

Committee & Publications **Reorganization**

Monday (2/6/23)

Presented by Don Beaty (TC9.9 first chair) & John Groenewold (TC9.9 current chair)

Opening Comments

Technology Advances stop for no one

TC9.9

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

Discussion Goals

Where we have been Where we are Where we are going

Recommendations

Change to Online Subscription Change how we operate

Where we have BEEN

Formation & Early Days

2002 - TG9 HDEC

High Density Electronic Equipment Facility Cooling

2003 - TC9.9

Mission Critical Facilities, ~~Data-Centers~~, Technology Spaces & Electronic Equipment

2004 – Book 1

Thermal Guidelines For Data Processing Environments (46 pages)

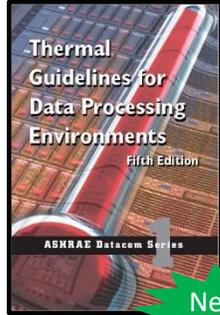
2005 – Book 2

IT Equipment Power Trends

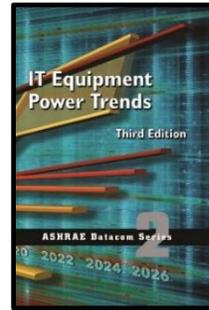


Where we have BEEN - Books

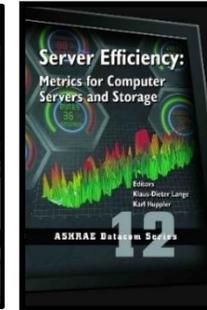
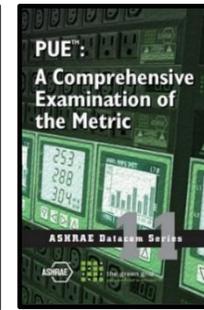
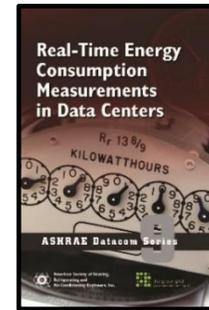
Environments



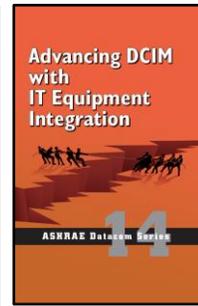
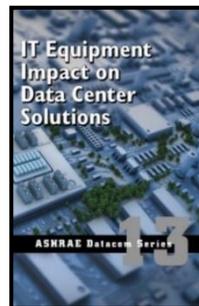
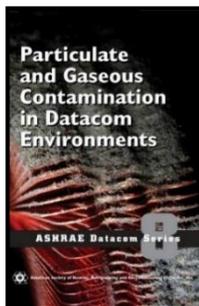
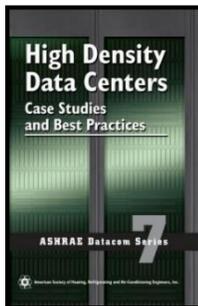
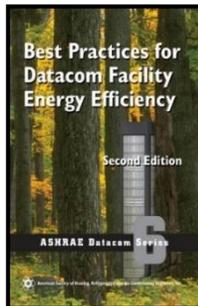
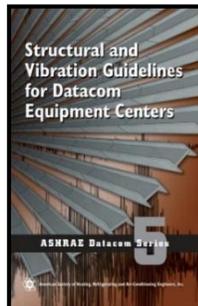
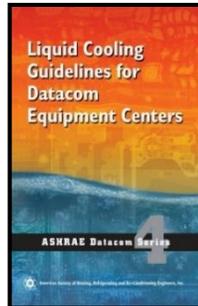
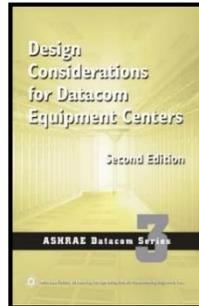
Forecasts and Trends



Key Metrics



Practical Applications



Where we have **BEEN** - Takeaways

Takeaway 1 (speed)

Obsessed with speed to market

Takeaway 2 (trusted)

Obsessed with unbiased, vendor neutral, TRUSTED source

Takeaway 3 (well known)

Obsessed with becoming known in the data center industry

Takeaway 4 (productive & efficient)

Meetings were bureaucracy / business LIGHT & production HEAVY

Where we ARE

Technology Advances

Faster than we can update publications

Publications Size

Books have become much larger.

Forced to use White Papers to try to keep up

Committee Size

Radically increased in size & beyond intended TC Structure Capacity

Committee Meetings

Meetings are mainly administrative & presentations

Little to no actual work is produced

Where we ARE

Hybrid Meetings

**Our meetings are hybrid which is not as effective as 100% in person or 100%
Ashrae is unable to provide suitable equipment for a hybrid meeting
Net result, meeting effectiveness is reduced**

Technical Committee Infrastructure

**Our size exceeds the scope & intent of the administrative software
We waist having to compensate for membership handling software errors**

Where we are GOING

Meetings

Most topics can be handled with an online meeting or simply email

Hybrid meetings will focus on working sessions to produce work. Activities such as:

- Updating content
- Proofreading content
- Extracting glossary items from content
- Work associated with references / hyperlinks
- Live discussions

Where we are GOING

Publications

Transition to 100% online

Switch to a modestly priced Online Subscription Model

Issue updates on a chapter or even subchapter level (much faster)

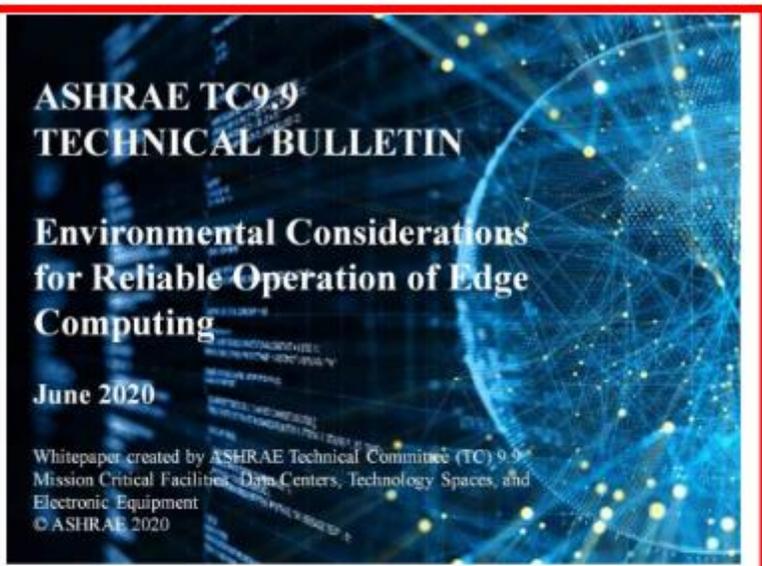
Updates will be issued periodically; frequency to be determined in the future

Focus on providing valuable content that is easily accessible:

. . . any time . . . any place . . . on any device

Whitepaper vs Technical Bulletin Comparison

Edge Technical Bulletin Comparison (whitepaper format to online format)



**ASHRAE TC 9.9
TECHNICAL BULLETIN**

**Environmental Considerations
for Reliable Operation of Edge
Computing**

June 2020

Whitepaper created by ASHRAE Technical Committee (TC) 9.9:
Mission Critical Facilities, Data Centers, Technology Spaces, and
Electronic Equipment
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Contributors

Jon Fitch (Lead Author) – Dell EMC
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Ben Coe – Skaska Consulting
Sama Aghniaey – Harris California - Harris Design Studio
Rajendera Kapoor – Star Consultants
Roger Schmidt – IBM

White Paper



ASHRAE TC 9.9 Technical Bulletin

Edge Computing Highlights

1. IT Equipment Warranty Risks
 - a. Temperature Excursions
 - b. Humidity Excursions
 - c. Air Quality Excursions
2. Practical Solutions to Avoid Warranty Risks

Edge Computing: Considerations for Reliable Operation

Technical Bulletin

Cover Page Comparison – White Paper

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White Paper

2 Line Title

3 Line Title

4 Line Author

Many Line Contributor

- 1.) Just a cover
- 2.) No attempt to attract, inspire
- 3.) No curiosity trigger

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Technical Bulletin

Key Plan

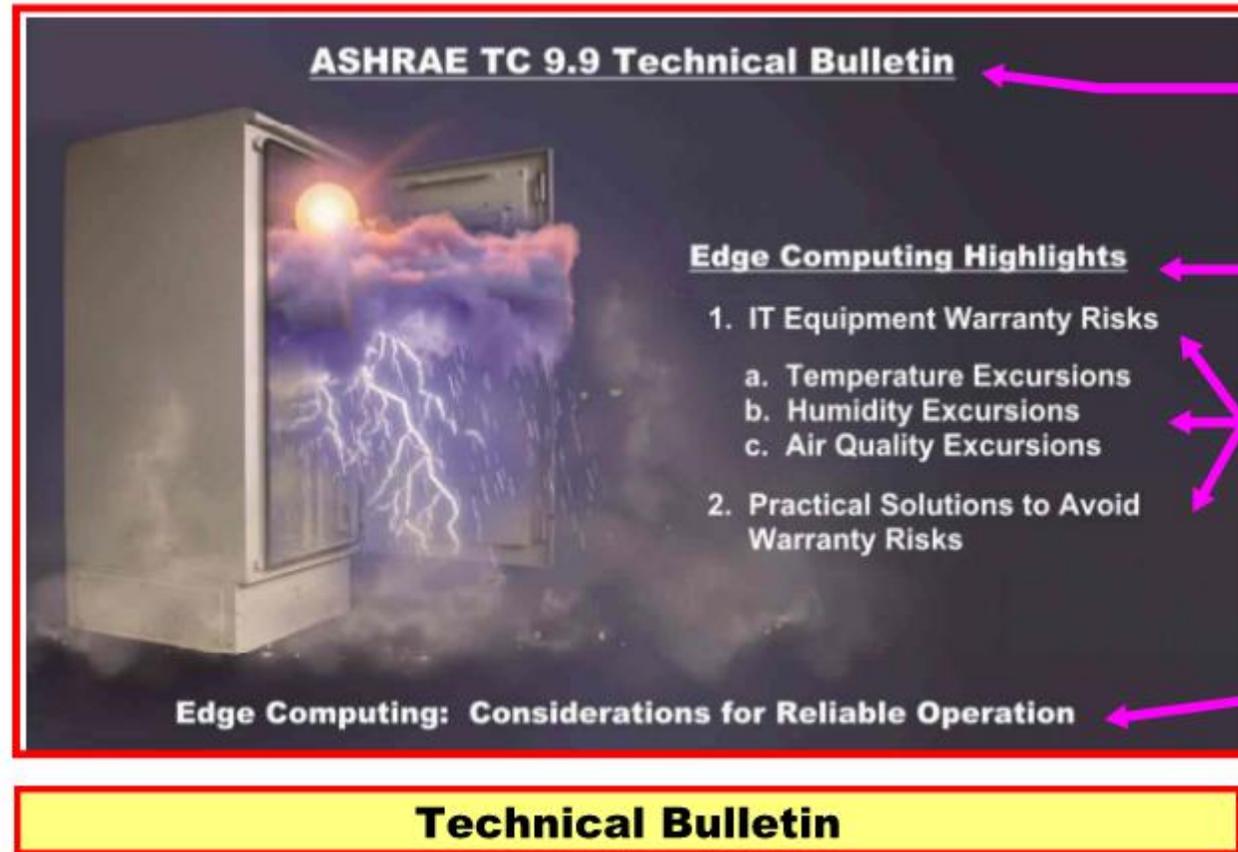


Cover Page Comparison – Technical Bulletin



Key Plan

- 1.) Landscape for easier digital viewing
- 2.) High impact dynamic graphic
- 3.) Highlights



1 Line Title

1 Line Title

Simple Highlights

1 Line Title



2/8/2023

Introduction Page Comparison – Side by Side

Introduction

According to Gartner, by the year 2025, more than 75% of enterprise-generated data will be created and processed outside the traditional data center or cloud [1]. Instead, some of this data will be handled by so-called “edge” computing solutions or “edge” data centers. Although the concept of edge computing is not new, it has been around for many years, “edge” is a somewhat subjective term. There are a number of resources in the public domain that provide a good definition of what comprises edge computing [2-6]. For the purposes of this paper, “edge” refers to computing that is carried out at or near the source of the data. Edge data centers can deliver cloud-like capabilities similar to those found in centralized data centers, but with much lower latency and lower data transport costs due to their proximity to the end user.

Rapid growth of edge computing is being driven by new classes of digital growth that require local processing, i.e. where the dataset is too large and/or the application is too latency sensitive to be transmitted back to a centralized cloud server. These areas of digital growth can be grouped into 4 categories: artificial intelligence (AI), internet of things (IoT), 5G, and blockchain. One way to think about the growth of edge computing is, as the volume of data grows, that data is becoming heavier and denser and more difficult to move [7]. Data sets are now so large it makes more sense to process and store them locally rather than transport them to a regional cloud data center. The net result is there will be many more edge data centers to complement the large data cloud centers that are the foundation for IT processing and storage. This paper will explore the challenges of designing and maintaining small data centers that are surrounded by semi-controlled, or even uncontrolled, external environments.

Scope and Problem Statement

This technical brief is written to highlight the environmental and reliability challenges of small edge data centers. Examples of small data centers include modular data centers fabricated from steel shipping containers, prefabricated edge pods, small stand-alone brick and mortar data centers, phone-booth-sized enclosures that hold a single rack, or even very small enclosures that hold only one or two servers. These small data centers generally include all of the compute, storage, networking, power, cooling, security, and management in a preassembled and pretested enclosure. What these examples all share is a close proximity to an outdoor or semi-controlled environment such that opening the outer door of the data center could dramatically impact the temperature, humidity or air quality reaching the IT equipment inside.



White Paper

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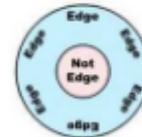


Figure 1 – Enterprise-Generated Data (Greater than 75% at the Edge)

Rapid growth of edge computing is being driven by new classes of digital growth that require local processing, i.e., where the data set is too large and/or the application is too latency sensitive to be transmitted back to a centralized cloud server.

- **Digital Growth Areas.** Growth in edge computing can be attributed to expanding and emerging applications, including:
 - Online shopping
 - Internet of things (IoT)
 - Streaming (i.e., videos, video conferencing)
 - 5G
 - Blockchain
 - Remote learning
 - Telemedicine
- **Data Volume Growth.** One way to think about the growth of edge computing is: as the volume of data grows, that data is becoming heavier and denser and more difficult to move [7].
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Edge Computing: Considerations for Reliable Operation

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Technical Bulletin

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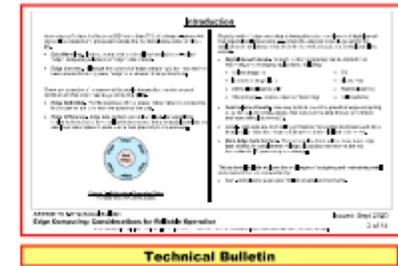
9 Line Paragraph

11 Line Paragraph

1 Line Title

9 Line Paragraph

Tiny photos; no captions



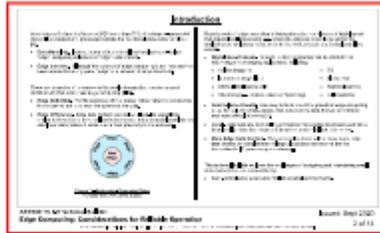
Key Plan

- 1.) Uninviting; especially on smartphone
- 2.) Very long paragraphs; no bullets
- 3.) Shrunk photos of little value; especially with no captions

Cover Page Comparison – Technical Bulletin



White Paper



Technical Bulletin

Key Plan

1.) Lots of integrated whitespace

2.) Simple graphics

3.) 2 Column format

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Technical Bulletin

2/8/2023

Confidential

16

Cover Page Comparison – Technical Bulletin

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- 1.) 3 Levels of Detail (reader’s choice)
- 2.) Bulleted Lists
 - a.) Rule of 7 +/- 1 (max list 8 items)
 - b.) Bullet headings

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Comparison Takeaways

Technical Bulletin format is:

- 1.) More reader friendly**
- 2.) Readable on smartphone**
- 3.) Multiple levels of detail (reader chooses)**
- 4.) Well integrated white space**
- 5.) Landscape / wide screen format**
- 6.) Good example of online friendly style**

Other Considerations

Simple Reformatting

Introduction

1.1 PURPOSE AND OBJECTIVE

Data center infrastructure management (DCIM) is the supervision, administration, and operational control of data center assets and resources with the aim to optimize cost and performance in terms of infrastructure availability, energy efficiency and operational efficiency. Managed assets include both the supporting physical infrastructure systems as well as the IT and telecom equipment (i.e., the load). The primary resources managed within a DCIM system to achieve effective capacity planning and workload scheduling are power, cooling, networking, and space. All should be maintained and provided in the right amounts at the right time even as load and environmental conditions dynamically change. An imbalance can strand resources, limiting capacity and operations, as well as be financially wasteful. Worse still, poor management and planning of these resources can put data center assets and their continued operation at risk.

When properly implemented and maintained, DCIM systems and their software tools will achieve the following:

- Prevent or reduce the impact of critical events
- Improve asset, change, and workflow management
- Help match resource supply and demand for greater operational and energy efficiency
- Improve capacity planning through key performance indicators and resource tracking and trend analysis
- Facilitate reporting, auditing, compliance, and general performance monitoring efforts

Introduction

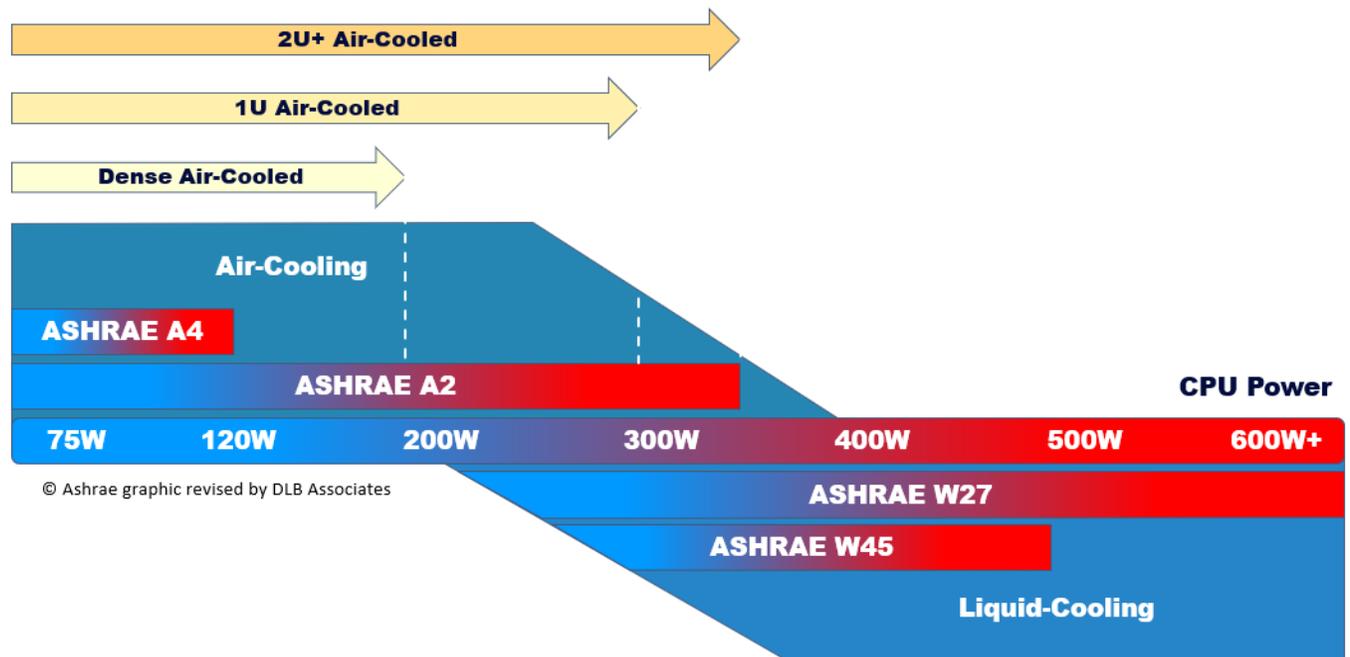
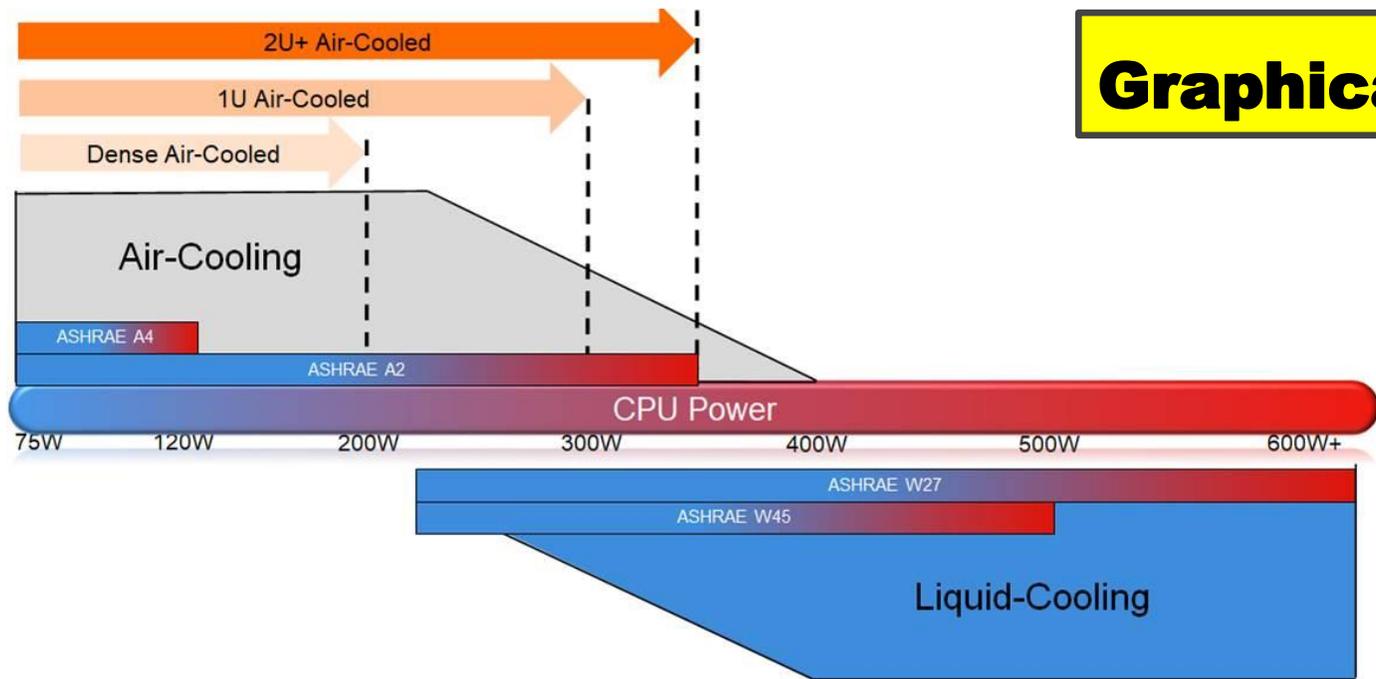
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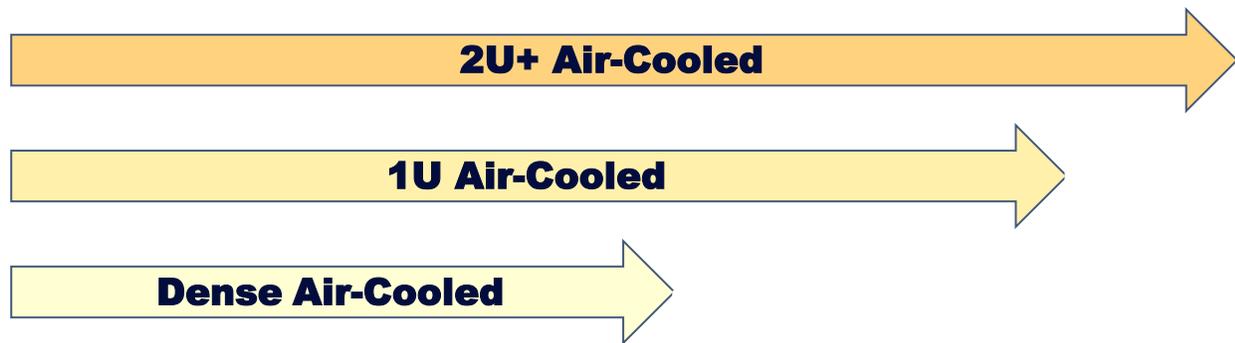
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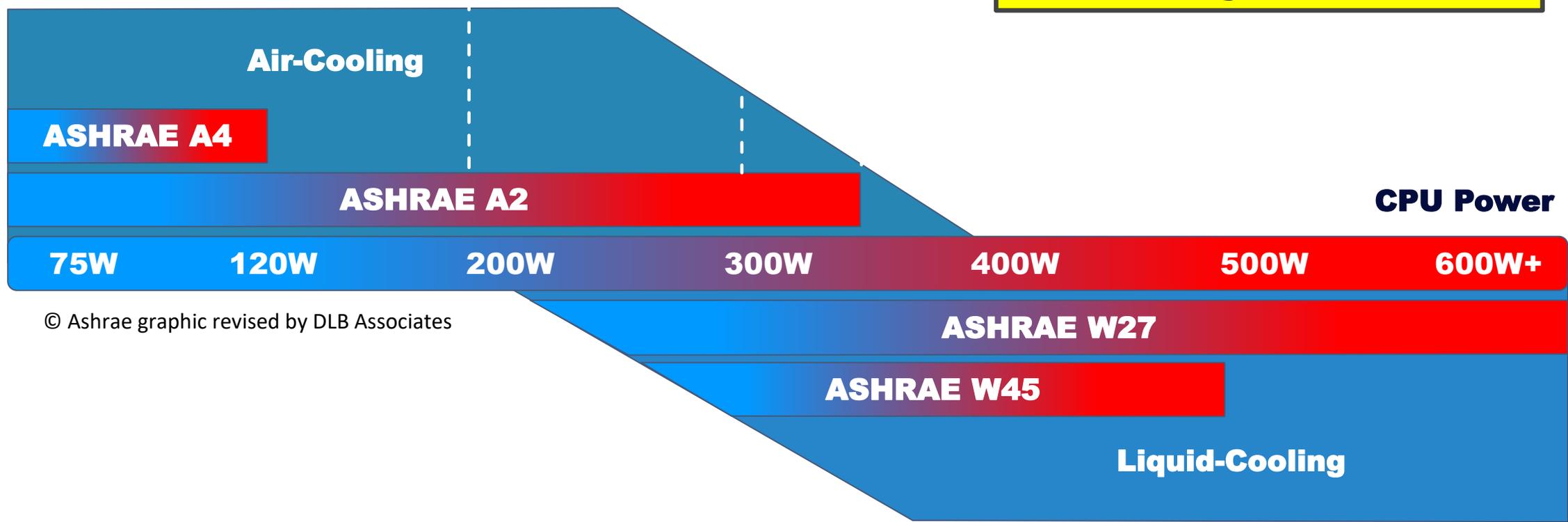
Graphical Impact



© Ashrae graphic revised by DLB Associates



**Dynamic Graphics
can really HELP**



© Ashrae graphic revised by DLB Associates

Book Assessment

Book Counts		
Current Books		
Book Count	A	14
Chapter Count	B	124
Appendix / Other Count	C	68
Page Count for Chapters	D	1,618
Total Page Count	E	2,100
Original Thermal Guidelines		
Chapter Count	F	5
Appendix / Other Count	G	3
Page Count for Chapters	H	34
Total Page Count	I	46

Book Ratios		
Current Books		
Pages / Book	$J = E / A$	150
Pages / Chapter	$K = D / B$	13
Pages / Appendix - Other	$L = (E - D) / C$	7
Pages / Chapter & Appendix - Other	$N = E / (B + C)$	11
Original Thermal Guidelines		
Pages / Book	$P = I$	46
Pages / Chapter	$Q = I / F$	7
Pages / Appendix - Other	$R = (I - H) / G$	4
Pages / Chapter & Appendix - Other	$S = I / (F + G)$	6
Compare Current to Original		
Pages / Book	$T = J / P$	3
Pages / Chapter	$U = K / Q$	2
Pages / Appendix - Other	$V = L / R$	2
Pages / Chapter & Appendix - Other	$W = N / S$	2

Book Assessment - Summary

Book Comparison - Current to Original			
Topic	Original	Current	Current / Original
Pages / Book	46	150	3
Pages / Chapter	7	13	2
Pages / Appendix - Other	4	7	2
Pages / Chapter & Appendix - Other	6	11	2

Recommendation

Rapidly Deliver Content Updates to the Industry by:

- 1.) Convert the books to an online subscription
- 2.) Issue updates at a chapter level
- 3.) Reduce chapter size

Book Comparison - Current to Original			
Topic	Original	Current	Current / Original
Pages / Book	46	150	3
Pages / Chapter	7	13	2
Pages / Appendix - Other	4	7	2
Pages / Chapter & Appendix - Other	6	11	2

Closing Comments

Books are a lot of work yet seldom accessed

- **Online.** We are going to convert the books to an online subscription
- **Smartphone.** The content will be easily accessed & used on a smartphone
- **Updates.** The content will be more up to date by updating at the chapter level