cold climate cannot be built without a vapor barrier on the inside. ABBA is now looking at this issue. Why do we put a vapor barrier when wood is already a vapor barrier? There are attempts to update the ISO standard on this topic.
- Marcus Bianchi asked for the first round of comments and feedback from people to be provided by July 15th (DD)
- SSPC will vote on Tuesday to co-sponsor, Neil Freidberg and Danko Davidovic will help review the process in creating the Work Statement.

Possible Research Projects

RTAR: Impact of Construction Moisture on the Hygrothermal Performance of Building Envelope Systems

- **Author:** André Desjarlais
- [Draft](#) is at Basecamp.
- It was shared with TC 1.12
- Comments are expected by **July 14 to rework the document, aim for December 15 RTAR submission**
- Laverne: could ABBA use this information to determine when the WRB could be installed?
- Identify scenarios where construction moisture will have an impact.

- ASTM D8 may be working on this same topic (moisture in concrete before vapor retarder)
- Literature survey and modeling study (could be done within \$250k)
- Considering limiting assemblies and climates (to be determined during WS phase) – Leslie’s notes

RTAR: Impact of New Low Embodied Carbon Building Materials on the Energy Efficiency and Durability of Building Envelopes

- Author: André Desjarlais
- André shared the first [draft](#) with the committee in the Fall and discussions took place during the Research Subcommittee meetings in February and June 2023
- Comments were received. Please provide additional comments.
- André has the draft RTAR and will continue to work and resubmit it for review (DD Notes).
- Some language on this topic already incorporated in Chapter 26 of Handbook of Fundamentals acknowledging the low embodied carbon materials and providing hygrothermal properties of these materials (Andre Desjarlais) (DD Notes)

RTAR: Influence of temperature on hygric properties of building envelope materials: significance for hygrothermal analysis

- Author: Sam Glass
- Sam addressed previous comments and provided a new [draft](#) on February 4th, 2023
- Comments were submitted in Basecamp
- Mehdi and Manfred had comments. Please provide additional comments on Basecamp.
- Sam will post a new version by July 14, 2024.

RTAR: Moisture Consequences of Building Electrification on Building Envelope

- Danko Davidovic and Mikael Salonvaara to work on Draft RTAR with support from Peter Adams and André, sponsored by TC 1.12.

4. Brainstorming Session

- The full [list](#) of ideas is available in Basecamp.
- The top eight ideas prioritized are in the table below.

Idea	Title	Priority
1	Hygrothermal impacts of residential building envelope energy retrofits	1
2	Strategies to mitigate thermal bridges	2
3	The impacts of water vapor and bulk water on the steady-state and dynamic performance of insulation in exterior wall cavities	3
4	Validation of laboratory aged material properties with in-situ aged materials	4
5	Best ways to install interior insulation during retrofit of masonry walls	
6	Measurement of thermal resistance of in-cavity and continuous insulation in existing buildings	6

7	Validation of thermal performance of retrofitted building envelopes	
8	Moisture impacts of interior continuous insulation applications for retrofits	

Lot of discussion on possible ideas to address retrofits:

- discussion how to prioritize the retrofits, can we select first low-hanging fruits, cost is big obstacle
- Andre: propose RTAR for some university to perform literature review on retrofits and compile all relevant information, some info might be relevant to Handbooks
- Diana also provided web links, about some guidelines

Kaushik from GTI, ASTM Symposium on Changing Face of Building Materials (abstracts by March 1st)

New Research Business

- Andre reiterated the need to get in touch with TC 4.2 – should we update the climate files to take account of hygrothermal loads in humid climates? Hartwig Künzle has such data.
 - Achilles Karagiozis mentioned that there is a development of weather data for humidity calculation. It was asked how to generate the data. ASHRAE has developed files for energy. We also need to create data files, including hygrothermal data for future years considering climate change. Mika will follow up and participate in TC4.2 meetings regarding this topic.
 - Tony recommended getting the files in EPW format for hygrothermal modeling.
- Durability and damage: who should address this issue? This could go beyond ASHRAE. The NRC has done some work (Mustafa Nofal) on data on material properties after exposure to moisture. If we want to include this in our modeling, we need to work on this problem to understand the mechanisms. Neil pointed out that others are also working on this issue. Laverne pointed out that the codes are moving towards resilience and climate adaptation. Carsten Rode would like to contribute to formulating research ideas on this. Jay Crandell pointed out that 1951-RTAR was written with this in mind. He shared some information from physical observation of damaged buildings after hurricane events (HUD buildings), and forensic investigation found that major structural parts to transfer the loads were corroded after five to seven years of service life. Another example was the premature corrosion of brick ties. A lot of such damage is not quantified and assessed well at the moment.
- Brad Carmichael and Jay Crandell stated that Standard 90.1 had a discussion on possible moisture absorption limits for different insulation types in contact with the ground. Jay Crandell’s opinion is that ASHRAE, or a federal funding agency, is the right path to research this topic and provide the best answers to the industry.

10. Standards Subcommittee Report (T. Weston)

Theresa Weston was not present. Brad Carmichael shared the notes from Theresa with the group.

Standard 90.1 (a.k.a. Commercial minimum compliance energy standard)

Energy Standard for Buildings Except Low-Rise Residential Buildings

Purpose: To establish the minimum energy efficiency requirements of buildings other than low rise residential buildings for

- a. design, construction, and a plan for operation and maintenance; and
- b. utilization of on-site, renewable energy resources.

Report (Brad Carmichael):

Addendum AA has been approved to revise the purpose and scope of Standard 90.1 to include the reduction of greenhouse gas emissions in building operations. This is an expansion of purpose and scope from energy.

Committee also now requires analysis for proposed changes to standard to consider the Social Cost of Carbon when performing LCCA. Social cost of carbon is not required to be the basis for decision-making but is required to be presented for review.

Updates are being developed at envelope sub-committee for full committee review ahead of 2025 cycle, as follows:

- Climate zone maximum U-factor and minimum R-value tables project are tracking for completion this cycle with incremental improvements, and
- U-factor calculation methodology for steel stud wall assemblies likely to be updated to allow for linear transmittance factors along with AISI S250 methodology.
- Z-girts and clips for cladding attachment through continuous insulation, a proposal to add this subject to the thermal bridging provisions is nearing completion.
- Energy credits are being developed for buildings that have are tested to demonstrate a whole building air leakage rate below the code value of 0.35 cfm/sf @ 75 pa. Some allowance for credits to be issued for test results slightly above the code limit are also being considered in order to encourage testing. Credits to be specific to climate and building type.
- Language for prior exemptions for alterations to existing building envelopes is being updated to provide further detail on scopes by individual components.
- There is a work group that is working on updating the methodology to better characterize F-factors for underslab insulation.
- Main committee rejected a motion to remove the 0.3% moisture absorption limit referencing ASTM C272 for insulation in contact with ground. They noted that there is insufficient data to support the 0.3% limit, but also insufficient data to remove and replace with a limit prescribed by ASTM C1918. They need help determining the appropriate limits for different to insulation types, and is this even the right metric? The reason cited for keeping it in the standard was that it is a legacy requirement.
 - This may be a possible future RTAR for TC 4.4.

Brad will continue to report on TC 4.4 activities and TC 4.4 sponsored seminars.

Standard 189.1 (a.k.a. Green and sustainable standard, not a minimum)

Standard for the Design of High-Performance Green Buildings, Except Low-Rise Residential Buildings

Purpose: The purpose of this standard is to provide minimum requirements for the siting, design, construction, and plans for operation of high-performance green buildings to reduce emissions from buildings and building systems, enhance building occupant health and comfort, conserve water resources, protect local biodiversity and ecosystem services, promote sustainable and regenerative materials cycles, enhance building quality, and enhance resilience to natural, technological, and human-caused hazards; ...

Report:

This is a joint venture project with ASHRAE, IES, AIA, ICC, and USGBC,
Last published edition 2023.

- Continue to use ASHRAE Standard 90.1 as the benchmark for energy with modifications for the green code. Future goal is moving eventually to energy neutral (a.k.a. net zero energy).
- A resiliency task-group has been initiated.

New liaison needed. The committee meets Tuesday 8-12 (Same time as 160) – Alejandra and Theresa will be at the meeting and can post additional updates.

Standard 90.2 (a.k.a. Above-code residential energy standard)

Energy-Efficient Design of Low-Rise Residential Buildings

Purpose: The purpose of this standard is to establish the minimum whole-building energy performance requirements for energy efficient residential buildings.

Report (Weston)

- Current version is 2018, a new version is expected to be published late summer 2024.
- 16 published or in process addenda, including:
 - Change to title purpose and scope to now read “**Energy Efficient Design of Residential Buildings**” where you will notice that the reference to “low-rise” has been removed. The document will now be applicable for all residential occupancies.
 - Scope changed to include greenhouse gas emission performance in addition to energy performance
 - Adding requirements for CO2e indexing, based on RESNET/ICC 301 standard CRI methodology.
 - Adding requirements concerning IEQ and ventilation.
 - Adding requirements for lighting controls.
 - Updating air leakage requirements.
 - Adding retrofit requirements
 - Updating ERI and CRI targets with the inclusion of off-site renewable power
 - EVs

Standard 160:

Criteria for Moisture-Control Design Analysis in Buildings

Purpose: The purpose of this standard is to specify performance-based design criteria for predicting, mitigating, or reducing moisture damage to the building envelope, materials, components, systems, and furnishings, depending on climate, construction type, and HVAC system operation. These criteria include the following:

- a. Criteria for selecting analytic procedures*
- b. Criteria for inputs*
- c. Criteria for evaluation and use of outputs*

Report (Glass)

- Current version is Standard 160-2021.
- [Addendum a](#) was published January 31, 2024. This improves the organization and clarity of Section 7 (Reporting) and adds commentary citing ASTM E3054/E3054M-16 (Standard Guide for

Characterization and Use of Hygrothermal Models for Moisture Control Design in Building Envelopes).

- Working to revise Section 6 (Moisture Performance Evaluation Criteria), focusing on corrosion, freeze-thaw, and material moisture tolerance relating to structural capacity of sheathing materials.
- Working to revise Section 4.6.1 (Rain Penetration).

Standard 227P

Passive Building Design Standard

Purpose: This standard provides requirements for the design of buildings that have exceptionally low energy usage and that are durable, resilient, comfortable, and healthy.

Report (Weston):

- Reviewing comments from Advisory Public Review and plan to have a full public review in 2024.

Guideline 46P

Design and Construction Practices for Controlling Humidity in Residential Buildings

(TC 1.12/RBC)

Purpose: The purpose of this guideline is to provide guidance and best practices for controlling moisture and humidity, in the design and construction of new residential buildings.

No update at this time. Andre has offered to be the liaison in the future.

Standard 240P

Evaluating Greenhouse Gas (GHG) and Carbon Emissions in Building Design, Construction and Operation

Proposed ASHRAE/ICC Standard 240P - Evaluating Greenhouse Gas (GHG) and Carbon Emissions in Building Design, Construction and Operation, will provide a whole life carbon approach to support emissions reductions in buildings. The proposed standard establishes how to measure and verify the greenhouse gas (GHG) and carbon emissions of a building, or group of buildings, over the entire life cycle. The goal is to provide consistent procedures and data to be referenced by policies, codes, and other standards that address new and existing building performance.

New liaison: Mengjia Tang (not present)

11. Old Business

- Update on TC 4.4 membership: Fitsum Tariku will be rolling on July 1st, 2024, as the voting member. The voting member head count will drop to nine (9) people. Alejandra Nieto invited people to become voting members.
- Update on TC 4.4 leadership team: Alejandra Nieto announced that she will step down from the chair position in July 2025, and we need volunteers to fill the secretary position.
- Update to TC 4.4 committee scope definition on the web: The general agreement is to define the scope better and reflect current trends on resiliency, durability, and decarbonization of buildings. Several changes have been proposed. However, the agreement was not to have TC

vote yet; the most current definition will be uploaded to Basecamp for people to review and propose additional changes, so we can vote on the improved version in the next meeting.

12. New Business

- Interim Meetings: Alejandra Nieto encouraged the committee for interim meetings. The first interim meeting agenda:
 - TC4.4 Scope document review. The date for interim meeting will be announced.
- Alexander Zhivov shared with the committee new ASHRAE published documents on resiliency for cold, arctic and humid climates initiated through IEA Annex 73; the documents include information on the envelope performance. The new project was approved by IEA Annex 93 to study resiliency for extreme cold climates: with three areas of interest to this TC:
 - An increased air tightness, US Army of Corp Engineers was using 0.25 cfm @75Pa test pressure, tested buildings demonstrate that is not that hard to achieve better performance.
 - increase indoor air humidity to ~20% (requires WRB, how do you deal with this),
 - what if the building loses power, indoor thermal comfort loses rapidly, and indoor temperature significantly degrades? What if the building was energy efficient, airtight, has large thermal mass, or incorporates PCMs to improve the response of the building in accidental situations, an (increased mass also impacts CO₂), 2 inches of PCM material is equivalent to 14 inches of concrete in thermal performance.
- Alexander is looking for partnerships with people who have experience using in PCM. Nine countries are participating already. Alejandra Nieto asked for official request for collaboration via e-mail.
- The IEA Annex 93 prpoosal from Alexander Zhivov, US Army of Corp Engineers, will be distributed to TC members via Basecamp.

Neil moved to end the meeting, seconded by Marcus.

Minutes by Danko Davidovic –Secretary, TC 4.4. Next meeting: Orlando, February 2025