Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

ASHRAE Winter Conference 2019
Atlanta

ASHRAE Code of Ethics

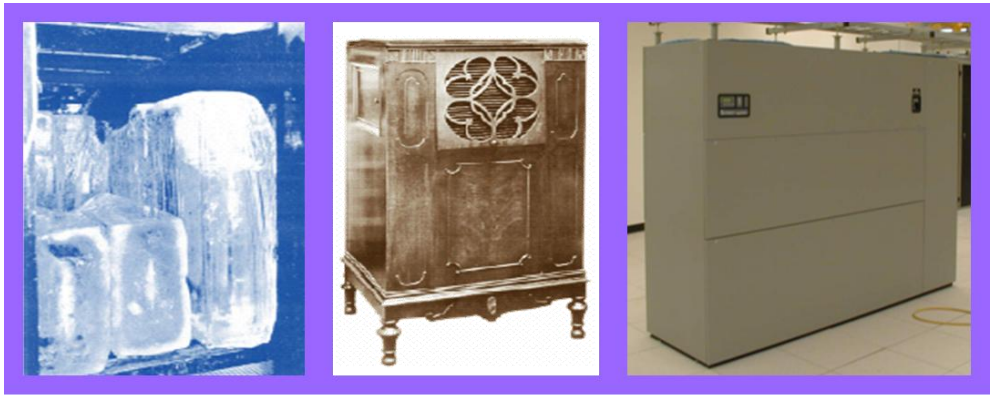
As members of ASHRAE or participants in ASHRAE committees, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct.

A. Efforts of the Society, its members, and its bodies shall be directed at all times to enhancing the public health, safety and welfare.
B. Members and organized bodies of the Society shall be good stewards of the world's resources including energy, natural, human and financial resources.
C. Our products and services shall be offered only in areas where our competence and expertise can satisfy the public need.
D. We shall act with care and competence in all activities, using and developing up-to-date knowledge and skills.
E. We shall avoid real or perceived conflicts of interest whenever possible, and disclose them to affected parties when they do exist.
F. The confidentiality of business affairs, proprietary information, intellectual property, procedures, and restricted Society discussions and materials shall be respected.
G. Each member is expected and encouraged to be committed to the code of ethics of his or her own professional or trade association in their nation and area of work.
H. Activities crossing national and cultural boundaries shall respect the ethical codes of the seat of the principal activity.

ASHRAE Overview

Who is ASHRAE?

- A nonprofit technical society formed in 1894 specializing in HVAC
- With over **56,000 members** from over 132 nations
- Almost **100 technical committees** with over **2,000 technical committee members**
- Focused on maintaining an unbiased role within the industry
- Actively writes standards, guidelines, model codes, etc.
- A creator of more than **125** standards and guidelines

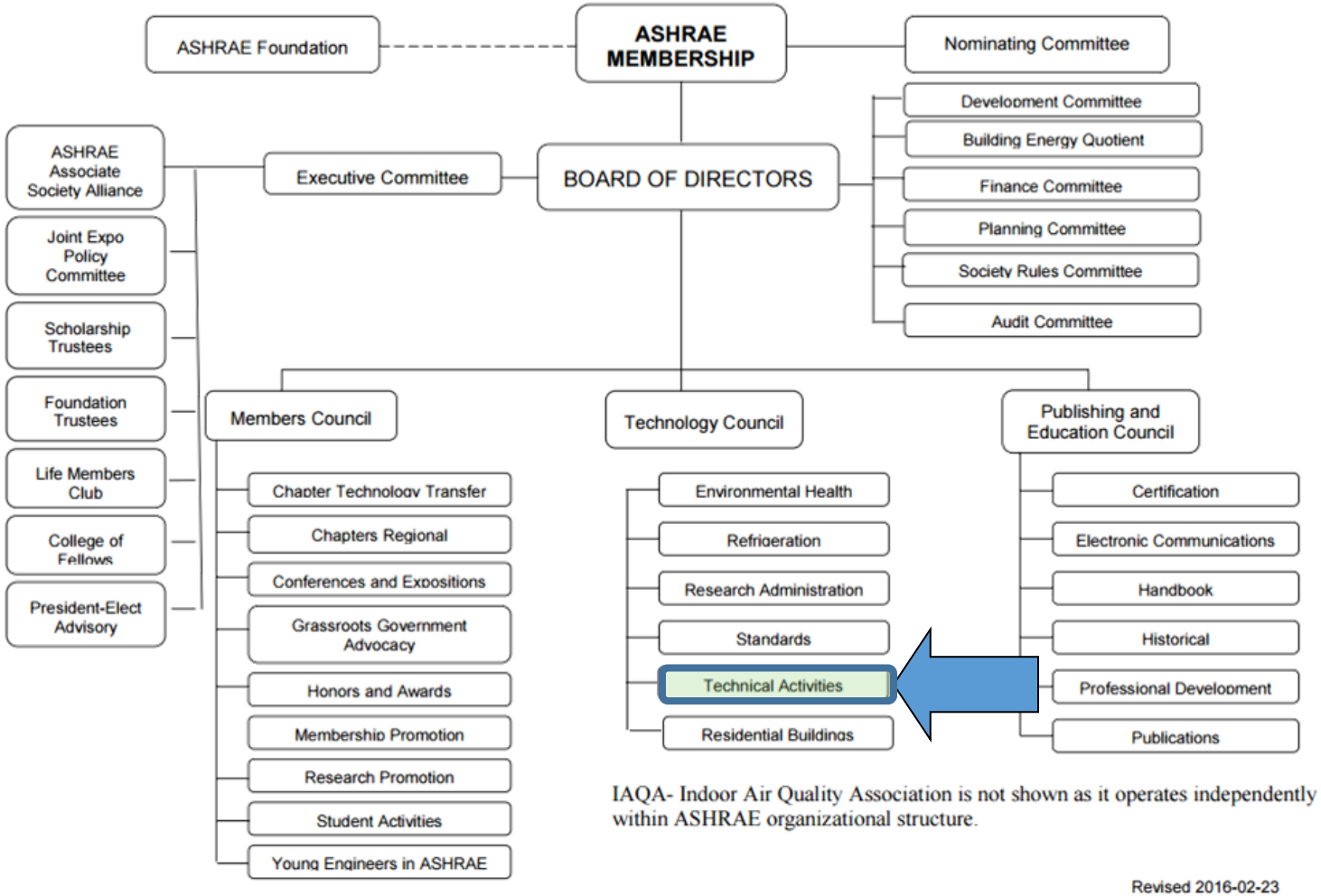


Ice Cooled System
(Circa 1890)

General Electric Room Cooler
(Circa 1932)

Computer Room Air Conditioner
(Circa 1980)

ASHRAE Structure



IAQA- Indoor Air Quality Association is not shown as it operates independently within ASHRAE organizational structure.

Revised 2016-02-23

ASHRAE TC 9.9 Overview

Title:

Mission Critical Facilities, Data Centers, Technology Spaces, and Electronic Equipment

Purpose:

To be recognized by ALL areas of the datacom industry as the UNBIASED engineering leader in HVAC and an effective provider of technical datacom information.

Scope:

All things datacom facilities: datacom refers to data processing and communication facilities. It includes rooms or closets used for communication, computers, or electronic equipment

ASHRAE TC 9.9 Membership

Participants:

- TC 9.9 is the largest and most active TC with over 350 members.

Representatives:

- Producers of Datacom Equipment – computing hardware, software and services
- Producers of Facility Equipment – HVAC, software, DCIM, rack solutions
- Users of Datacom Equipment – facility owners, operators, managers
- General Interest – government agencies, utilities, consultants, academia, testing laboratories

ASHRAE TC 9.9 Contributions

Industry Volunteers Provide the Expertise:

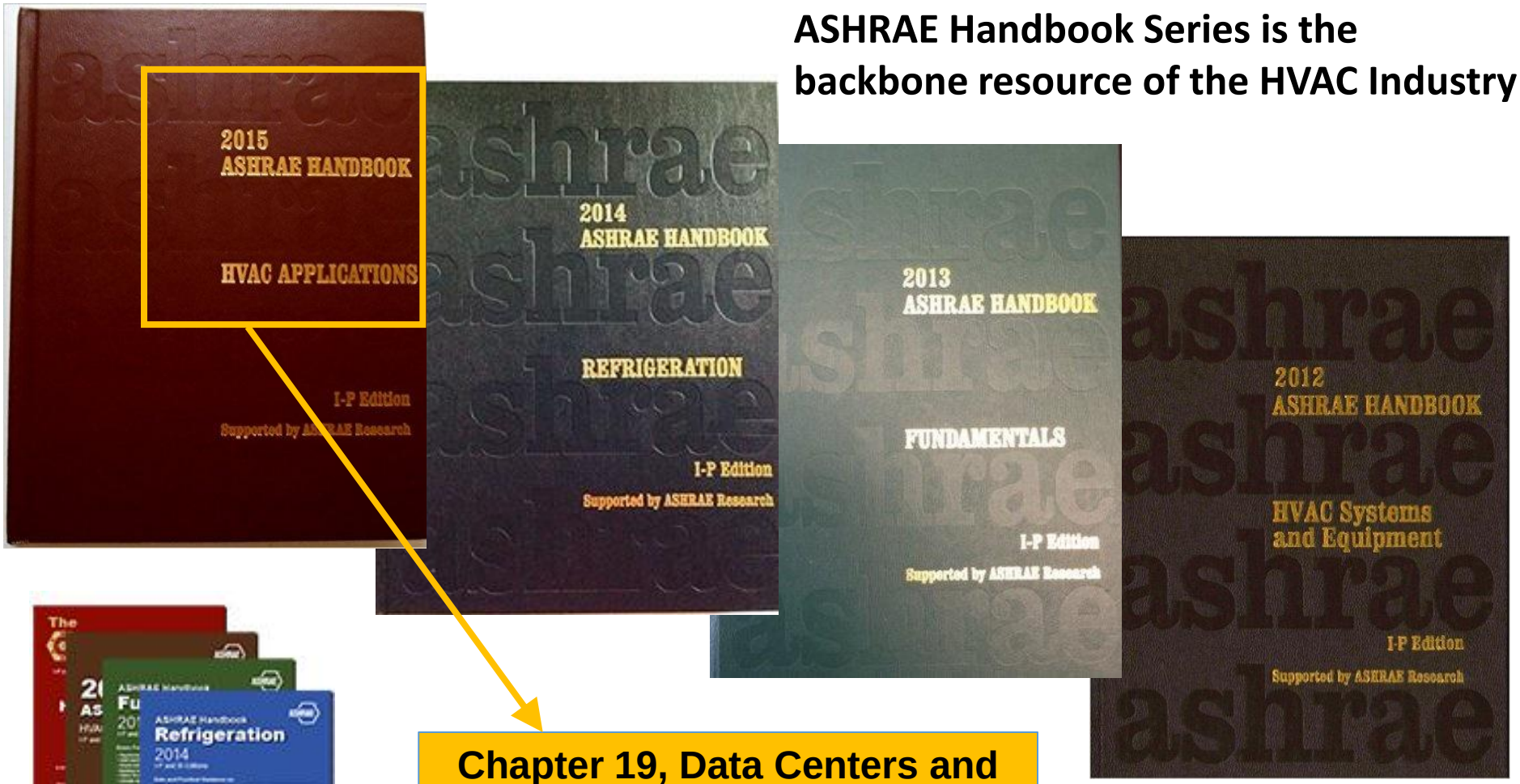
- Manufacturers, Consultants, Researchers, Universities, Utilities, Regulators, Contractors, and Government

Areas of Influence:

- Standards
- Research
- Handbook
- Programs (including paper reviews)
- Technical Activities – Books, whitepapers, education, etc.

ASHRAE Handbook

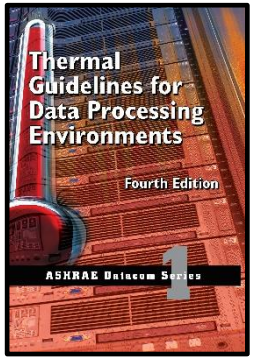
ASHRAE Handbook Series is the backbone resource of the HVAC Industry



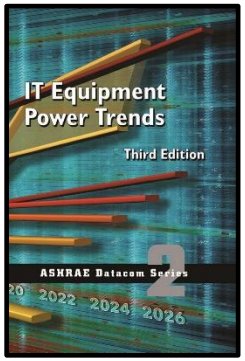
Chapter 19, Data Centers and Telecommunication Facilities

TC 9.9 Datacom Book Series

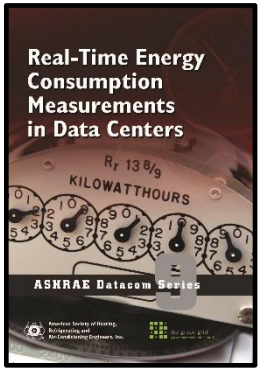
Environments

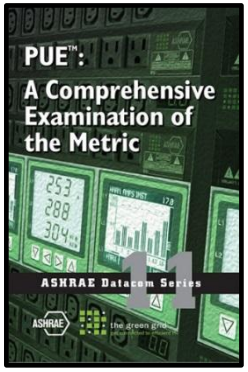


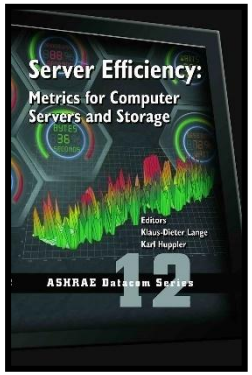
Forecasts and Trends



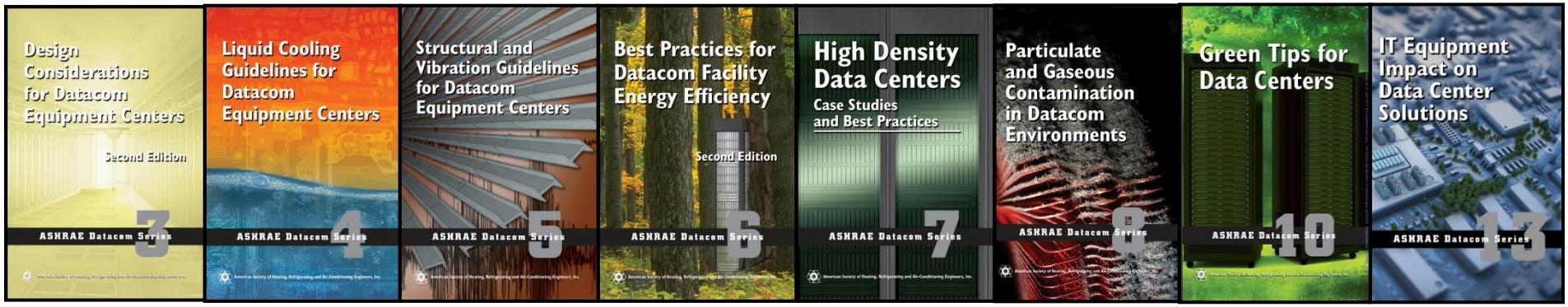
Key Metrics



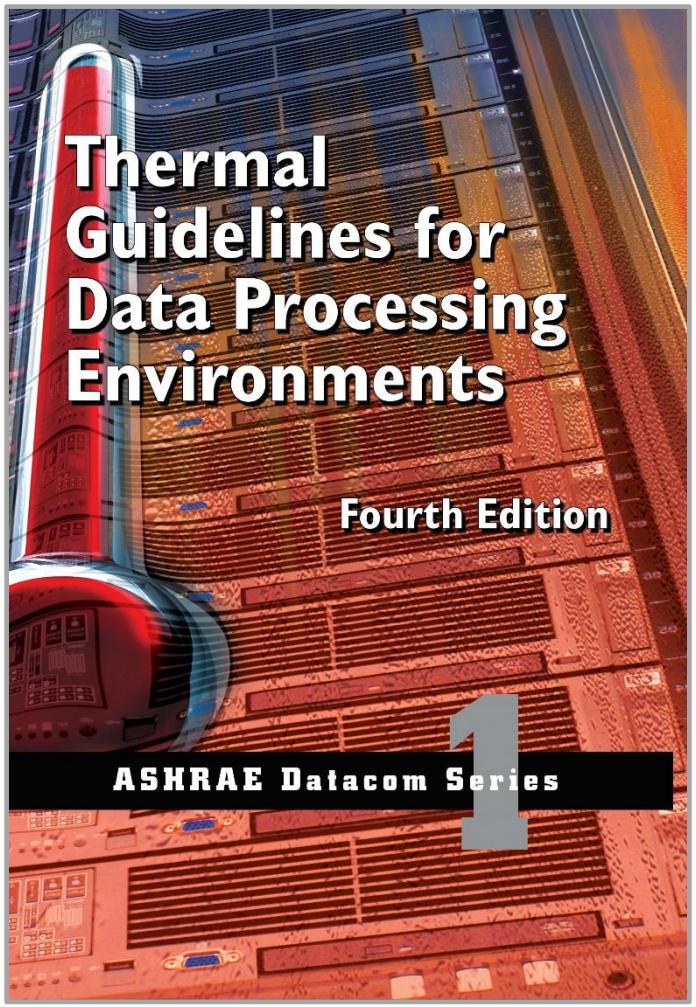




Practical Applications

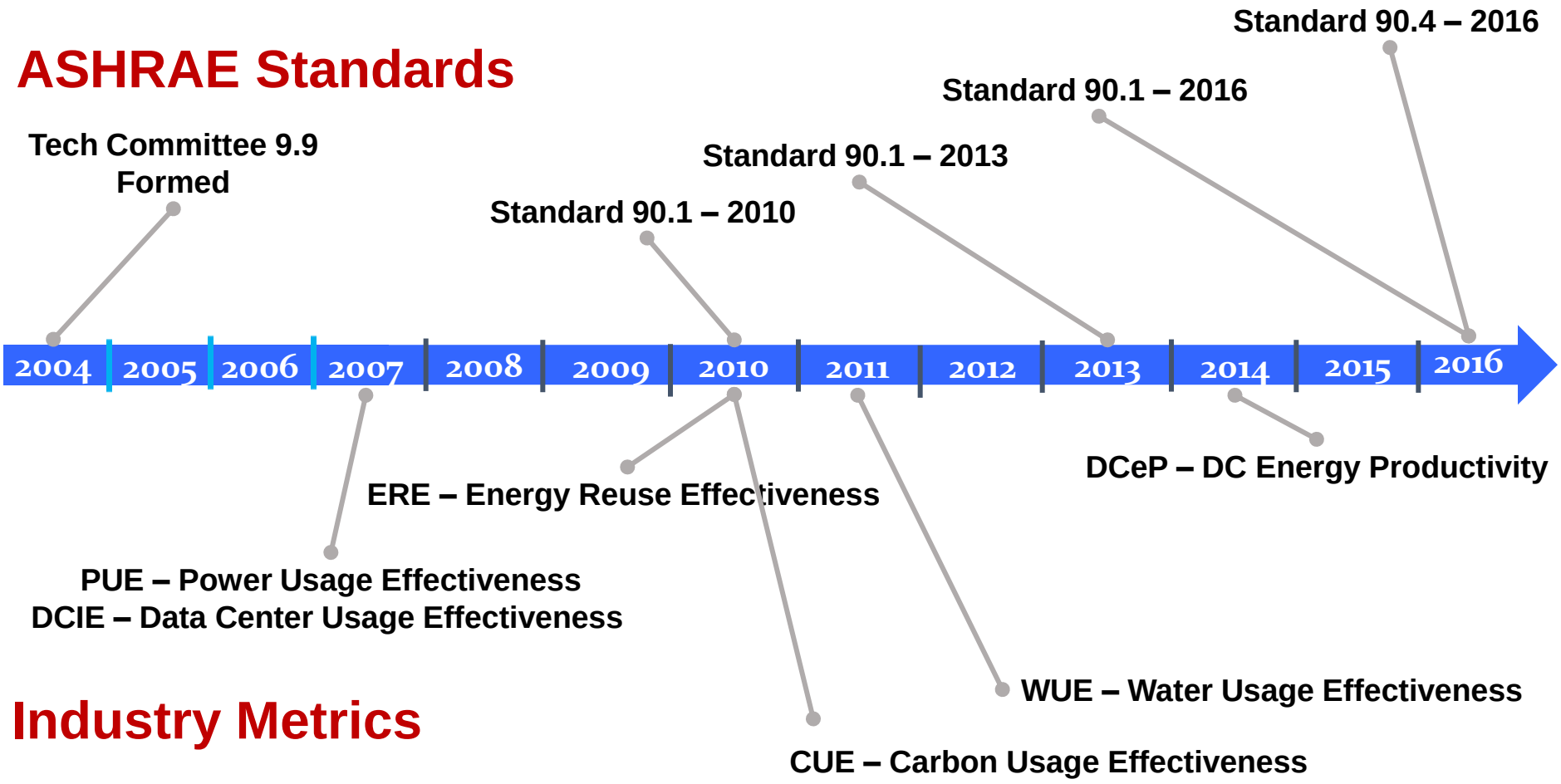


Book 1 – Thermal Guidelines

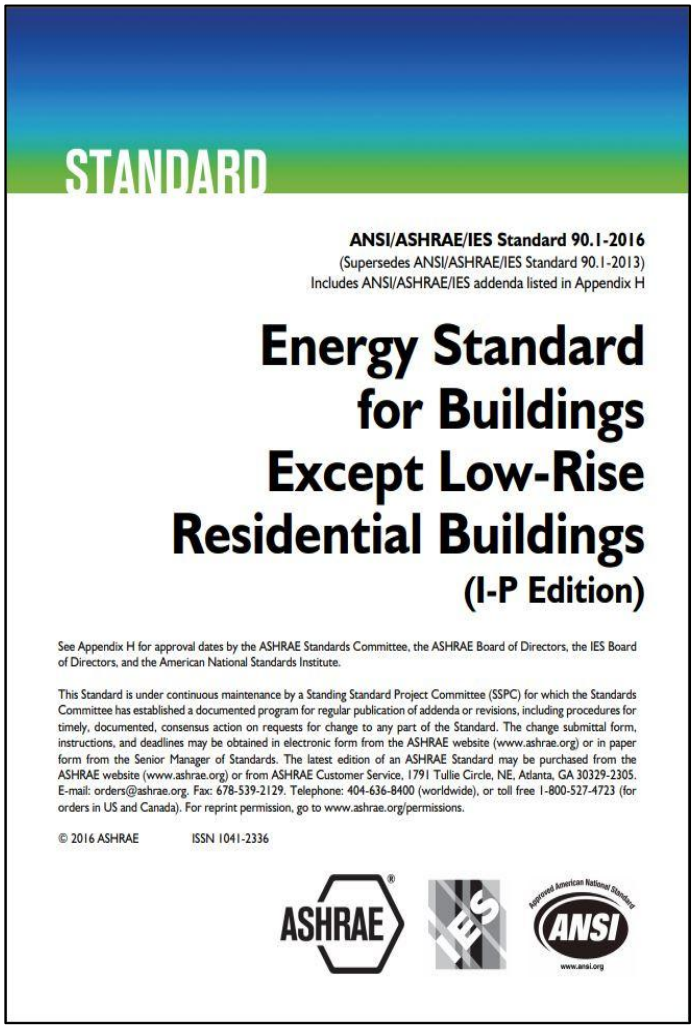


- The Foundation of the Datacom Series
  - IT Equipment temperature-humidity guidelines
  - Measurement locations
  - Reliability, power consumption and airflow implications of environmental settings

Data Center Standards and Metrics



ASHRAE Standard 90.1



STANDARD

ANSI/ASHRAE/IES Standard 90.1-2016
(Supersedes ANSI/ASHRAE/IES Standard 90.1-2013)
Includes ANSI/ASHRAE/IES addenda listed in Appendix H

Energy Standard for Buildings Except Low-Rise Residential Buildings
(I-P Edition)

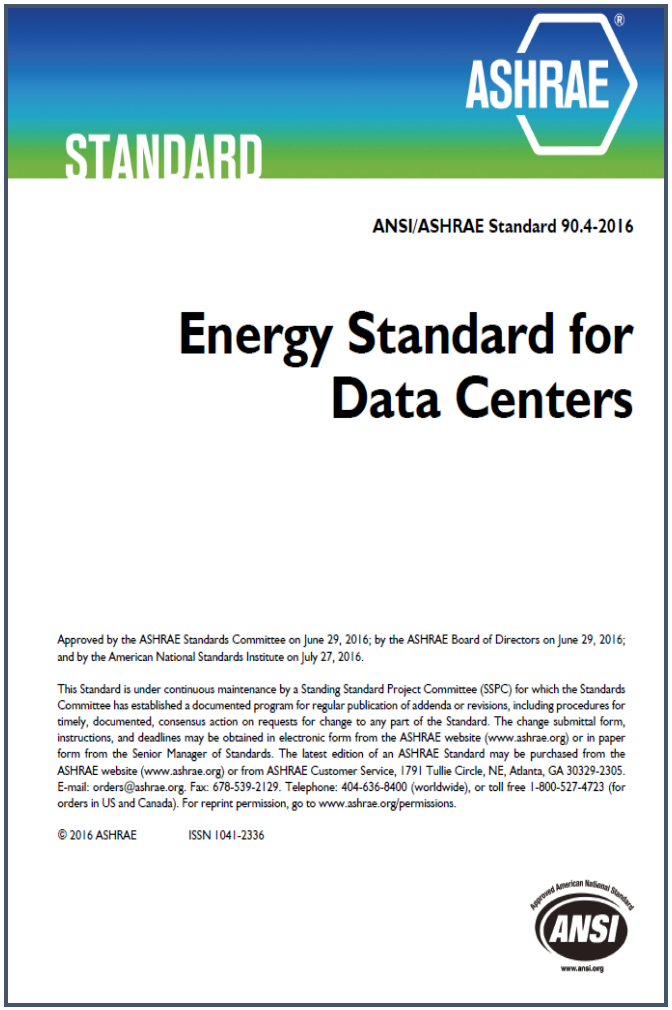
See Appendix H for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the IES Board of Directors, and the American National Standards Institute.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the Standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE website (www.ashrae.org) or in paper form from the Senior Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

 ISSN 1041-2336

ASHRAE IES Approved American National Standard ANSI www.ansi.org

ASHRAE Standard 90.4



STANDARD

ASHRAE

ANSI/ASHRAE Standard 90.4-2016

Energy Standard for Data Centers

Approved by the ASHRAE Standards Committee on June 29, 2016; by the ASHRAE Board of Directors on June 29, 2016; and by the American National Standards Institute on July 27, 2016.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the Standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE website (www.ashrae.org) or in paper form from the Senior Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

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ANSI
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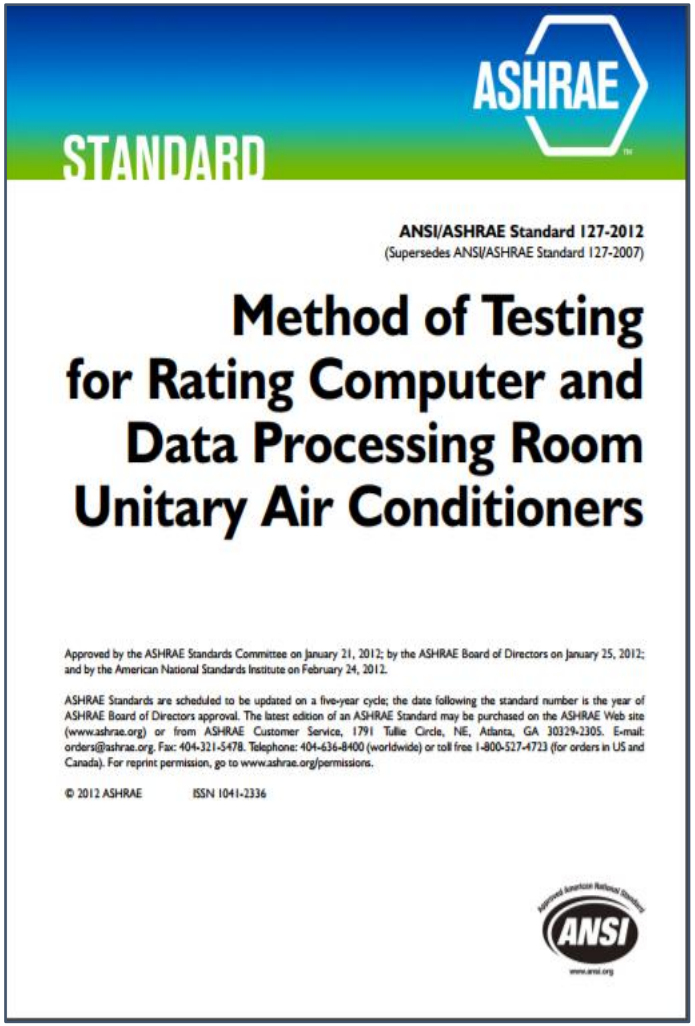
ASHRAE Standard 127-2012



STANDARD

ASHRAE

ANSI/ASHRAE Standard 127-2012
(Supersedes ANSI/ASHRAE Standard 127-2007)

Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners

Approved by the ASHRAE Standards Committee on January 21, 2012; by the ASHRAE Board of Directors on January 25, 2012; and by the American National Standards Institute on February 24, 2012.

ASHRAE Standards are scheduled to be updated on a five-year cycle; the date following the standard number is the year of ASHRAE Board of Directors approval. The latest edition of an ASHRAE Standard may be purchased on the ASHRAE Web site (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide) or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

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Approved American National Standard
ANSI
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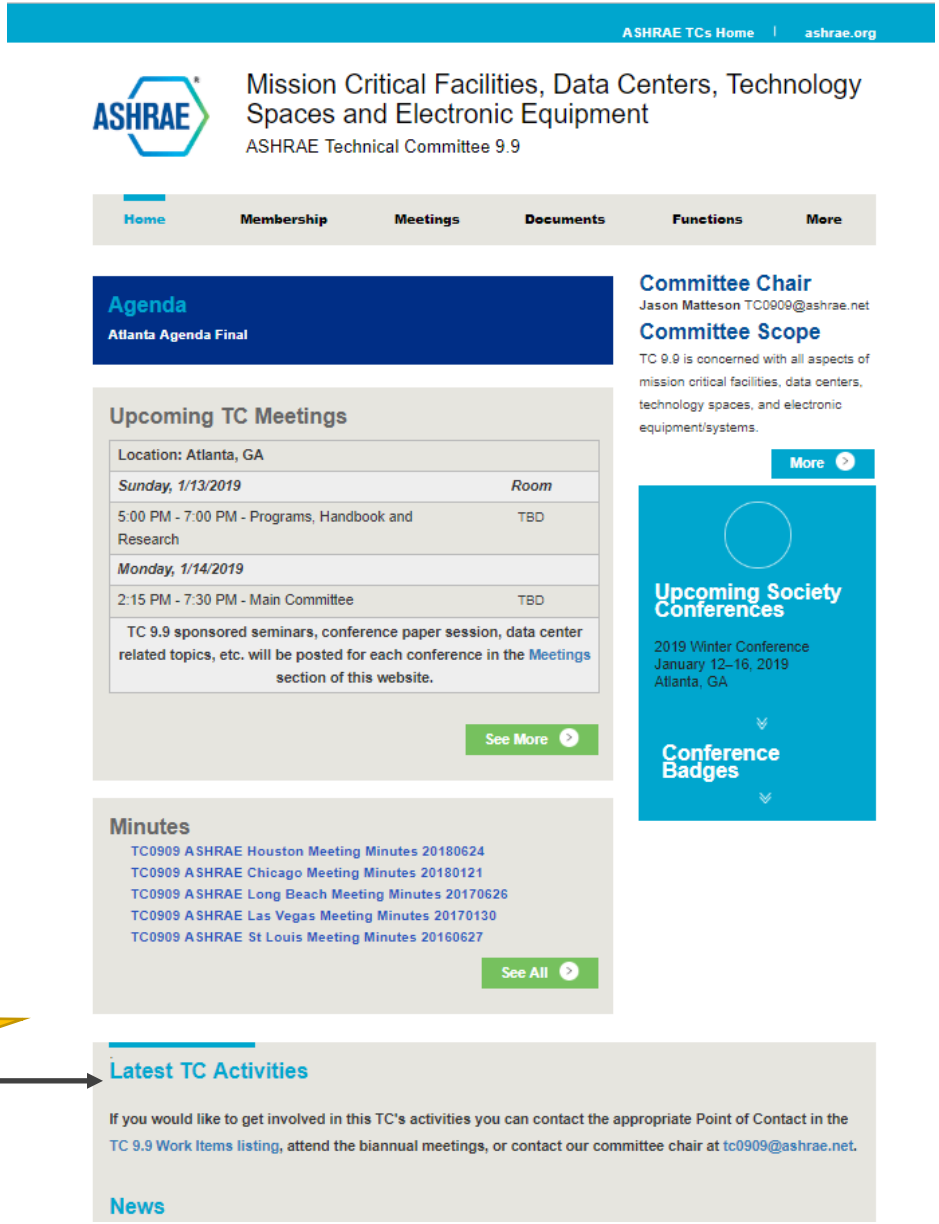
Current TC 9.9 Work Activities (Jan 2019)

- Datacom Series Books
  - Data Center Infrastructure Management (DCIM)
  - Design Considerations for Datacom Equipment Centers, 2nd Edition
- Research
  - 1755-RP, Impact of Gaseous Contamination and High Humidity on IT Equipment Corrosion
  - 1675-RP, Guidance for CFD Modeling of Data Centers
- White Papers
  - Water Cooled Servers -Common Designs, Components, and Processes
  - Impact of Acoustics on Hard Disk Drive Reliability
  - Cold Weather Shipping Acclimation and Best Practices
- Standards
  - SPC 127, Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners
  - AHRI 1360, Performance Rating of Computer and Data Processing Room Air Conditioners



New activities section

Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

ASHRAE Technical Committee 9.9

Officers & Membership

July 1, 2018 to June 30, 2019

TC9.9 Officers

Chair		Jason Matteson, *Vertiv*
Vice Chair		Dustin Demetriou, *IBM*
Secretary		John Groenewold, *JP Morgan Chase*
Research Subcommittee Chair		Dustin Demetriou, IBM
ITE Subcommittee Chair		Dr. Roger Schmidt, *IBM Fellow Emeritus* *Syracuse University*
Standards Subcommittee Chair		Rick Pavlak, *Heapy Engineering*
Program Subcommittee Chair		Nick Gangemi, *Northern Air Systems*
Handbook Subcommittee Chair		Robert McFarlane, *Shen Milsom & Wilke, LLC*
Membership Subcommittee Chair		Jack Glass, *Citigroup retired*
Webmaster		Ecton English, *Department of Defense*
Marketing Subcommittee Chair		Paul Finch, *KAO Data*

Liaisons

- Standard 90.1 – Rick Pavlack
- Standard 90.4 - Dave Kelley
- Standard 127 - John Bean
- DMTF - Chris Lindberg (primary)
  Jason Matteson (alternate)
- International - Don Beaty

Membership information – largest TC (345 as of Jan 9)

Provisional corresponding Members 106 (pre-roster update)

- Newly registered
- Implies participation in committee activities through correspondence or in-person involvement to become corresponding member
- Provisional corresponding members serves up to two one year terms
- Chair updates roster to move from provisional to corresponding
  - Roster update always due Tuesday following main meeting during Winter Conference
  - If the chair takes no action on a provisional member, they are dropped from the roster in two years
- Can not be voting members, but after provisional term, may be considered for future voting membership.'
- For purposes of committee assignments and other work "Provisional" status does not limit an individual's active involvement in the work of the committee

Corresponding Members 239* (pre-roster update)

- Full members
- Can be voting members
- Can be nominated/elected as an officer

Keep Your Profile Updated!

* Does not include 65 ghost members removed out of cycle to maintain tenable roster

Membership information - cont'd

Voting Members (14) current

- TC shall consist of approximately 12 Voting Members, with a minimum of six (6) and a maximum of eighteen (18)
- Shall be appointed annually by the chair for not more than four consecutive one-year terms
- Only one person from any employer, organization, university, or specific government agency may serve as a Voting Member on the same TC/TG/TRG at one time
- Voting Members should serve at least one term previously as an active Corresponding Member
- Quorum to conduct business at meetings is established when the number of voting members present is four (4) or exceeds 1/2 of the number of total voting members of the committee, whichever is larger.

Current Voting Members (14)

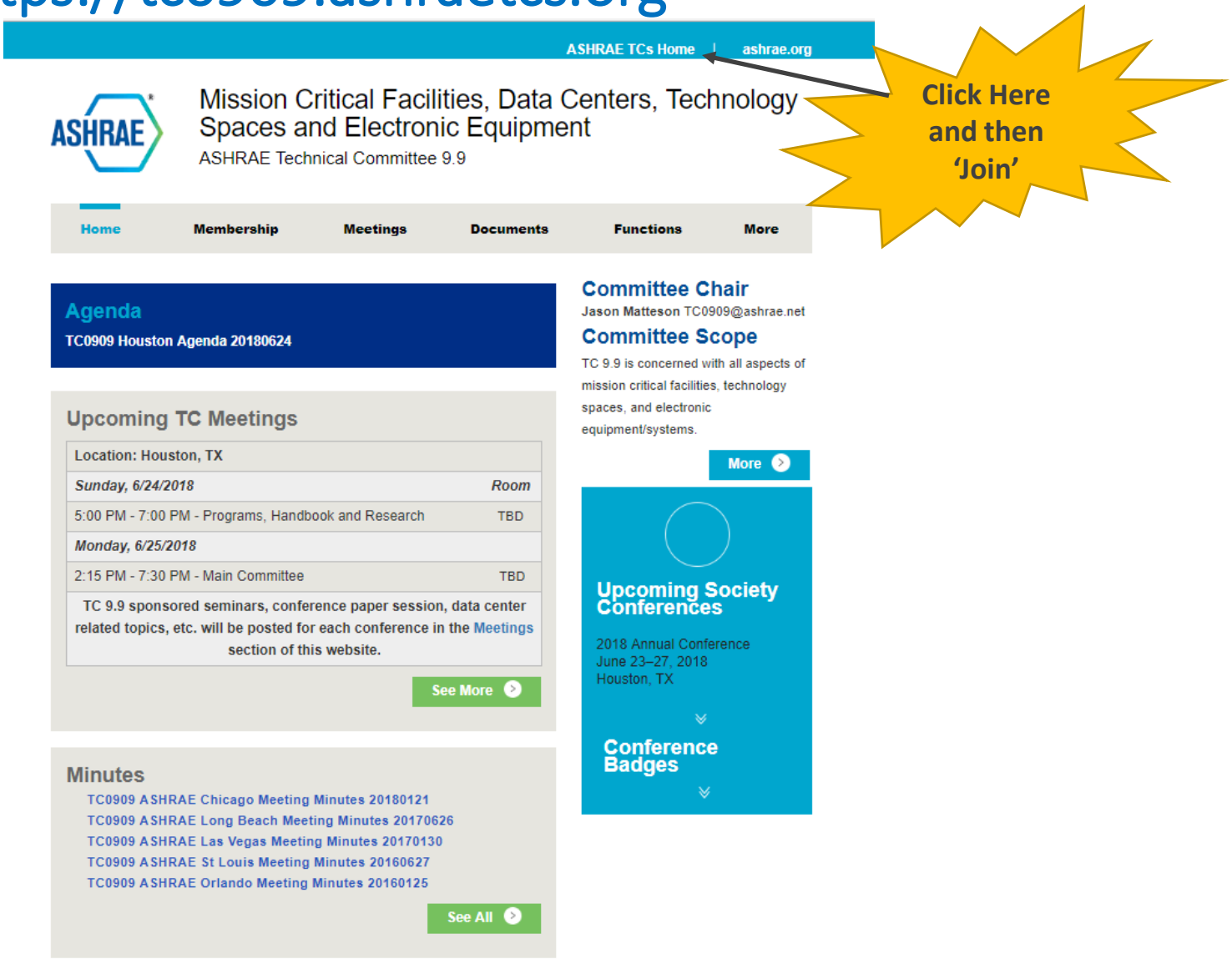
1. Jason Matteson, Vertiv
2. Dustin Demetriou, IBM
3. Chris Muller, Purafil
4. Jon Fitch, Dell
5. Mukesh K Khattar, PhD – EPRI
6. Don Beaty, DLB
7. Vali Sorell, Sorell Engineering
8. Terry Rogers, Primary Integration
9. Ecton English, DoD
10. John Bean, Schneider Electric
11. Roger Schmidt, Syracuse University
12. Lex Coors, Interxion Headquarters
13. Dave Meadows, Stultz America
14. Alfonso Gerardo, Ingeal

2018 Votes

Vote	Date	Approved
St. Louis Meeting Minutes	January	Yes
Chicago Meeting Minutes	April	Yes
Corrosion Risk RTAR*	July	Yes
HVAC Handbook : Chapter 19	October	Yes
Houston Meeting Minutes	November	Yes
DCIM Datacom Book #14	December	Yes
Water Cooled Servers Whitepaper	January (’19)	Yes

*RTAR submission was rejected by RAC

https://tc0909.ashraetcs.org



Other Announcements/Requests

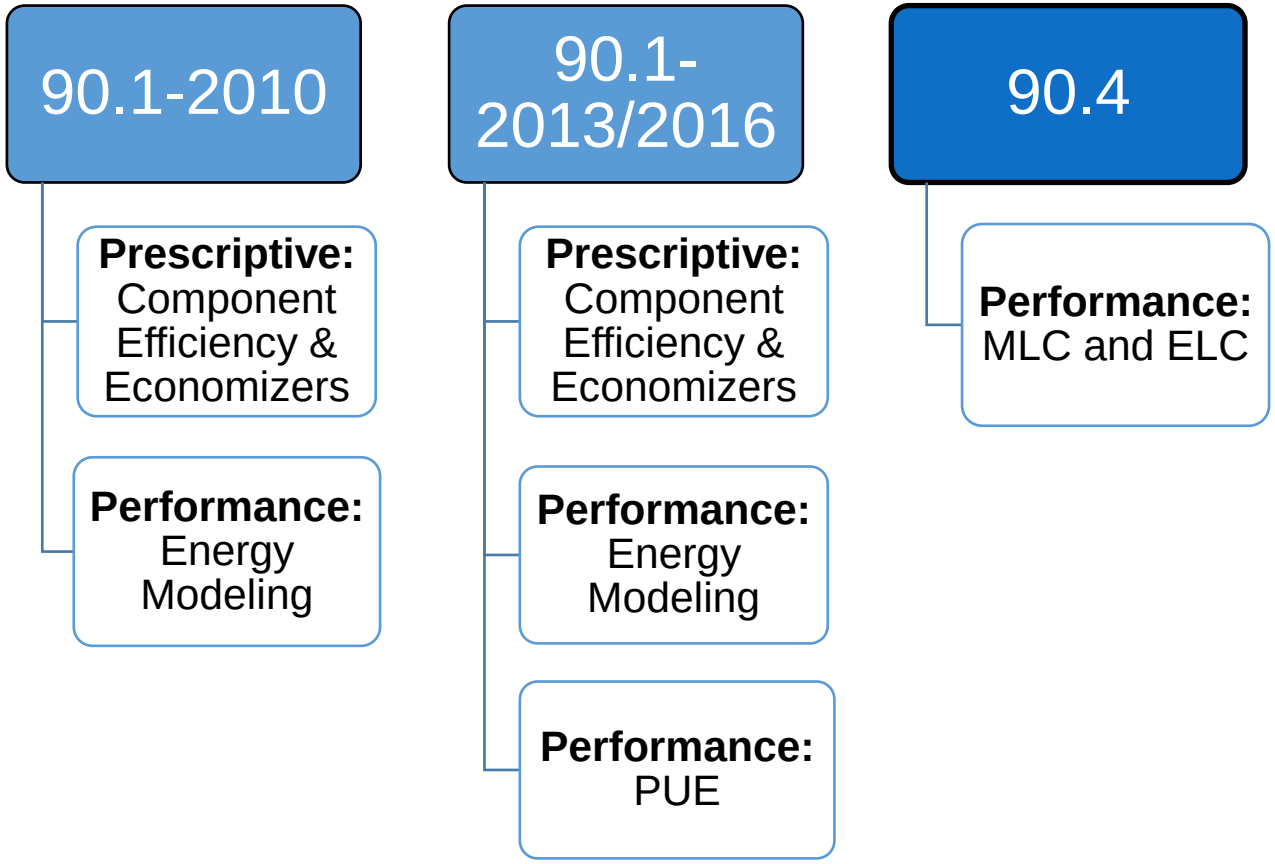
1. **TC/TG/MTG/TRG Reorganization Feedback Requested**
   - **TAC looking to reduce number of functional group meetings (110) and subcommittee meetings (180) at each conference**
   - **Goal is to block off mornings for programing, and allow members to attend. Afternoons would be blocked off for ~30 TWG (technical Working Groups)**
2. Conference and Exposition Committee (CEC) Standing Request for Future Society Meeting Program Track Suggestions
   - Seeking ideas for Austin 2020 Annual Conference and beyond
3. Professional Development Committee (PDC) is seeking ideas for new ASHRAE Learning Institute (ALI) courses

Thank You

TC 9.9 Website:
tc0909.ashraetcs.org

Backup

Standards 90.1 and 90.4



Industry – Enable innovation through performance-based standards

IT Equipment Envelope Definitions

Recommended:

- Guidance to data center operators for operating the datacom equipment for optimal performance, high reliability and lowest power consumption.

Allowable:

- Limits within which the IT equipment is validated to function. Peak performance at upper extreme may not be guaranteed.

Practical Application:

- Optimal range for a given data center based on operational goals including performance, power efficiency, compute efficiency, etc.

IT Equipment Environment – Measured at Inlet

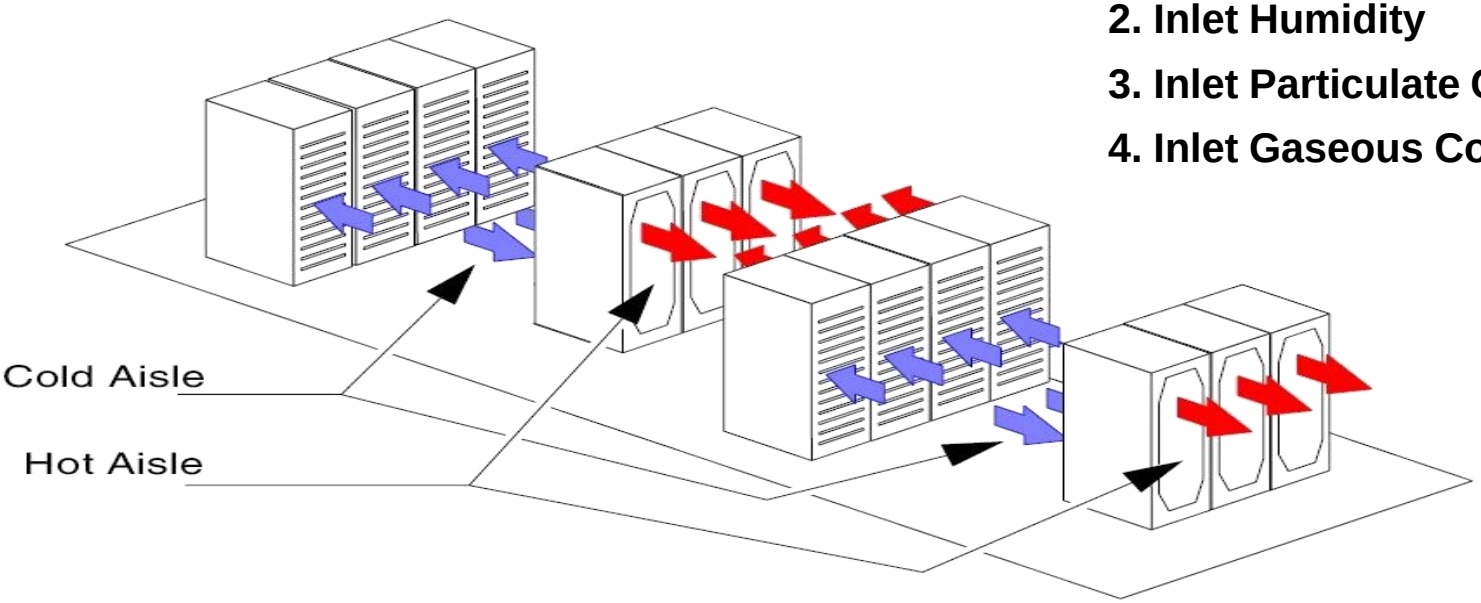
Four Key Environmental Requirements

1. Inlet Air Temperature

2. Inlet Humidity

3. Inlet Particulate Contamination

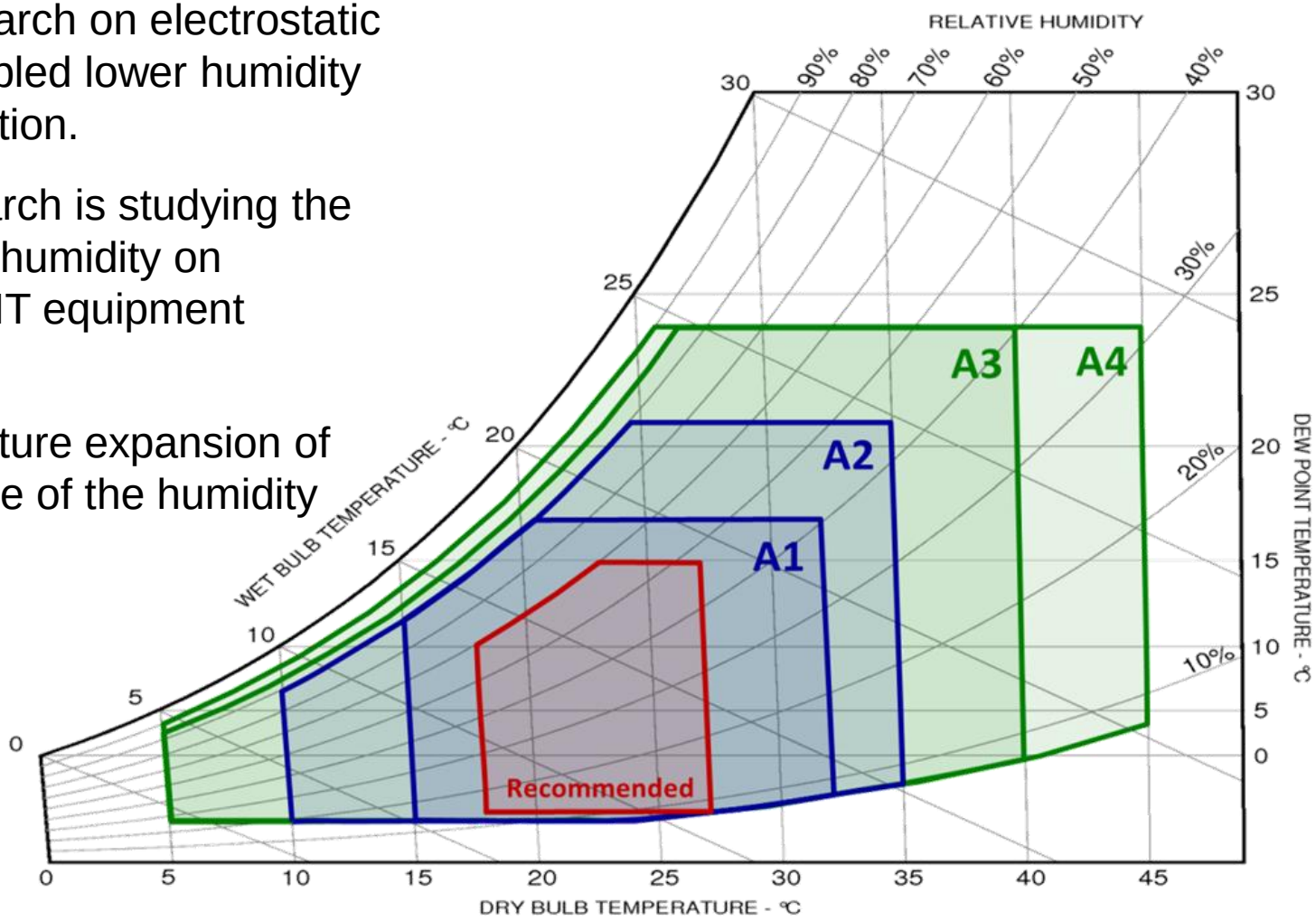
4. Inlet Gaseous Contamination



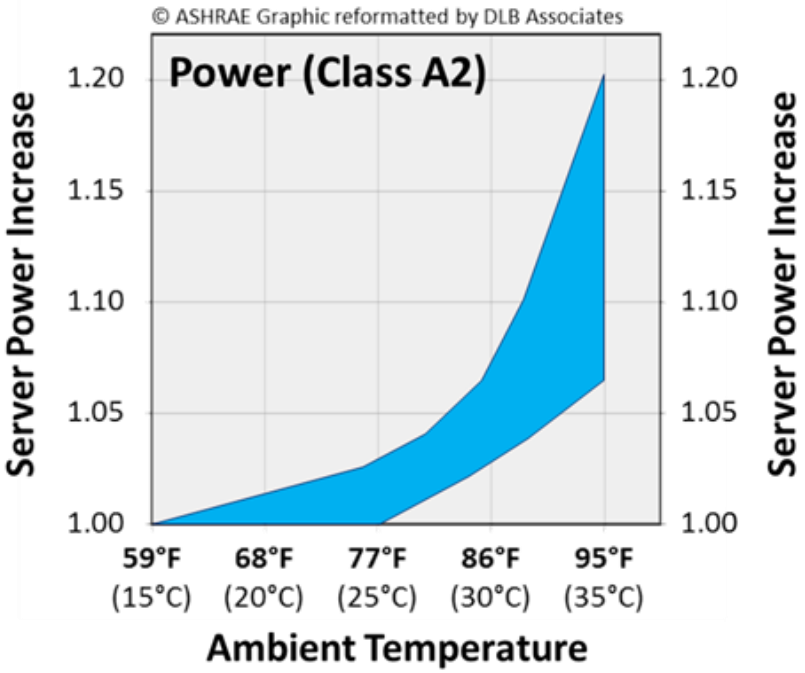
- AIR INLET to datacom equipment IS the important specification to meet.
- OUTLET temperature is NOT of concern to the datacom equipment (but is limited by safety and other concerns).

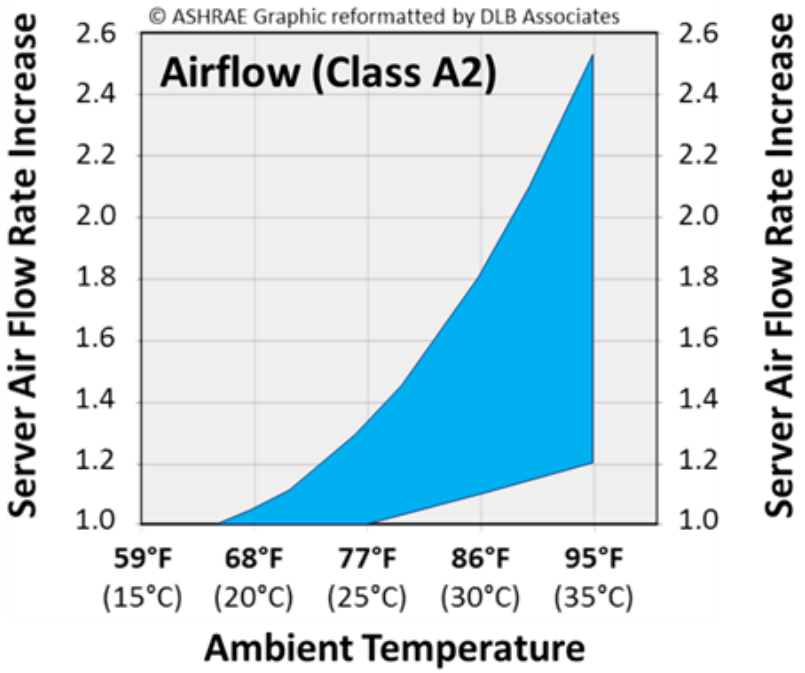
Thermal Guidelines – 4th Edition

- ASHRAE research on electrostatic discharge enabled lower humidity limits in 4th Edition.
- Ongoing research is studying the impact of high humidity on corrosion and IT equipment reliability
- Potential for future expansion of the upper range of the humidity envelope



IT Equipment Inlet Temperature Impact





- Airflow and total power increase with temperature
- Fan power increases to the cube of the fan speed (RPM)
- Total power increase includes both fan and component power

Special Discount Pricing for the DataCom Series *

1 – 9 copies	No discount
10 – 99 copies	50% off list price
100+ copies	60% off list price

- 90577- Thermal Guidelines for Data Processing Environments, 4th — List- $59
- 90451- DataCom Equipment Power Trends and Cooling Applications, 2nd — List- $59
- 90445- Design Considerations for DataCom Equipment Centers, 2nd — List- $59
- 90564- Liquid Cooling Guidelines for DataCom Equipment Centers, 2nd — List- $59
- 90429- Structural and Vibration Guidelines for DataCom Equipment Centers — List- $59
- 90447- Best Practices for DataCom Facility Energy Efficiency, 2nd — List- $59
- 90441- High Density Data Centers — List- $59
- 90568- Particulate and Gaseous Contamination in Datacom Environments, 2nd — List- $59
- 90446- Real-Time Energy Consumption Measurements in Data Centers — List- $59
- 90554- Green Tips for Data Centers — List- $59
- 90282- PUE™: A Comprehensive Examination of the Metric — List- $59
- 90457- Server Efficiency—Metrics for Computer Servers and Storage — List- $59
- 90462- IT Equipment Design Impact on Data Center Solutions — List- $59

*Special discount pricing applies to combination and single title purchases of the Datacom Series titles.

To place your order, please contact the Inventory and Subscriptions Manager, Kimberly Gates, using one of the options below:

Phone: 678-539-1152(direct)

Fax: 678-539-2152

E-mail: kgates@ashrae.org