

Upcoming Events

Thursday, September 7th, 4:30-6:30 PM

- ASHRAE Kickoff YEA Event

Wednesday, September 13th, 5:30 PM

- Monthly Meeting

A message from Ms. Gena Knight,
SWFL ASHRAE President

Welcome back SWFL ASHRAE! We have some exciting things in the works for 2023-2024 year, including our chapter's 40th anniversary.

So far, this year kicked-off with Region XII's CRC 2023 in Trinidad August 9th through the 12th. Thank you to all of those who were able to take the time to represent our chapter. Region XII's own John Constantinide and Wayne Conlan were able to appear on Trinidad's local news to discuss the many benefits of ASHRAE. Watch the interview here: https://www.youtube.com/watch?v=eMVc9us2_D0.

Looking ahead - Please plan on joining YEA Thursday, September 7th from 4:30-6:30PM Headpinz Fort Myers, 14513 Global Pkwy, Fort Myers, FL 33913 to say a big thank you to our sponsors. Appetizers will be provided. Please feel free to bring a friend or potential sponsor to check what SWFL ASHRAE has to offer.

Our first meeting is scheduled for dinner, September 13th at Crowne Plaza Bell Tower (13051 Bell Tower Dr, Fort Myers, FL 33907). Details to follow.

I encourage you to explore the ASHRAE website (www.ASHRAE.org) and all its offerings as well as taking a moment to update your ASHRAE Bio on-line. Thank you for your time and I look forward to seeing you all very soon.

- Gena Knight

SWFL Chapter President 2023-2024



SWFL ASHRAE Chapter Meeting Announcement

Date: Wednesday, September 13th, 2023
Location: CROWNE PLAZA AT BELLTOWER SHOPS
Start Time: 5:30 p.m. to 6:45 p.m. Networking
6:45 p.m. to 8:00 p.m. Dinner meeting and main program
Cost: COST: \$35.00 PER ATTENDEE – RESERVATIONS ARE A MUST
NO COST FOR COLLEGE STUDENTS WITH A VALID STUDENT I.D.
Pre-Pay via www.paypal.com to swfl.ashrae@gmail.com
RSVP by 11SEP23 via the following link: <https://forms.gle/WGuEDLzKzHumFgYx8>

Main Program: [The Inflation Reduction Act & Thermal Energy Storage](#)

The Inflation Reduction Act of 2022 (IRA) was designed to make major investments in domestic energy production & manufacturing, healthcare, and climate change. This presentation will explain the IRA in detail and show specifically how it creates a massive opportunity for us in the HVAC & Construction industries in the form of Thermal Energy Storage.

Guest Speaker: [Mark MacCracken](#)

In November 2017, Mark MacCracken became the VP, CALMAC Portfolio for TRANE. Prior to CALMAC's purchase by TRANE, he was CEO of CALMAC, which is one of the largest manufacturers of Thermal Energy Storage equipment in the world, with over 4,500 installations in 60 countries. He received his BS in Mechanical Engineering from the University of Rhode Island in 1976, has five U.S. Patents, and is a Professional Engineer and a LEED Fellow. Throughout his career he has regularly been involved in ASHRAE, as a distinguished lecturer, Technical Committee Chairman, and Vice Chair of the 189.1 Standards Committee. He has also held several board positions for the USGBC, AHRI, & New Buildings Institute to name a few. In his continual support of energy efficiency, he is regularly in contact with the DOE, EPA, EPRI and electric utilities across the country and around the world.

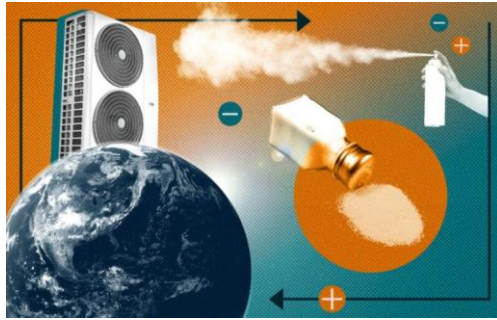
Upcoming ASHRAE Meetings (Topics TBD)

- October 11th, Dinner
- November 8th, Lunch
- January 10th, Lunch
- February 21st, Lunch
- March 13th, Dinner
- April 10th, Lunch
- May 8th, Dinner

Refrigeration – Jeff Brooks

Thermodynamic Cycles

This Cool New Approach to Refrigeration Could Replace Harmful Chemicals



By
[Jennifer Ouellette](#)

Scientists at Lawrence Berkeley National Laboratory have developed a novel potential means of alternative refrigeration: ionocaloric cooling. The method involves electrically charged atoms or molecules (ions) changing the melting point of a solid material, much like adding salt made with iodine to roads before a winter storm changes how ice will form. Their proof-of-principle experiment used salt made with iodine and sodium along with an organic solvent to achieve energy-efficient cooling, according to a recent paper published in the journal *Science*.

“The landscape of refrigerants is an unsolved problem: No one has successfully developed an alternative solution that makes stuff cold, works efficiently, is safe, and doesn’t hurt the environment,” said co-author Drew Lilley. “We think the ionocaloric cycle has the potential to meet all of those goals if realized appropriately.” [Read more](#)

Research Promotions – Tony Amita

On behalf of our SWFL ASHRAE Chapter I want to take a moment to thank our 2023 donors. Your support continues to fund valuable research aimed at the development of standards that guide the design of our modern built environment.

ASHRAE’s research program, established in 1912, supports 140 research projects with a combined value of more than \$15 million. Research focus includes energy and resource efficiency, indoor environmental quality, design and operation and management tools, alternative technologies and materials and equipment. Through scholarships, grants and awards, the Society supports engineering education for undergraduate students and research projects for graduate engineering students and new post-doctoral scholars.

Thank you again to our 2023 partners at Trane, Commercial Air Management, Tom Barrow Company, Gilbane Building Company Sarasota, Johnson Controls Tampa, B&I Contractors, Ameresco, Duct Detectives, Spelman Engineering, Insight Partners, Applied Marketing Knowledge, and all individual contributors. We encourage you to reach out to be a partner of our 2023 campaign, our latest sponsorship flyer is attached.

Warm Regards,

Tony Amita 2023 RP Chair.

Student Activities – Gary Devore

Upcoming Event Notice: Kick-off meeting for STEM events through Lee County Foundation

Topic: STEM@Work Committee Meeting

Time: Sep 6, 2023, 03:00-4:00 PM Eastern Time (US and Canada)

Join Zoom Meeting

<https://us02web.zoom.us/j/83731543354?pwd=OVMvM0prbnRiRVRzb0lyTGf3R005QT09>

Meeting ID: 837 3154 3354

Passcode: 743654

Meeting Agenda:

- Introductions of new attendees (if any)
- Debrief from last year (lessons learned)
- Kick-Off Event (yes/no)
 - Type of event
 - Potential dates and location
 - Review Kick-Off Event schedule
 - Pre-event assessment/questionnaire
- Update on STEM@Work events
- Good of the Order

STEM@Work

SCIENCE . TECHNOLOGY . ENGINEERING . MATH
<http://www.leeschoolfoundation.org>



Our focus on STEM began with the notion that students need more opportunities in the areas of Science, Technology, Engineering, and Math related fields. The National Science Foundation estimates that 80% of the jobs created in the next decade will require some form of math and science skills.

Our STEM Initiatives are a collaboration between the Foundation and the School District of Lee County. Funded through the generosity of our business partners, this initiative offers students the opportunity to participate in field trips and internships, as well as experience hands-on activities through partnerships with businesses in the community.

Membership Promotion – Sidney Feldman

Please take the time to welcome our new chapter member, Alejandra Marisol Acosta. They work locally for Politecnico Fort Myers, we hope to see Alejandra at an upcoming meeting.

Government Affairs – James Martin

Department of Energy Projects

Department of Energy Earmarks \$46M to Reduce Energy Waste in Buildings



[Joe Burns](#) Reporter



The Department of Energy said more than half of the 29 projects selected will “pursue advancements to improve space conditioning and water heating.” Credit: MingzheZhang via Getty Images

The U.S. Department of Energy is allocating \$46 million to develop advanced building technologies and retrofit practices to reduce energy waste in buildings. The Buildings Energy Efficiency Frontiers and Innovation Technologies, or Benefit, funding will be channeled toward 29 projects across 15 states to help advance cost-effective building electrification solutions. The projects are expected to support decarbonization strategies that will significantly reduce the building sector’s greenhouse gas emissions, eliminate energy consumption and reduce strain on the nation’s grid. [Read more](#)

Decarbonization

Chicago Puts \$15 Million Into Induction Stove, Heat Pump Retrofits



By
[Steve Hanley](#)

On July 20, Chicago Mayor Brandon Johnson announced a request for proposals to select providers for the city’s Residential Decarbonization and Retrofit Program. That program will advance the equitable decarbonization of Chicago’s residential buildings by providing low and moderate income homeowners with several home upgrades including new insulation, heat pumps, induction stoves and heat pump water heaters, among other energy saving measures. [Read more](#)

CRC 2023 - Trinidad



ASHRAE

ASHRAE Merchandise

Shop your favorite ASHRAE logo merchandise below. From hats and polos to car magnets and tumblers, we have all the gear you need to show off your ASHRAE pride.

Regions and Chapters are welcome to email merchandise@ashrae.org with questions about ordering items at-cost or in bulk if stock is available.

[Get Your Merch Today!](#)

Featured Jobs

- ❖ Construction Project Manager
- ❖ Industrial Maintenance HVAC Technician
- ❖ Senior Instrument & Controls Engineer
- ❖ Associate Safety Engineer
- ❖ Project Manager / Senior Project Manager
- ❖ Regional Sales Manager
- ❖ Senior Manager of Standards
- ❖ Manufacturing Engineer
- ❖ ESH Engineer, TMC
- ❖ Assistant Professor in Computer Science



[Apply Here](#)



August, 2023

From: ASHRAE Southwest Florida Chapter

Subject: ASHRAE Southwest Florida Sponsorship Opportunities for 2023-2024

The ASHRAE Southwest Florida Chapter RP fund-raising events are excellent sponsorship opportunities. Your company reaches many key decision makers and sends a strong message of supporting the research that the community relies upon for comfort and sustainability.

The Southwest Florida Chapter is continuing to make sponsorships even easier by offering levels that include the promotion of your company at all chapter events! If you are unable to contribute at one of these levels, sponsorship opportunities for the Golf and Fishing tournaments will be offered separately before each event!

Go To: <https://www.swflashrae.org/sponsorship> for an on-line payment option!

Annual Sponsorship Levels

Diamond Level - \$6,000 (Savings: \$825)

One Available

- "Happy Hour" Sponsorship - One drink ticket per attendee with sponsor's logo (Value: \$2,000)
 - Swag distribution during happy hour by reception chair (Value: Priceless)
- Golf Tournament: Gold Sponsorship Package (Value: \$1,750)
 - (8) Player Entries, (1) Tee Sponsorship, (1) Flag Sponsorship, (8) Mulligans, (1) Arm Length Raffle, (8) Putting Contest Entries
- Fishing Tournament: Gold Sponsorship Package (Value: \$500)
 - (4) Entries, Company Logo on Shirt, and special recognition
- Tech Topic Presentation (Value: \$250)
- A Complimentary Fishing Charter (Value: \$1,000)
- (15) Monthly Meeting Tickets (Value: \$525)
- (2) Meeting Sponsorships (Value: \$500)
- Signage at each monthly meeting (Value: \$100)
- (10) Yeti Raffle Tickets (Value: \$100)
- Logo on Monthly Newsletter (Value: \$100)

Gold Level - \$3,000 (Savings: \$300)

- Golf Tournament: Gold Sponsorship Package (Value: \$1,750)
 - (8) Player Entries, (1) Tee Sponsorship, (1) Flag Sponsorship, (8) Mulligans, (1) Arm Length Raffle, (8) Putting Contest Entries
- Fishing Tournament: Gold Sponsorship Package (Value: \$500)
 - (4) Entries, Company Logo on Shirt, and special recognition
- Tech Topic Presentation (Value: \$250)
- (10) Monthly Meeting Tickets (Value: \$350)
- (1) Meeting Sponsorships (Value: \$250)
- Signage at each monthly meeting (Value: \$100)
- Logo on Monthly Newsletter (Value: \$100)

Silver Level - \$1,500 (Savings: \$175)

- Golf Tournament: Silver Sponsorship Package (Value: \$1,000)
 - (4) Player Entries, (1) Tee Sponsorship, (4) Mulligans, (1) Arm Length Raffle, (4) Putting Contest Entries
- Fishing Tournament: Silver Sponsorship Package (Value: \$300)
 - (2) Entries, Company Logo on Shirt
- (5) Monthly Meeting Tickets (Value: \$175)
- Signage at each monthly meeting (Value: \$100)
- Logo on Monthly Newsletter (Value: \$100)

Bronze Level - \$1,000 (Savings: \$150)

- Golf Tournament: Tee Sponsorship (Value: \$500)
- Fishing Tournament: Bronze Sponsorship Package (Value: \$200)
 - (1) Entry, Company Logo on Shirt
- (2) Entries in either Golf or Fishing Tournaments (Value: \$250)
- Signage at each monthly meeting (Value: \$100)
- Logo on Monthly Newsletter (Value: \$100)

Officers 2023-2024

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Research Promotion

Tony Amitia

Membership Promotion

Sidney Feldman

Golf and Fishing Tournament Flyers will be distributed ahead of each event if you are interested in event-specific sponsorship packages.

If you wish to be a 23-24 ASHRAE Sponsor or have any questions about the process please reach out to:

**Tony Amitia
(239)470-5036
tamitia@bandiflorida.com**

We greatly appreciate your assistance and support.

Welcome Back to ASHRAE 2023-24



YEA is hosting a Welcome Back event for the new ASHRAE year as an opportunity to say thank you to our sponsors.

HeadPinz
Thursday, September 7th
4:30-6:30 pm

Come join us at HeadPinz for networking and appetizers.



HeadPinz: 14513 Global Pkwy, Fort Myers, FL, 33913

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Lighting Changes in ASHRAE/IES Standard 90.1-2022

BY MICHAEL MYER; KELLY SEEGER, ASSOCIATE MEMBER ASHRAE

Many elements related to lighting were made in the 2022 edition of ANSI/ASHRAE/IES Standard 90.1, *Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings*. The updated standard saves energy via reduced lighting power values, expanded control requirements and expansion of its scope to cover more exterior lighting applications such as walkways on campuses and parking lots that serve building occupants but that are not powered by a building electrical service. The updated standard also introduces efficiency requirements for horticultural lighting.

Scope Expansion

One of the most significant changes affecting lighting in Standard 90.1-2022 was the expansion of the standard's scope from buildings to buildings *and* building sites. The scope in previous versions of the standard was limited to buildings and the related exterior areas directly connected to the building. This meant lighting powered via electrical service, e.g., the parking lot, was covered only if it was powered by the building's electrical service. Any parking lots or other exterior areas such as walkways not powered by a building were not in scope. However, many exterior lighting applications are not directly powered by the building's electrical service. Common examples include lighting on a campus powered by a central

plant, lighting between buildings, plazas or even parking lot lighting where the lighting is powered by the utility.

This scope change does not modify other aspects of the prescriptive lighting requirements. The new scope addresses exterior areas that may be in a "gray zone" of coverage. Beyond reducing this "gray zone," additional energy savings are achieved because new spaces that were not previously covered are now covered by the standard.

Horticultural Lighting

Another important inclusion is mandatory efficiency requirements (Section 9.4.4) for horticultural lighting (addendum *ar*). The proliferation of indoor-grow

Michael Myer is a senior researcher at Pacific Northwest National Laboratory. Kelly Seeger is the technical policy director at Signify North America Corporation.

spaces, greenhouses, controlled environmental agriculture and similar spaces have increased in the last five years and, as a result, Standard 90.1-2022 now addresses these applications.

Other parts of the standard use (or are based on) the term “lumens,” but lumens are for humans. Lumens are based on the human visual system (a mathematical function based on cones in the retina of the eye), but plants do not have cones and need a different metric. The standard has adopted photosynthetic photo efficacy (PPE) as the metric for the horticultural lighting requirements. PPE recognizes that plants create energy via photosynthesis. PPE is the measure of the visible, infrared and ultraviolet light produced per unit of energy. The unit for PPE is micromole (μmol) per joule (J). You don’t have to dust off your chemistry textbooks—the higher the $\mu\text{mol}/\text{J}$ value, the more efficiently the light source provides photosynthetic photon flux per input electric power. PPE is a metric developed in ANSI/ASABE S640, *Quantities and Units of Electromagnetic Radiation for Plants (Photosynthetic Organisms)*.

This requirement does not apply to small indoor horticultural or greenhouse spaces/buildings. A facility must have at least 40 kW of connected load dedicated to horticultural lighting, which is probably on the order of 1,000 ft² (93 m²) of indoor grow facility or greenhouse, before the requirement needs to be considered.

Greenhouses have glass roofs and allow daylight to enter the space. Therefore, the PPE requirement for greenhouses is 1.7 $\mu\text{mol}/\text{J}$. In contrast, indoor grow buildings that have opaque roofs as a result have higher PPE requirements of at least 1.9 $\mu\text{mol}/\text{J}$.

The required PPE values are achievable with some high-pressure sodium lamps. Very few metal halide lamps meet the requirement. Many LED sources and fixtures can meet the horticultural lighting requirements; however, verify the information—which reputable vendors should be able to provide—to determine if the product under consideration can meet the requirement.

Alterations

Moving into the main body of Section 9, Lighting, Standard 90.1-2022 Addendum p revised the alterations (Section 9.1.3) requirements for interior

lighting. Previous versions of Standard 90.1 included some vagaries when determining if an alteration met the requirements to increase the energy efficiency of the lighting system.

The 2022 edition established specific thresholds to determine if the project meets the conditions for an alteration. Within an interior space, if 2,000 W of existing interior lighting is replaced, the project must meet all the requirements of Section 9. If less than 2,000 W is replaced, the new lighting must meet certain lighting controls requirements of Section 9.4.1 and either use 50% less power than the existing system being replaced or comply with the Space-by-Space (Table 9.5.2.1-1 and 9.5.2.1-2) compliance method.

Exterior alterations are a little different. If more than 10 luminaires or more than 20 linear ft (6 linear m) of luminaires are being replaced, the new lighting must meet all the requirements of Section 9. If not, any new lighting must meet a subset of lighting controls in Section 9.4.1 and either have 50% lower wattage or meet the wattage requirements of Table 9.4.2-2.

Luminaire Wattage

Standard 90.1-2022 Addendum z revised the methodology for determining the power allotment for track lighting. Track lighting can be a challenge for lighting projects. Lighting drawings often do not indicate the number of track heads, but rather just the linear amount (feet) of track. Track is designed to be functional and allow occupants to add or subtract track heads as necessary. For line-voltage track, e.g., track that is directly supplied with either 120 V or 277 V, Standard 90.1 has long established a maximum allowable power per linear foot (W/linear foot).

Track that is powered by a transformer or driver is limited by the power rating of that device. In contrast, line-voltage track is not limited, and a power rating was necessary. An estimate of the power of the track was necessary. Previous versions of Standard 90.1 required users to assume 30 W/linear ft (98 W/linear m) for line-voltage track. This value was based on a mixture of incandescent, halogen and other light sources. Since 2015, LEDs have become more prevalent, and since 2019 they have been the de facto light source for lighting projects. Standard 90.1-2022 requires users to assume 10 W/linear ft (33 W/linear m) for line-voltage track.



MICHAEL MYER

This power rating change does not directly save energy. The power requirements save energy. This power rating in track was necessary to reflect the change in technology. This change to line-voltage track allows for track projects to meet these new reduced lighting power requirements in the prescriptive sections.

Lighting Exceptions

Additional lighting power exceptions were added to the existing list in Section 9. Some equipment is not included within the power calculations when determining the lighting power allowance for a site (Section 9.2.2.1). Table 9.2.2.1 lists the equipment that is exempted and the required lighting controls. Standard 90.1-2022 recognized germicidal luminaires. If a luminaire uses light or ultraviolet light for germicidal function to disinfect spaces, the power for the germicidal function does not need to be included in the lighting power budget calculations. Note that in a dual-function luminaire (e.g., general lighting and UVC lighting), only the power for the germicidal function is exempt.

Addendum *ac* also removed the previous exception for lighting in casinos and the daylight transition zone in parking garages (Figure 1) because new lighting power requirements for both casinos as well as the daylight transition zone in parking garages were added into Standard 90.1-2022.

Exterior Lighting Power

Multiple changes were made to exterior lighting requirements in Table 9.4.2-2 (addendum *am*). First, a column was added to the table directly stating which exterior lighting control(s) apply to each exterior application. This change improved the clarity of the code because no changes were made to the existing exterior lighting control requirements.

Addendum *am* also reduced the exterior lighting power values by close to 30%. The values in this table had not been modified since the 2016 version during which time LED products have improved and design practices have changed.

Table 1 includes a sample of these new exterior lighting power density values from Standard 90.1-2022. Within the standard, exterior lighting is based on zones. The zones range from Zone 0 (national park and should be dark) to Zone 4 (major urban commercial core like Times Square or Las Vegas Strip). Values in Table 1 are for Zone 3. All the values in the exterior lighting table changed in similar proportions as shown in Table 1.

The exterior area, stairway, was removed from Table 9.4.2-2 because it was deemed hard to define in terms of what the area actually is to be illuminated, i.e., is it the stair treads only, the area before and after the stairs, etc. Exempting the area addressed the compliance issues at hand.

Guest Room Controls

Standard 90.1 now requires all lighting and switched receptacles in guest rooms and suites in hotels, motels, boarding houses and/or similar buildings to be automatically controlled and turned off after 20 minutes of the space becoming unoccupied (Section 9.4.1.3). Previously the standard allowed spaces with key card controls to be exempt. Standard 90.1-2022 removed the exception for key cards and explicitly stated that card key controls could not be used to

TABLE 1 Sample exterior lighting power density values, Standards 90.1-2016, 2019, and 2023.

EXTERIOR AREAS (ZONE 3)	90.1-2016, W/ft ²	90.1-2019, W/ft ²	90.1-2023, W/ft ²
Parking Areas	0.06	0.06	0.037
Sales Canopy	0.60	0.60	0.50
Open Outdoor Sales	0.20	0.20	0.180
Loading Docks	0.35	0.35	0.260

comply with this provision. Within North America, key cards have significantly declined in use. The evaluation conducted in the development of the addendum to make this change revealed that this control method had not yielded the intended energy savings, explaining its declining use.

Dwelling Units

Dwellings units have different requirements for both lighting fixtures and lighting controls from other spaces within Standard 90.1. Standard 90.1 defines dwelling units as a single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation. The luminaires and lamps for dwelling units have an efficacy requirement. Lighting efficacy is the “efficiency” of converting power into visible light (lumens per watt [lm/W]). Standard 90.1-2022 Addendum *br* increased the efficacy for luminaires in dwelling units to be no less than 50 lm/W and lamps in dwelling units to be no less than 75 lm/W for 75% of the permanently installed luminaires in the space (Section 9.4.3).

Standard 90.1-2022 also established a requirement for lighting controls for dwelling units. At least 50% of the permanently installed luminaires in dwelling units must be controlled with dimmers or devices that automatically turn off the lighting within 20 minutes of the space becoming unoccupied (Section 9.4.3).

Finally, Standard 90.1-2022 also established an exterior lighting control requirement for dwelling units. Permanently installed exterior luminaires (such as those on a balcony or patio) dedicated to a dwelling unit must have lighting controls that turn off the light during daylight hours as well as when no activity has been detected for 15 minutes in that area.

Lighting Controls

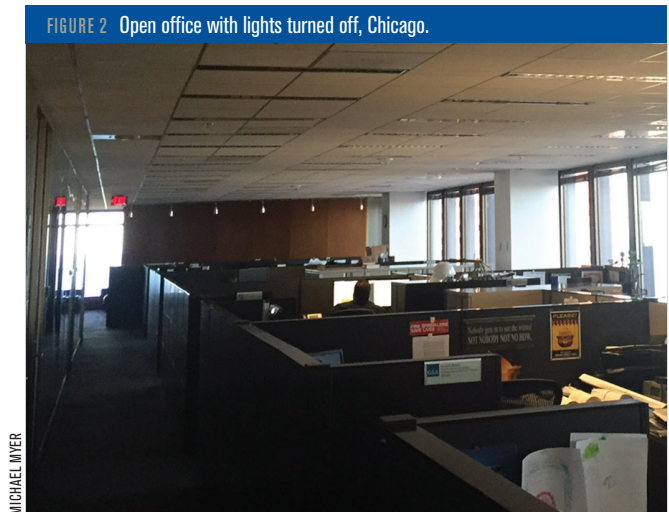
Multiple updates were made to lighting controls requirements, including the daylighting control wattage threshold (Section 9.4.1.1(e) and (f)); manual dimming requirements (Section 9.4.1.1(d)); automatic full off (Section 9.4.1.1(h)); and lighting controls in open offices (Section 9.4.1.1(b)).

Standard 90.1-2022 reduced the wattage threshold for daylight responsive controls to 75 W (addendum *o*) for the primary sidelighted zone and 150 W for the

secondary sidelighted zone. This change resulted from the evaluation of updates in technology as well as the cost and use of lighting controls. Projects determine the area of daylighted space, and if the luminaires in that calculated area sum to 75 W (150 W if secondary), daylight responsive controls are required. A similar change was made to the daylighting requirements in toplighted spaces.

Bi-level lighting control was removed in favor of multilevel control (addendum *ba*). Previous versions of the standard required that spaces have the option of a control point between 30% and 70% full lighting power, which could be achieved via a dimmer, multiple switch

FIGURE 2 Open office with lights turned off, Chicago.



MICHAEL INYER

legs or step-ballasts. LEDs are more common and easily dimmed, so the standard was changed to require a manual dimmer that provides continuous dimming from full power to 10% (or less) output.

Automatic shutoff has long been required in Standard 90.1. Addendum *ba* revised the requirements for automatic full off, adding exemptions to full off for spaces where lighting is required for 24/7 operation and spaces where patient care is rendered.

Open offices larger than 300 ft² (28 m²) saw the most significant change. Standard 90.1-2022 revised Section 9.4.1.1(c) to address the needs of these large open plan spaces. Previously, the standard established 9.4.1.1(c) so no more than 50% of the lighting power could automatically turn on. This requirement also prevented all the lights from turning on to half power. As a result, large offices appeared dark in places (Figure 2). To remedy this, open offices greater than 300 ft² (28 m²) must now have occupancy controls

with zones that are limited to 600 ft² (56 m²). The general lighting in the occupied zone is permitted to automatically turn on to full upon occupancy, while the lighting in other unoccupied zones is also permitted to turn on, but to no more than 20% power (Figure 3).

Occupants had expressed dissatisfaction with the zone size and the darkness within their field of view as they looked across the office toward unoccupied workstations. This change allows all the lighting to turn on, but to a low level (not more than 20%). Turning on the lighting allows for even distribution and reduces occupant dissatisfaction in spaces. Occupant-driven controls still enable energy savings.

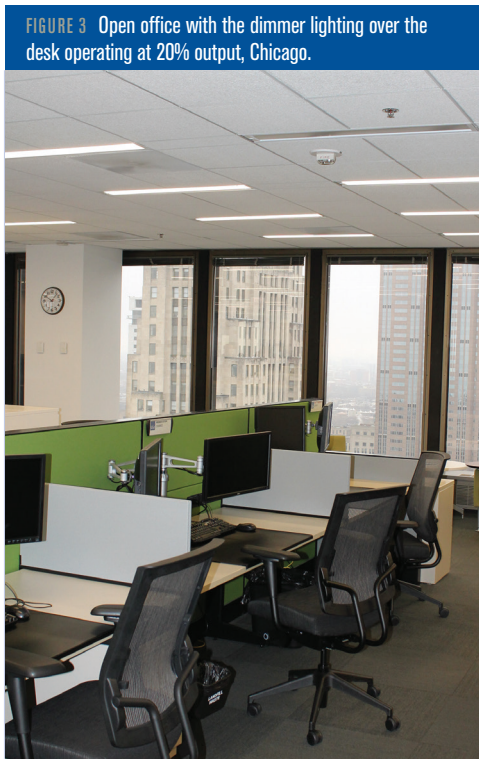


FIGURE 3 Open office with the dimmer lighting over the desk operating at 20% output, Chicago.

MICHAEL MYER

Interior Lighting Power

Three prescriptive compliance approaches, Simplified Building Method (Section 9.3), Building Area Method (Section 9.5.1) and Space-by-Space Method (Section 9.5.2) are available. Each method requires users to comply first with lighting power limits and then lighting controls.

For power, projects have a lighting power allowance (LPA). The LPA is determined by multiplying the area by a lighting power density (LPD) value. The LPD value is specified in each of the applicable compliance pathways.

TABLE 2 Sample interior lighting power density values, Standards 90.1-2016, 2019 and 2023.

SPACE TYPE	90.1-2016, W/ft ²	90.1-2019, W/ft ²	90.1-2023, W/ft ²
Classroom	0.92	0.71	0.72
Corridor	0.66	0.41	0.44
Conference Room	1.07	0.97	0.88
Enclosed Offices*	0.93	0.74	0.73
Large (Open Plan) Offices	0.81	0.61	0.56
Warehouse - Medium/Bulky	0.35	0.33	0.33

*Enclosed office size designations changed from 250 ft² to 150 ft² in Standard 90.1-2023.

Standard 90.1 has a model used to develop the LPD values (which users reference to determine the lighting power budget). The model creates the LPD for the Space-by-Space method tables. The values for the Building Method and Simplified Building Methods are then based on the values in the Space-by-Space tables. The Standard 90.1 lighting model is updated each cycle to reflect changes in lighting practice, incorporate new luminaire data and reflect updates from more efficient equipment.

Table 2 shows a sample of spaces in the Space-by-Space table. The LPD values for some spaces (e.g., classroom,

corridor) increased between 2019 and 2022. The increase was due to a combination of factors including changes in lighting recommendations, revised inputs and assumptions and incorporation of new or modified design practices. Similarly, the LPD values reduced for many spaces (e.g., conference rooms, open plan offices) for the same reasons. Finally, in some spaces there was no change in value (e.g., warehouse-medium/bulky).

Overall, a 4% reduction in the interior lighting power density values occurred in Standard 90.1-2022 compared to Standard 90.1-2019.

Lighting Power Allowances

Within the Space-by-Space Compliance Method, users have an option for additional power if the standard prescriptive values are not sufficient for their needs. Section 9.5.2.2 of Standard 90.1-2022 is Additional Interior Lighting Power (previously this was Section 9.6.3).

The lighting power density values for decorative lighting in this section were evaluated and resulted in a reduction from 0.75 W/ft² to 0.70 W/ft² (8 W/m² to 7.5 W/m²). The retail values were also reduced. Both changes result from LED luminaires becoming more efficient and allowing for potential savings.

Additionally, Standard 90.1-2022 added an additional lighting power allowance for videoconferencing. With the rise of videoconferencing technologies, spaces may need more lighting for those dedicated lighting systems. If a project meets the lighting recommendations in ANSI/IES/AVIXA RP-38-17, Recommended Practice for Lighting Performance for Small to Medium Sized Videoconferencing Rooms, then the project is allowed to use a little more power (0.50 W/ft² [5.4 W/m²]) if needed.

Table 3 provides a comparison of the additional lighting power density values for the last three code cycles.

Credits

The August ASHRAE Journal issue included a good overview article on the new Section 11 within Standard 90.1 on energy credits. Multiple lighting and control-related credits are offered, including credits for reduced interior lighting power, expanded use of daylighting, expanded use of occupancy controls and

TABLE 3 Additional lighting power density values, Standards 90.1-2016, 2019, and 2023.

SPACE TYPE	90.1-2016, W/ft ²	90.1-2019, W/ft ²	90.1-2023, W/ft ²
Decorative Allowance	0.75	0.75	0.70
Retail Allowance			
Retail 1	0.45	0.45	0.40
Retail 2	0.45	0.45	0.40
Retail 3	1.05	1.05	0.70
Retail 4	1.88	1.88	1.00
Videoconferencing	---	---	0.50

new control options like task tuning and grid-related operations like demand response.

Conclusion

The elements of Section 9 were revised, and several new subsections were added. The changes in 90.1-2022 related to Section 9 alone result in at least 1.5% energy savings in buildings. ■

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