# *ASHRAE TC 1.12*
# *Moisture Management in Buildings*
# *Full Committee Agenda*

**2025 ASHRAE Winter Meeting, Orlando**

**Main Committee Meeting:**
**Saturday 02/08/25, 1:00 PM – 3:00 PM ED**

Hilton Orlando, Spring Lake (Lobby Level)

Hybrid same Zoom Link

1. **Call to Order** **Carl Grimes**
   a. Meeting called to order at 1:05 EDT
2. **Review Scope** TC 1.12 is concerned with the interaction between the weather, the building envelope, its systems and its occupants which either lead to moisture accumulation or which prevent it.
3. **ASHRAE Code of Ethics Commitment** **Carl Grimes**
   "In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests." See full ASHRAE Code of Ethics: https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics
4. **Introductions** **All**
   a. Determination of a quorum Diana Fisler
   *VOTING MEMBERS FOR THIS MEETING (Need (6) or ½+1 for a Quorum)*

| | | | |
|---|---|---|---|
| Carl Grimes | 06/30/2026 | Deborah Callaway | 06/30/2025 |
| Erika Bonfanti | 06/30/2028 | Danko Davidovic | 06/30/2026 |
| Dave Finley | 06/30/2028 | Paul Haas | 06/30/2024 |
| Wahid Maref | 06/30/2028 | Ed Light | 06/30/2025 |
| Don Snell | 06/30/2027 | Mikael H Salonvaara | 06/30/2026 |
| Simon Pallin | | | |

5. **Agenda additions** **All**

**Program discussion and timing** **Carl Grimes**

6. **Chair's Report**
   a. Chair's Goals and Announcements
7. **Approval of minutes from Hybrid Indianapolis Meeting** **Carl Grimes**
   a. No comments or discussion
   b. Motion by Eric, Wahid second
   c. Motion passed 8-0-0-CV

**8. Membership/Roster** **Diana Fisler**

As of September 12, 2024. (All voting members and/or subcommittee chairs)

| Name | Role | Voting |
|---|---|---|
| Carl Grimes | Chair | Yes |
| Erika Bonfanti | Vice Chair | Yes |
| Diana Fisler | Secretary | Yes |
| Wahid Maref | Research Chair | Yes |
| Don Snell | Standards Chair | Yes |
| Simon Pallin | Handbook Chair | Yes |
| Dave Finley | Program Chair | Yes |
| NA | Webmaster | |

| Name | Role | Voting |
|---|---|---|
| Deborah Callaway | | Yes |
| Danko Davidovic | | Yes |
| Paul Haas | | Yes |
| Ed Light | | Yes |
| Mikael H Salonvaara | | Yes |
| | | |
| | | |
| | | |

**a.** Adjustments and corrections of terms, changes to the officers, voting members, and subcommittee chairs.

**i.** Sub-committee chair not voting is no issue but generally have training sessions
- Can attend even if not formally in the position

**ii.** Can do emergency roster update as needed
- Contact section head accordingly
- Carl to work with section head for emergency updates as needed

**iii.** TC committee balance is important in all committees but can be difficult
- Can't have 2 voting from same company (3 years max term before voting again)
- Chairs 1 to 2 years but can extend as needed

**iv.** Carl term as Chair end in June 2026 when should be 2025
- Ericka Bonfanti voting until 2028 - correct (non-voting should be)
- Dave Finley voting until 2028 – correct
- Wahid Maref voting until 2028 – correct
- Don Snell as voting until 2027 but stepping down as Standards chair Craig Martin to be new Standard chair
- Danko as voting until 2026 – correct
- Ed Light as voting until 2025 – correct
- Mikael Salonvaara as voting until 2026 – correct
- Neil as a voting member per official record but to be fixed

**v.** Carl to coordinate with Section Head as to which is official roster since finding several versions
- Tara provides the official record

**vi.** Diana Fisler stepping down as Secretary and David Baird as new secretary

**vii.** Simon off handbook chair with Danko moving to Handbook chair

**viii.** Neil will move to webmaster position

**ix.** Wahid will become as Vice Chair come July 2025

**x.** Masih Alavy will become new Research chair come June 2025

**xi.** Alchilles Karagiozis to become a voting member as of July 2025

**xii.** Carl to get the roster form submitted on-time March 3rd

**9. Liaison Reports**

**a.** Section Head - Jason

**i.** Tracks coming out of TAC but not voted on yet when this meeting occurs

**ii.** Several other TCs are in the same boat

**iii.** Potentially try to meet remotely outside of this main conference

**iv.** Vegas seminars aren't due until July so will have time to discuss before submission deadline

**v.** If update anything will automatically update into Bio

**vi.** Roster update conversation going which is good

**vii.** Publication and making sure to support
- Damp Buildings in HVAC design planned to support

**viii.** Chair's Breakfast will include training and updates on Sunday morning 7 am

**ix.** Sub-committee chairs have training opportunities at the conference

**x.** Phoenix will be the next meeting

**xi.** Programs will include Fundamentals, Systems and Equipment, Energy Storage, Research Summit, Decarbonization, Artificial Intelligence, Ventilation and IAQ for Healthy Buildings, Future Proofing for Built Environment but not finalized yet

**xii.** Position Documents tend to lead to tracks associated in the future

**xiii.** Partnering with other TCs or other committees are great ways to get your programs accepted

**xiv.** Chairs and Vice Chairs have a normal e-mail alias that can be used

**xv.** If get a request after this conference for support likely need to letter ballot

**10. Subcommittee reports**

**a. Programs** **Dave Finley**

-Submitted for track 9 this time around on Future Proofing in Built Environment but was not accepted

- Las Vegas sounds like a new Future Proofing track and re-submit

  Consider partnering with another TC to increase chances per discussion

  Don Snell to check with 62.1 or 62.2 for co-sponsorship

- Had another program planned but didn't submit in time regarding …
- Different sessions to consider for this committee are as follows:
  - Seminar 12: Indoor Environmental Quality in Schools Part 1: Thermal, Visual, Acoustic and Air Quality
  - Seminar 29: LIVESTREAM: Advancing Building Sustainability: ASHRAE Standard 160 and Freeze-Thaw Assessment Integration
  - Paper Session 4: Improving the Building Envelope
  - Paper Session 28: IAQ / Ventilation
  - Seminar 29: LIVESTREAM: Advancing Building Sustainability: ASHRAE Standard 160 and Freeze-Thaw Assessment Integration
- Phoenix tracks are as follows:
  - Track 5 on Industrial Ventilation and Air Conditioning possible but suggest wait for Vegas
  - Track 6 on Heat Pumps and Refrigeration
    - Building Retrofit and Electrification for Heating and Moisture Management Forum was submitted for Orlando but not accepted
    - Dave Finley motioned to re-submit in Track 6 headed by Mika for Phoenix. Wahid seconded. Motion passed. (8-0-0-CV)
    - Stephen Duda would be willing to moderate in place of Mika
    - Submission deadline is February 26th
- Las Vegas tracks not finalized but please consider tracks for possible submission
  - Document on construction moisture would be a good topic for a forum possibly
  - Need to consider format since it impacts acceptance
  - Forum can be done during committee meeting as an alterative
  - Forum gives a pulse from the public before moving into seminar right away
  - Forum is not official and no record to encourage open-ended discussion
  - Moisture is often not considered in HVAC but it affects all sorts of things people don't understand
  - ASHRAE Journal is always looking for topics and another avenue to consider

**b. Research** **Wahid Maref**

- RP 1844 Estimating Internal Moisture Generation Rates in Recently Constructed Occupied Homes
    - Done and completed
    - Research was not incorporated into publications
    - Just administration work to formally close it and can be posted to TC website
- Risk Assessment Practitioners guide to whole building moisture and hygrothermal analysis
    - Led by Ed Light
    - All related to moisture and construction
    - Overall moisture management in construction to expand research
    - Do a separate project to summarize what we already know about it but the guideline process is challenging
    - Lew Harriman wrote a lot of good items years ago and could
    - Effa will lead the effort with Ed, Dave Finley, and Neil to work on the RTAR
- Occupant comfort, experience relevant to health and well-being
    - Decide to move on towards an RTAR
    - Work with SGPC 10 is desire since published Addendum A for Guideline 10
    - Peter Luttik and Carl Grimes are to take the lead with this
    - Looking for a general vote to support it
    - Wahid to coordinate with TC 5.11 and TC 8.10 on partnership on moisture RTARs

**c. Handbook** **Simon Pallin**

- Danko is new chair of handbook and learning
- Carl Grimes has e-mail from Handbook with specifics and will coordinate with Danko

**d. Standards** **Don Snell**

MTG on Damp Buildings, Human Health, and HVAC Design

- Carl motioned to form and lead working group to update. Dave Finley motioned. Wahid seconded. 8-0-0-CV

Guideline 10-23

- In publication. Addendum A to guideline defines moisture.
- Committee should review accordingly.

Standard 241P (Control of Infectious Aerosols)

- Out for public review currently until March 2nd

ISO 22185-2 Diagnosing Moisture Damage in Buildings and Implementing Counter-measures

- No update at this time

Standard 160 – Criteria for Moisture-Control Design Analysis in Buildings

- Current version is 2021. Working on updates to publish in 2026
- Addendum A published last year providing clarity on Section 7
- Working on Section 6 (corrosion, freeze-thaw, and structural degradation of exterior sheathing)

GPC 45 - Design and Construction Practices for Controlling Humidity in Residential Building

- Don reached out to Pat and Paul for an update on this standard

**e. Web site** **NA**

- **i.** No update

**11. Old Business**

- **a.** Special Publications is an alternative to guidelines and been done by this committee in the past.
  - **i.** Based on technical content
  - **ii.** Take prior construction moisture management content for a special publication
  - **iii.** Have had 30 minutes at end to talk about cutting edge stuff from a speaker at the end.
  - **iv.** Identify a potential speaker for the summer meeting
- **b.** Handbook applications
  - **i.** Always looking at adding stuff
  - **ii.** Put brief introduction and summaries regarding managing moisture in buildings.
  - **iii.** Important to review and what can add to it in handbook chapters

**12. New Business**

- **a.** Review TC 1.12 documents to be in compliance with moisture definitions in Guideline 10 Addendum a. (attached)
  - **i.** Modified to Carl's motion for TC to submit Addendum A moisture definitions to ASHRAE for inclusion in their definitions. Neil second. Motion passed. (8-0-0-CV)
  - **ii.** Handbook fundamentals did not have a specific definition.

**13. Adjourn**

- **a.** Neil motioned to adjourn. Dave second. Passed. 8-0-0-CV.
- **b.** Adjournment at 3:00 PM EDT

*Draft minutes approved in Summer 2025 meeting, 06/21/2025.*

# Attachment A

## *DEFINITIONS – per Addendum A, Guideline 10-2023*

***absolute humidity:*** the weight of water vapor contained in a unit volume of air, expressed as milligrams of water vapor per cubic centimeter of air.

> ***Note: The*** measurement of absolute humidity is expressed sensitive to changes with the temperature of air and atmospheric pressure. Specific humidity is a more accurate and useful term for the indoor environment, while absolute humidity is technically correct for chemical processes.

***acceptable indoor environment:*** an environment that is suitable for the purposes of the intended occupancy.

> ***Note:*** The meaning of acceptability depends on the criteria and the process that is applied to perform the determination. This is influenced by the individuals involved in this process (e.g., occupants, building operators, owners, and visitors) along with relevant health and other standards. These different individuals may render diverse determinations. Acceptability of an indoor environment is the determination of any affected party that the environment is suitable for the purposes of the intended occupancy.
>
> It should be noted that acceptability is not identical to the satisfaction of most or all occupants, which would generally require a somewhat higher level of environmental quality. Ultimately, acceptability is defined by the process used to determine it, as well as by the individuals who make the evaluations, assessments, or judgments that are part of the process. This guideline recognizes that individual acceptability is often dependent on context and on cultural expectations.

***acoustical environment:*** the sound and vibration conditions in a space.

***aspect:*** the components that make up an environmental factor.

***condensation***: the conversion of water vapor in the air to liquid water on a surface that is at or below the dew point temperature of the surrounding air.

***contaminant*****:** see ***pollutant.***

***dew point temperature****:* the temperature to which the air must be cooled to become 100% saturated with water vapor. Water vapor (humidity) will form condensation on adjacent surfaces that are at or below the dew point temperature of that air.

***dry bulb temperature:*** the ambient temperature of the air as measured by using a normal thermometer freely exposed to the air but shielded from radiation and moisture.

***enthalpy:*** the integrated representation of the dry-bulb and wet-bulb condition of the air that describes the total energy content of the air.

***equilibrium relative humidity*****:** the relative humidity of air in contact with a surface when neither air nor surface is gaining or losing energy or moisture.

> ***Note***: Full equilibrium between surface and air does not occur in buildings because equilibrium requires a sealed and insulated container that isolates both surface and air from external sources of energy and moisture. But when the surface temperature of building components or furnishing and the dew point temperature of the adjacent air is known with some certainty converting the dew point of the air to relative humidity with respect the temperature of the surface can be useful for assessing whether a surface might be gaining or losing moisture.

***factor:*** the major features of the indoor environment that affect its acceptability as addressed in this guideline are termed *factors*.

***health:*** the World Health Organization defines *health* as, "... a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." For the purposes of this document, the term *health* extends to the general category of interactions, whether currently known or unknown, affecting the achievement of acceptable indoor environments.

***health risk****:* an *interaction* of the *factors* of the *indoor environment* that decreases below satisfaction the chance of developing a diagnosable disease or a definable hazard.

***humidity****:* The presence of water vapor in the air or in a gas. The amount of water vapor in the air can be expressed in at least four different terms, each of them linked to a different way of measuring the humidity.

***humidity measurement by:***

1. **Specific humidity** is a measure of the weight of water vapor contained in a unit weight of air, expressed as grams/lb / grains of water vapor per lb/kilogram of air. Note 1. It is the vertical axis of psychrometric charts, and corresponds directly with dewpoint.
   ***Note 2:*** The measurement of specific humidity is not influenced by the temperature of air or atmospheric pressure of the air
   ***Note 3:*** Specific humidity is more relevant to effects on materials rather than to humans.
2. **Dewpoint condition** is a measure of absolute humidity that is measured by cooling the air until it start condensing or "dew"forming on a cold surface.
3. ***Absolute humidity*** the weight of water vapor contained in a unit volume of air, expressed as milligrams of water vapor per cubic centimeter of air.
   ***Note 1: as pressure or dry bulb temperatures change the amount of water vapor in a fixed volume of air changes.*** At the constant temperature and pressure of "standard CFM" conditions absolute and specific humidity directly correspond to each other as well as the dewpoint of the air.
   ***Note 2:*** The measurement of absolute humidity measures weight per volume or g/m3 or grains/cfm. HVAC air supply conditions are usually defined in terms of volume per time i.e. (CFM/CMH) , it can be used to determine how much water needs to be added or removed to get to target conditions in term of DB/RH.
4. ***relative humidity****:* the amount of water vapor present in air expressed as a percentage of the amount needed for saturation at the same temperature. Abbreviated as RH.
   ***Note 1***: Relative humidity is more relevant to effects on humans, while dew point temperature is more relevant to effects on materials.
   ***Note 2***: The relative humidity as measured in the open air is not the same value as relative humidity when measured near indoor surfaces, unless both the air and the surface in question are at the same temperature.
   **Note 3**: Extremes of the relative humidity of indoor air can affect perception of comfort. High relative humidity supports growth of biological agents, including decease vectors like viruses. High relative humidity also drives moisture development on cold surfaces. It can also maintain the size of moisture droplets in the air with viruses/bacteria inside of them that are expelled by occupants. Heavier droplets will more quickly fall down. Low relative humidity increases the lifetime of airborne decease vector by quickly reducing the size of droplets. It also adversely affect the human immune system in a number of ways that lead to significant increases in transmission of infectious diseases like the flue.

***illumination:*** non-ionizing radiation in the visible portion of the electromagnetic spectrum.

***indoor air quality:*** the measurable physical, chemical, and biological composition of air in a space compared with reference values for its components, the acceptability of the air to occupants, and the total composition of the air, whether detectable or not.

***indoor environment:*** the conditions that exist inside an enclosed, nonindustrial building intended for human occupancy.

***interaction:*** the combined effect on a building occupant of two or more environmental factors or their aspects.

***ionizing radiation:*** a form of energy that acts by removing electrons from atoms and molecules of materials that include air, water, and living tissue; ionizing radiation can travel unseen and pass through these materials.

***moisture****:* 1. Water vapor in air. 2.Water liquid absorbed or adsorbed into or below the surface of a solid such as the materials or furnishings of a building.

**Note 1:** Moisture is an aspect of the environment that is interactive, individually or collectively, as an influence of the four environmental factors that affect the acceptability of indoor environments. Moisture is active in the air as vapor (enthalpy), in materials as liquid (moisture content), or on surfaces of materials or furnishings (water activity/available water) of the indoor environment. Moisture can be considered a pollutant when excessive in air, in materials, or on surfaces of materials; and potentially considered a health risk when excessive or deficient in air. Water as vapor, liquid, or solid can also contain or distribute dissolved or suspended material as Category 1, 2, or 3 Water, per ANSI-IICRC S500 Professional Water Damage Restoration.

**Note 2:** Moisture accumulation in materials create favorable conditions for biological growth, including but not limited to the growth of molds on surfaces and growth of decease vectors like viruses and bacteria. Very low moisture conditions on surfaces can lead to extended life of micro biological substances. High surface moisture can lead to adverse surface reactions that increase gaseous pollutants of indoor air and over time can lead to health-relevant building dampness.

**Note 3:** The term “moisture” is routinely used as a generic reference to the collective or inclusive use of relative humidity, specific humidity, moisture content, and water activity without differentiation.

***moisture content***: the weight of water in a material compared to the dry weight of that material, expressed as a percentage.

***Note***: Moisture content is a common metric used to assess the risk of excessive moisture accumulation in wood and other cellulosic building materials, including paper-faced gypsum board and acoustic ceiling tile. For building materials, moisture content is generally expressed as a percentage of the material when oven dried. Wood moisture equivalent (WME) is a convenient metric of moisture content because low cost handheld moisture meters are widely available with that calibration. WME values that imply risk of mold growth on cut wood surfaces also imply risk of mold growth and other adverse effects in the adjacent cellulosic materials and fabrics commonly found in buildings.

***non-ionizing radiation:*** a type of low-energy radiation that does not have enough energy to remove an electron (negative particle) from an atom or molecule; non-ionizing radiation includes visible, infrared, and ultraviolet radiation; microwaves; radio waves; and radiofrequency energy from cell phones.

***pollutant:*** any unwanted environmental component that is present in an occupied building space.

***Note:*** What is “unwanted” will vary with the use of a space and the individual users. For example, loud sound (music, speech, motors, etc.) that interferes with a desired function of a space, such as conversation, a lecture, or other activity with audible content essential to its success, is considered sound pollution (usually referred to as *noise*). However, what may be perceived as noise by one person may be considered desirable by another, as in the case of music, where taste and personal preference differ for loudness (sound intensity). Differences in auditory acuity will also affect perceptions of acoustical conditions as visual acuity, olfactory sensitivity, and tolerance or preference for thermal conditions will affect perceptions of thermal comfort.

Both disability glare (lighting that interferes with occupants’ ability to see), discomfort glare (lighting that causes discomfort for the occupants), and color spectrum could be considered undesirable components in the built environment. Here, too, individual preferences can be important. Contaminants in air are commonly referred to as *air pollutants*. No equivalent concept exists for thermal conditions inside buildings, but

thermal pollution of water occurs at power plants where cooling water is released into a water body and adversely affects aquatic life.

***psychrometric chart***: a graphical representation of the thermodynamic properties of air at various conditions.

***thermal environment:*** the combined effect of the temperature, humidity, air movement, and thermal radiation in a space.

***visual environment:*** the combined effect of the spectral distribution, intensity, and direction of the visible electromagnetic energy in a space.

***wet bulb temperature:*** a measure of the enthalpy/energy content of the air, measured air temperature influenced by humidity and other environmental factors.

> ***Note:*** wet bulb temperature reflects the cooling effect of evaporation of water from a thermometer bulb wrapped in wet muslin, whirled in the air until the thermometer reaches a constant value. Modern digital instruments calculate web bulb temperature from the measured values of temperature and humidity. The wet bulb temperature can also be located on a psychrometric chart.

***water activity/available water***: the ratio between the water vapor pressure of a surface and the vapor pressure of distilled water at the same temperature, when both are in equilibrium at a constant temperature.

> ***Note***: Water activity is abbreviated as aW and is the decimal equivalent of the equilibrium relative humidity at the surface in question. For example, a water activity value of 0.8 is the same as an equilibrium relative humidity of 80%. At high water activity values, moisture at the surface of a material is available to fungus and bacteria to support growth and reproduction.

***wood moisture equivalent:*** the moisture level in any building material as if it were in close contact and in moisture equilibrium with wood, expressed as the equivalent moisture content of wood.

> ***Note***: Wood moisture equivalent is abbreviated as WME and can be used directly to establish if materials are in a dry, at risk, or damp condition as the critical percent moisture content thresholds for wood are known. WME is particularly useful not only for direct comparisons but when a material under evaluation is not directly accessible to the moisture meter.