**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.***

**AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.**

**1791 Tullie Circle, NE, Atlanta, GA**

**404-636-8400**

**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: Wednesday, January 20. Meeting convened at 2:00 pm EST.**

**Location: Virtual**

**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

**ASHRAE TC 4.4 MINUTES**

**Building Materials and Building Envelope Performance**

# Introductions

The Chair, Diana Fisler, called the meeting to order at 2:00pm, which was followed by roll call attendance from leadership team.

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

Voting Members rolling off June 30, 2021: Diana Fisler, Chris Schumacher, Dave Yarborough, Florian, Roderick Jackson.

New voting members rolling on July 1, 2021: Marcus Bianchi, Danko Davidovich. 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 be a Corresponding Member for minimum of 2 years.

## Voting Members and Officers Attended:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Affiliation** | **Role** | **VM** |
| Diana Fisler | ADL Ventures | Chair | Voting Member |
| Peter Adams | Morrison Hershfield |  | Voting Member |
| Fitsum Tariku | BCIT |  | Voting Member |
| Sam Glass | USDA Forest Products Laboratory |  | Voting Member |
| David Finley | WJE |  | Voting Member/YEA |
| Sam Taylor | DOE (retired) |  | Voting Member |
| Laverne Dalgleish | AABA |  | Voting Member |
| Florian Antretter | Fraunhofer |  | Voting Member NQ |
| Andre Desjarlais | ORNL |  | Voting Member |

 ***Total Number of VM: 9 (1 non-quorum)***

## Voting Members and Officers Absent:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Affiliation** | **Role** | **VM** |
| Roderick Jackson | NREL |  | Voting Member |
| David Yarbrough | R&D Services |  | Voting Member |
| Chris Schumacher | RDH Building Science |  | Voting Member |

## Corresponding/Provisional Members Attended:

|  |  |  |
| --- | --- | --- |
| **Name** | **Affiliation** | **Role** |
| Alec Cusick | Owens Corning | YEA |
| Bob DeVries | Nu Wool |  |
| Gina Onodera | CertainTeed Gypsum |  |
| Deborah Callaway | Pabco |  |
| Danko Davidovic | Huber |  |
| Anthony Fontanini | NREL |  |
| Hua Ge | Concordia | YEA |
| Simon Pallin | ORNL |  |
| Rick Peters | TBS Engineering |  |
| Mika Salonvaara | ORNL |  |
| Michael Schmeida | Gypsum Association |  |
| Som Shrestha | ORNL |  |
| Shayne Spence | Lamtec |  |
| Wahid Maref | Ecole de Technologie Superieure |  |
| Marcus Bianchi | NREL | Research Chair |
| Mehdi Ghobadi | NRC | Membership Chair |
| Leslie Scheppelman | WJE | Webmaster |
| Soph Davenberry | National Energy Management Institute Committee |  |
| Theresa Weston | The Holt Weston Consultancy, | Standards Chair |
| Jonathan Humble | American Iron & Steel Institute | Liaison |
| Manfred Kehrer | WJE | Vice Chair |
| Paulo Tabares | Colorado School of Mines | Program Chair |
| Sam Vacek | Vacek LLC |  |
| Alejandra Nieto | Rockwool | Secretary |

***Total number of CM, PCM: 26***

## Guests Attended

|  |  |
| --- | --- |
| **Name** | **Affiliation** |
| Brad Carmichael |  |
| Charlie Haack | NAIMA |
| Jamie Bennett | TAC Section Head |
| Nate Huygen | National Brick Research Center |
| Suda Molleti | NRC |
| Larry Smith | TAC Vice Chair |
| Carsten Rode | Technical University of Denmark |
| Soph Davenberry | National Energy Management Institute Committee |

***Total number of guests: 8***

# 3. Report from the Chair (D. Fisler, Chair) with Section Head Jamie Bennett

Section head reviewed the new functional group evaluation form designed to assess the functioning of each TC. Completing the form is the responsibility of the Chair with input welcome from members of the TC.

# Approval of Minutes (M Kehrer, Acting Secretary)

The draft minutes from the June 2020 virtual meeting were posted to the ASHRAE Website and Basecamp for review. Motion to approve was made by Manfred, David Finley seconded.

***Vote: For 7, Against 0, Abstaining 1; MOTION CARRIED (CNV)***

# Program Subcommittee Report (P. Tabares, Programs Chair)

Seminars for winter meeting

* 20 (Live!) Idle Buildings are the Devil's Playground (Diana Fisler). 1.12, 1.8, 4.4
* 40 Building-Integrated Photovoltaic Envelope for Cold Climates: Here Comes the Power of the Sun (Costa Kapsis) 6.7, 4.4, 7.6
* 86 Use of Reflective Technology in Buildings (David Yarbrough)

**Seminars proposed for summer meeting**

Hot, Hot, Hot? Or Future Proofing

Chair: Achilles Karagiozis

SPC 160: hygrothermal modeling, today, tomorrow and the future

paper 1: Wahid Maref

paper 2: Simon Palin: developing THERM to include moisture

paper 3: Florian Antretter

Hot, hot, hot

Chair: Paulo Tabares

Peter Adams: Building in Jamaica. Having to ventilate with OA to solve humidify problems

FSEC is providing two additional speakers

Building envelope recover to wind and flood

Chair: Andre Desjarlais

Speaker 1: Pete Consigli (RIA) restoration industry association Insurance Company

Speaker 2: NRC post-disaster for roofing. (Mehdi Ghobadi to send Suda Molleti’s email to Andre)

Speaker 3: Wildfires…California Energy Commission… envelope code & fire. Andre Desjarlais will contact. He already secured most speakers.

Thermal performance of air permeable claddings (Phoenix or Vegas)

Chicago (Energy Conservation):

Chair: Paulo Tabares

1.-Dolaana PMS 1759

2.- Nate: CFD+ experimental testing: R-value of ventilation brick veneer assembly

3.-Mehdi Ghobadi (NRC): reflective insulation in air cavity

4.- Wahid Maref: thermal performance of building envelope using reflective materials

New chapters in ASHRAE:

Chair: Handbook chair (Laverne Dalgleish)

1.            25 Marcus Bianchi

2.            26 Hua Ge

3.            27 Mikael Salonvaara

Overall view of rainscreens.

Benefit of rainscreens to reduce solar to reduce load

Rainscreen principles and how to avoid issues and connection with performance issue

Danko Davidovic, Wahid Maref, Soph Davenberry and Paulo Tabares to follow up.

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

### Announcements

* Reminder that Section 4 Research Liaison (RL) is Natascha Milesi-Ferretti (NIST)
* Research Subcommittee Chair Virtual Breakfast will be held on February 9, 2021 at 8:00 AM EST.
	+ Update to TC 4.4 via Basecamp
* Reminder for everyone that the deadlines for RTAR, WS, etc. submissions to RAC:
* March 15
* May 15
* August 15
* December 15

### Active Research Project Status

**1696-RP**, “Thermal, Moisture and Air Transport Property Values for New Building and Insulating Materials”

* PMS: Alex McGowan (Chair), Sam Glass, Theresa Weston, Achilles Karagiozis
* PI: Chris Schumacher (RDH Building Science Laboratories)
* History:
	+ Contract awarded Fall 2015
	+ 2 no-cost extension granted
	+ Presentation was presented to Buildings XIV, Clearwater, Dec 2019
	+ TC 4.4 voted to advance final research report to RAC on recommendation of PMS in June 2020
* Status:
	+ **Final report was submitted to RAC on August 14, 2020**

**1759-RP**, “Impact of Airflow on Thermal Performance of Airspaces behind Cladding (Phase 1 of 2)”

* PMS: Paulo Tabares (Chair), Hua Ge, Jay Crandell, Marcus Bianchi
* PI: Dolaana Khovalyg (EPFL)
* History:
	+ Contract awarded Spring 2018
	+ 1 no-cost extension granted
* Status:
	+ **Final report was submitted to RAC on August 14, 2020**

**1730-WS**, “Research to determine the mass flow rate correlations across standard venting strategies and components in attic spaces with sloped roofs”

* Authors: Anthony Fontanini and David Roodvoets
* History:
	+ W 2014 – RTAR accepted
	+ F 2019 – WS 1 returned (not accepted) returned with comments from RAC
	+ RL says comments should be addressed and we should resubmit WS to RAC for their spring 2020 mtg (March 15, 2020).
	+ Neil Freidberg (then Owens Corning, now LP) attended the virtual meeting in June 2020; Anthony Fontanini was unable to attend. Neil reported that they were still revising the work statement
	+ The group discussed a plan to get the revised WS to RAC for their fall meeting
* Status:
	+ Anthony to revise with support from Neil Freidberg and others
* Actions:
	+ Chris Schumacher to assist Anthony and Neil Freidberg.
	+ **Anthony Fontanini will follow up**

**1857-WS**, “Improved simplified methodology for describing and calculating conduction between buildings and the ground”

* Authors: Neal Kruis and Tim McDowell (TC 4.7)
* 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
	+ Sp 2020 – TC 4.4 voted to co-sponsor
	(by email ballot: 8/0/0 CNV; 4 non-response)
	+ Paulo Tabares offered to represent TC 4.4 on the project
	+ Tim McDowell submitted a revised version of the WS to RAC on December 4, 2020
* Status:
	+ On January 19, RL communicated to Tim that it was conditionally accepted by RAC and the authors will receive comments
* Actions:
	+ **Marcus will follow up with Neal Kruis to connect Paulo Tabares with them**

### Possible Research Projects

* **RTAR**: “Development of Material Moisture Tolerance Criteria and Evaluation Methodology for Hygrothermal Analysis of Building Enclosures using ASHRAE 160”
	+ Author: Jay Crandell
	+ Still in development. No update because the author did not attend.
* **RTAR**: “Hygrothermal Properties of Aged Construction Materials”
	+ Author: Neal Holcroft
	+ Still in development
	+ ***Diana Fisler has volunteered to assist Neal in this effort. Neal no longer available. Diana to follow up with Suda Moletti.***
* **RTAR**: “Moisture Transfer in Building Materials at High Temperatures”
	+ Author: Sam Glass
	+ Still in development
* **Potential new RTAR:** “Low-slope and ratiometric performance data for reflective technologies in roof assembly applications”
	+ Authors: Wahid Maref, David Yarbrough, Peter Adams
	+ **Wahid will follow up**

### Brainstorming

* Status:
	+ Scheduled for January 28th, 11:00 AM to 1:00 PM EST (See Basecamp)
* From our past brainstorming efforts, we had a Top 10 list:
	1. Air and moisture transport at building envelope interfaces
	2. Characterize impact of air leakage on moisture deposition in assemblies
	3. Develop full characterization of material properties with all dependencies (e.g., temperature, moisture content) and error bands in dependencies for stochastic modeling
	4. Effect of aging on air permeance of assemblies (aging of openings)
	5. Effect of aging on heat, air and moisture related properties
	6. Effects of aging, temperature, and moisture content on thermal conductivity
	7. Field work to better characterize/understand/quantify air movement in and through assemblies (source, path, distribution)
	8. Mold growth risk on common building materials vs. moisture/temperature/time
	9. Normalize interior humidity loads across different climates, weather conditions, building types, building age, occupancy, and construction
	10. Thermal mass and the grid: How can we use the building envelope

# Standards Subcommittee Report (T. Weston)

**ASHRAE International Standards Participation**

Request by members of the ISO TAG US Committee to have TC 4.4 get involved by reviewing ISO proposed updates and reporting findings and recommendations to the US Committee. Currently under review is “Diagnosing Moisture Damage in Buildings and Implementing Countermeasures Part 1: Principles, Nomenclature and Moisture Transport Mechanisms”. The meeting is Tuesday 1- 3:30 in the Lake Lucerne room.

**Standard 90.1 (a.k.a. Commercial minimum compliance energy standard) Energy Standard for Buildings Except Low-Rise Residential Buildings** (Jonathan Humble - reporting)

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

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

Report:

* 2019 edition has been published,
* Committee preparing for 2020 edition by developing work plan (15 + aspirational goals),
* Addendum “av” (Thermal Bridging, related to RP-1365) will be going out for a 2nd public review,
* Mr. Humble continues to report on TC 4.4 activities.

**Standard 90.2 (a.k.a. Residential leadership energy performance code) Energy Efficient Design for Low-Rise Residential Buildings** (Jonathan Humble reporting)

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

Report:

* Published 2018 edition in 2019,
* Revising title purpose and scope to move from above code to high energy efficiency standard for all residential occupancies to read (Draft at this time) “1. PURPOSE - The purpose of this standard is to establish the minimum whole-building energy performance requirements for highly energy efficient residential buildings”,
* New categories being considered:” 8. renewable energy systems, 9. energy storage systems and their controls and control algorithms, and 10. internet connected control of the systems listed above, 11. energy management systems”.
* Revisiting energy metrics in preparation for the next edition.

**Standard 160 Criteria for Moisture-Control Design Analysis in Buildings** (Achilles Karagiozis reporting)

*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:

* Vote on public review of moisture reference year addendum
* Currently working durability (1) Corrosion, (2) Freeze/Thaw
* There have been several roster changes

**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** (Jonathan Humble reporting)

*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,
* Business agreement between ASHRAE and International Code Council to create one high performance green code for North America,
* Recently published 2018 document entitled the International Green Construction Code which combines the technical requirements of Standard 189.1 and the ICC International Green Construction Code,
* Continue to use ASHRAE Standard 90.1 as the benchmark with modifications for the green code, and
* Preparing to complete all proposals and publish a 2020 ASHRAE edition, and a 2021 International Green Construction Code edition.

New Standards Projects Initiated:

* **Standard 227P Passive Building Design**

*Purpose: This standard provides requirements for the design of buildings that have exceptionally low energy usage and that are durable, resilient, comfortable, and healthy.10/3/19.*

* **SPC 228P Standard Method of Evaluating Net-Zero Energy Building Performance**

*Purpose: This standard sets requirements for evaluating whether a building or group of buildings meets a definition of “net-zero energy”. It provides a consistent method of expressing qualifications for net-zero energy buildings associated with the design of new buildings and the operation of existing buildings.*

**Potential New Guidelines:**

* Building Enclosure Commissioning - Laverne Dalgleish to investigate

# Handbook Subcommittee Report

# Chapters 25,26,27 were revised and submitted for publication. Next chapter due for revision is chapter 45. Peter Adams has agreed to coordinate.

# Old Business

Review of TC 4.4. Scope:

No progress was made on scope or vision since last meeting. Discussion will continue on Basecamp in advance of next meeting.

# Andre Desjarlais asked for an update on TC elimination and combination. Some of the section 10 TCs are combining. No action anticipated regarding TC 4.4 at this time.

# New Business

None

***Minutes by Diana Fisler – Acting as a Secretary, TC 4.4. Next meeting: Phoenix, AZ June, 2021***