Harmonization of Standards in the Industry

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Education Manager, AMCA International

Session Moderator

- Joined AMCA in February 2019
- Responsible for development of AMCA's education programs; staff liaison for the Education & Training Committee
- Projects include webinars, online education modules, presentations at trade shows, AMCA Speakers Network and many other items.

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Senior Manager,
Advocacy
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Dr. Geoff Sheard

President
AGS Consulting

- Consultant, AMCA Member Company

- Over 40 years experience in the aerodynamic and mechanical design of rotating equipment.
- International expert in fan technology and development of high efficiency fans for commercial and industrial application.
- Holds a BEng in mechanical engineering, a DPhil in aerodynamics plus a DSc awarded for the application of aerospace design techniques in commercial and industrial fan design.
- Past President of AMCA and Chairman of the FAN 2012, 2015, 2018 and 2022 conference organizing committee.

Emily Toto

Manager of Codes
ASHRAE

- With ASHRAE for nearly 4 years and serves as ASHRAE's staff liaison for code interaction as well as Standards 90.1 and 90.2
- Represents ASHRAE at model code hearings and helps members engage in the code change process.
- Prior to working at ASHRAE, taught middle and high school science.
- Holds a B.S in Civil Engineering from the Georgia Institute of Technology, an M.S. in Mechanical Engineering from the University of Texas at Austin and is currently pursuing her J.D. from Georgia State University College of Law.

Jim Walters

Consultant; Format V.P. International Affairs AHRI

- Retired from AHRI December 31, 2022; served for over 23 years in multiple roles
- Prior to AHRI, worked as a Strategic Analyst assessing global political and economic factors for the U.S Department of the Army and for the American Petroleum Institute
- Academic background in political science, international affairs, economics, and business
- Attended Roanoke College, The George Washington University, The University of Virginia, and Stanford University.

Joe Brooks, PE

Director of Publications and Standards
AMCA International

- Has worked at AMCA for 27 years; currently responsible for the maintenance and development of all AMCA publications and standards
- Has designed & built testing facilities; was responsible for AMCA's lab operations; administered the Certified Ratings Program; instrumental in the development of AMCA standards and technical publications
- Active member of ASHRAE & former chair of ASHRAE TC 5.1-Fans
- Earned his BSE(NE) at the University of Michigan

Aaron Gunzner, PE

Senior Manager, Advocacy
AMCA International

- Joined AMCA in May 2019
- Supports advocacy initiatives in U.S. codes, standards, and regulations
- Committee liaison for many AMCA & external committees, primarily related to energy, construction, and life-safety codes and standards and energy-efficiency regulations.
- B.Sc., M.Sc. Mechanical Engineering from Colorado School of Mines
- CONTACT: agunzner@amca.org

Harmonization of Standards in the Industry

Purpose and Learning Objectives

The purpose of this presentation is to provide an overview of how standards organizations and other stakeholders work together strategically to develop standards that affect our entire industry, and how these efforts are coordinated to ensure success and benefit for all who rely on these groups.

At the end of this presentation, you will be able to:

1. Describe processes implemented by standards-developing organizations such as ASHRAE, AHRI, and AMCA.
2. Explain challenges faced during standards development and harmonization.
3. Describe examples of harmonized standards and case studies of standards development.
4. Explain how this harmonization applies to other industry stakeholders.

Session Outline

- Standards Programs & Harmonization Efforts
  - AHRI
  - AMCA
  - ASHRAE
- Case Study: AMCA 210 & ISO 5801
- Applicability to Stakeholders & the Public
- Q & A

AHRI STANDARDS PROGRAM

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Presentation Outline

- AHRI Mission and Programs
- AHRI Standardization Scope and ISO Connection
- AHRI Standards Program
- Challenges to AHRI Standards

AHRI MISSION & PROGRAMS

Make Life Better

- A North American association with global interests and services
- Membership of 325-plus HVACR and water heating equipment manufacturers from virtually every continent
- AHRI presence: **United States**, Canada, China, UAE, India, and Mexico
- AHRI standards are critical to AHRI's certification, standards, advocacy, and analytics programs

AHRI PROGRAMS

Advocacy--Conducting outreach to U.S. representatives, senators, and their respective staff, AHRI helps educate policy makers on the issues of importance to the HVACR and water heating industries

Certification--AHRI's globally recognized and industry respected certification program helps equipment and component manufacturers sell more products, win bids, differentiate themselves from competitors, and comply with government requirements

Analytics--AHRI compiles statistical data on the scope, size, and growth of the U.S. HVACR industry

Standards & Guidelines—A continuously evolving portfolio of over 100 AHRI performance rating standards and guidelines for the HVACR and water heating industry. They promote consistency in manufacturer specifications, which increases consumer confidence, and provides a means for manufacturers, third-party laboratories, regulators, and certification bodies to evaluate products objectively and consistently.

AHRI Members: Four Main Product Sectors

Applied

- 17 Product Categories
- 8 Component Categories

Heating

- 10 Product Categories
- 6 Component Categories

Refrigeration

- 12 Product Categories
- 6 Component Categories

Unitary Products

- 6 Product Categories
- 13 Component Categories

AHRI Standardization Scope

Terminology, mechanical safety, methods of testing and rating equipment.

Measurement of sound levels, refrigerant and refrigeration lubricant chemistry.

Environmental protection.

Includes factory-assembled air conditioners (cooling),

Heat pumps, dehumidifiers, refrigerants,

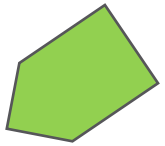
Refrigerant reclaiming and recycling equipment

Other devices, components and equipment such as humidifiers,

Ventilation equipment and automatic controls used in air-conditioning

Refrigeration systems that are not covered by other

ISO technical committees



ISO TC 86 Scope

Standardization in the fields of refrigeration and air conditioning, including terminology, mechanical safety, methods of testing and rating equipment, measurement of sound levels, refrigerant and refrigeration lubricant chemistry, with consideration given to environmental protection. The scope includes factory-assembled air conditioners (cooling), heat pumps, dehumidifiers, refrigerants, and refrigerant reclaiming and recycling equipment as well as other devices, components and equipment such as humidifiers, ventilation equipment and automatic controls used in air conditioning and refrigeration systems that are not covered by other ISO technical committees.

ISO/TC 86
Refrigeration and air-conditioning
Creation date: 1957

Secretariat: ANSI

Chairperson (until end 2024): Mr. Drake Erbe
Vice President Market Development,
Airxchange, Inc.

Standards by ISO/TC 86 Refrigeration and Air Conditioning

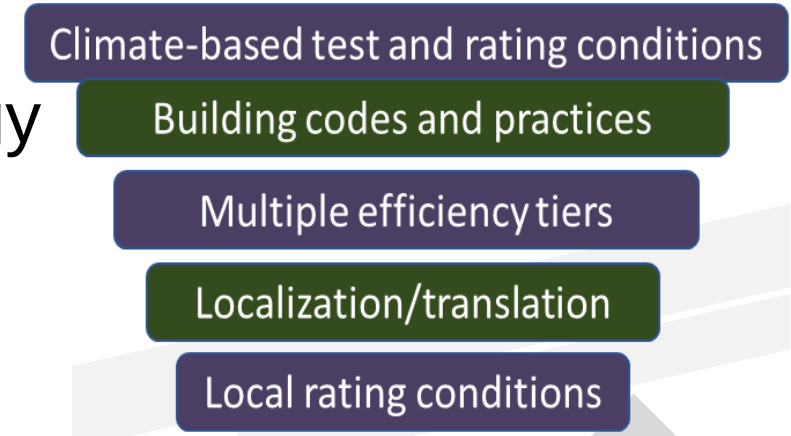
Subcommittee	Subcommittee Title	Published standards	Standards under development
ISO/TC 86/SC 1	Safety and environmental requirements for refrigerating systems	11	7
ISO/TC 86/SC 4	Testing and rating of refrigerant compressors	1	3
ISO/TC 86/SC 6	Testing and rating of air conditioners and heat pumps	26	12
ISO/TC 86/SC 7	Testing and rating of commercial refrigerated display cabinets	6	4
ISO/TC 86/SC 8	Refrigerants and refrigeration lubricants	5	2

AHRI Standards Program

- 165 standards and guides
- Most used for **AHRI certification** and for U.S. and Canada regulation
- AHRI standards process accredited: ANSI and SCC

Challenges to AHRI Standards

- Focus on energy efficiency performance of HVACR and water heater equipment
- BUT -- Historical focus on U.S. and Canada » global focus
- "Global focus" = standards that are relevant to global, regional, and local needs
- **A significant challenge**: Demonstrate that equipment tested to AHRI standards and certified in AHRI's AHRI Product Performance Certification Program meets climactic conditions and regulatory energy efficiency requirements



Globally Relevant Standard/Equipment
AHRI Standard 1230-2010 , Variable Refrigerant Flow (VRF) Multi-split
ANSI/AHRI/ASHRAE/ISO Standard 13256-1 (2012), Water-to-Air and Brine-to-Air Heat Pumps
AHRI Standard 210/240 (2017), Unitary Air-conditioning & Air-source Heat Pump Equipment
AHRI Standards 1060 (I-P)/2018 and 1061 (SI)/2018, *Air-to-Air Exchangers for Energy Recovery Ventilation*
AHRI Standard 340/360 (2019), Commercial and Industrial Unitary Air-conditioning and Heat Pump
AHRI Standard 365 (I-P/2009) and 366 (SI-2009), Commercial and Industrial Unitary Air-Conditioning Condensing Units
AHRI Standard 390 (2013), Single Package Vertical Air-Conditioners and Heat Pumps
AHRI Standards 550/590 (I-P/2018) and 551/591 (SI/2018), Water-chilling Packages
AHRI Standard 1360 (I-P)/2017 and 1360 (SI)/2017, Computer and Data Processing Room Air Conditioners
AHRI Standards 400 (I-P)/2015 and 401 (SI)/2015, *Performance Rating of Liquid to Liquid Heat Exchangers*
AHRI Standard 410 (2001) with Addenda 1, 2, and 3, *Forced-Circulation Air-Cooling and Air-Heating Coils*
AHRI Standards 430 (I-P)/2014 and 431 (SI)/2014, *Central Station Air-handling Units Supply Fans*
AHRI Standards 1350 (I-P)/2014 and 1351 (SI)/2014, *Central Station Air-handling Unit Casings*

Are AHRI Standards International and Globally Relevant?

The AHRI Product Performance Certification Program

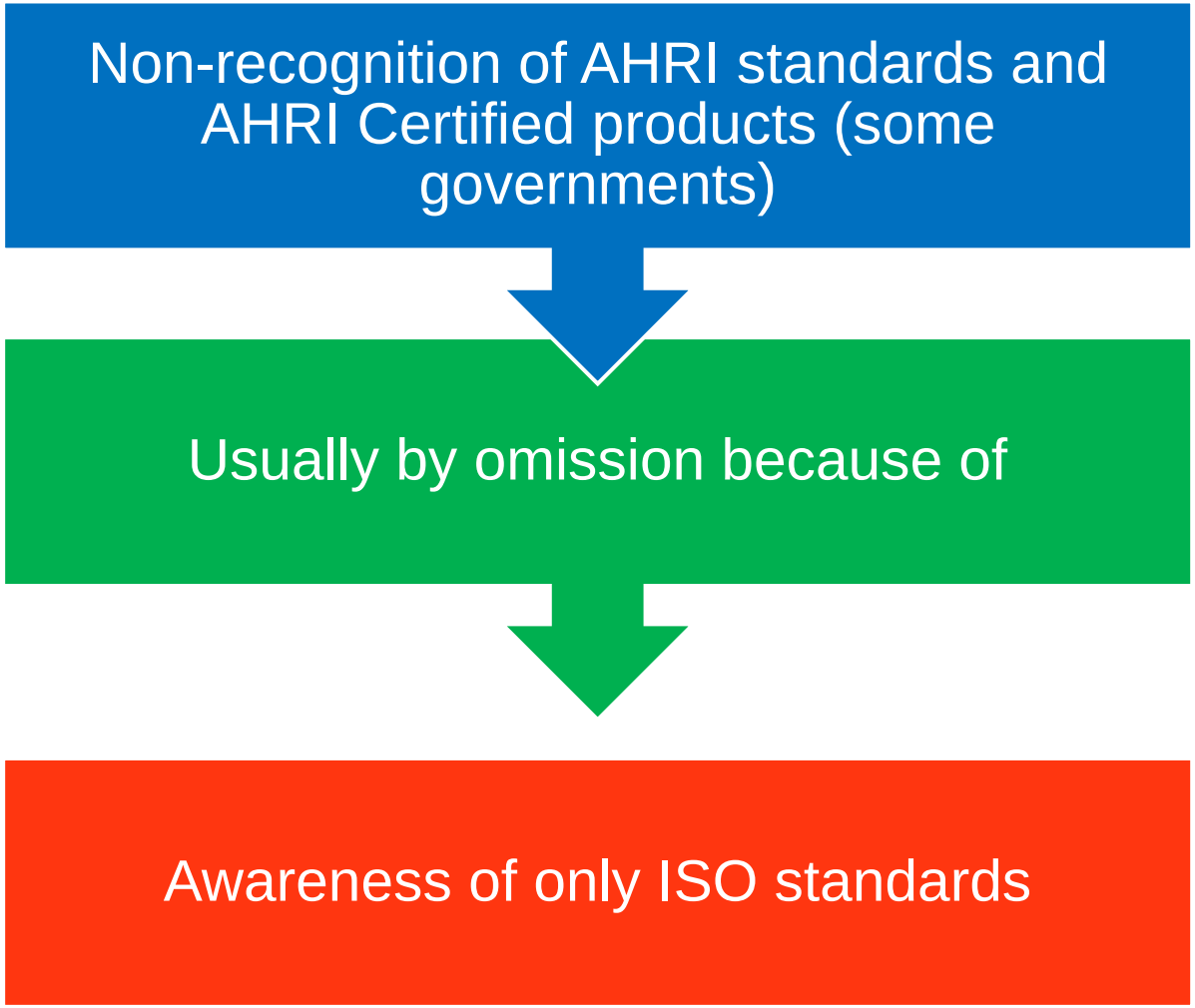
- Voluntary program, administered and governed by AHRI

- Ensures that various types of heating, ventilation, air conditioning, refrigeration, and water heating products perform according to manufacturers' published claims

- Products certified through the AHRI Product Performance Certification Program are continuously tested, at the direction of AHRI, by an independent third–party laboratory, contracted by AHRI, to determine the product's ability to conform to one or more product rating standards or specifications.

How AHRI Addresses Technical Barriers To Trade

- Via AHRI Members, Regional AHRI Offices and HQ:
  - Makes foreign regulators aware of AHRI Certification Program and its value in meeting climate change and energy efficiency goals
  - Secures joint agreement to recognize AHRI's as well as ISO's relevant standards (dual approach) to eliminate TBTs
  - Acquires membership on relevant government committees



Example -- Regulatory Harmonization

Regulatory Bodies		Access to WG	MOU	Standards Adopted	Certification Adopted
Saudi	SASO	**1**	1		
UAE	MoIAT	**1**			
GCC wide	GSO	**4**	1	1	
Kuwait	MEW	**1**			
Egypt	EOS	**0**	1	1	1
Jordan	JISMO	**1**	1	1	
Abu Dhabi	QCC	**0**		1	1
Bahrain	BTMD/MOIC	**1**		1	

Oh, BTW…Five Take-Aways – Davos 2023 Conference

1. **Global disruption isn't slowing down.** Companies must prioritize building resilience muscles today to prepare for tomorrow
2. **No region is an island.** The future of globalization needs diversification rather than decoupling
3. To achieve a net-zero future, leaders must **balance the energy transition and energy resilience**
4. Global companies are finding that **inclusion is helping them tap underserved markets, giving them a competitive edge**
5. **The budding space economy has vast potential to change the world.** Many sectors can capture the innovation of space

AMCA STANDARDS & HARMONIZATION

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AMCA Standards & Harmonization

- AMCA Standards/ANSI process
- ISO process
- International efforts
- Examples

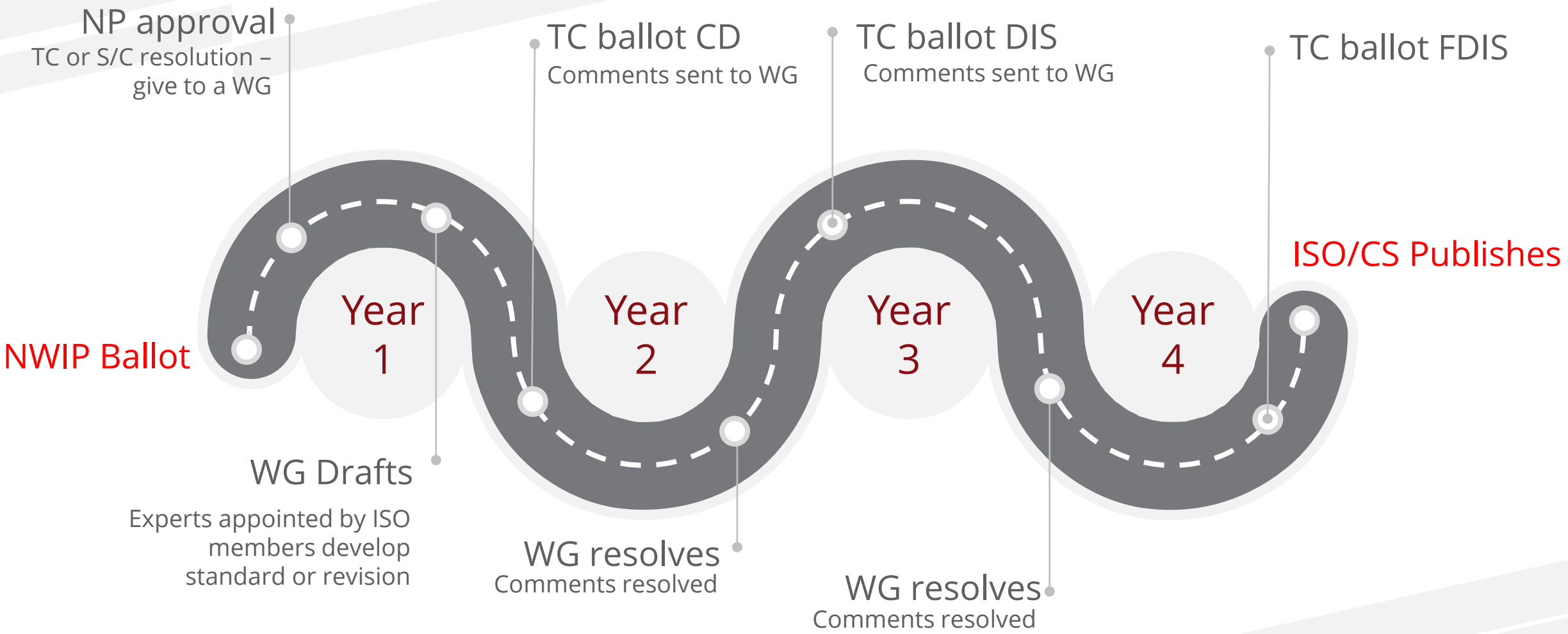
AMCA Standards & Harmonization

- AMCA Standards/ANSI process
  - Need identified
  - AMCA board approval
  - ANSI PINS
  - Form committee/consensus body (TC/CB)
  - TC/CB develop/revise standard
  - Approval process: TC/CB ➡ AMCA Div. &Public Review ➡ AMCA BoD ➡ ANSI approval ➡ Publish

Harmonization

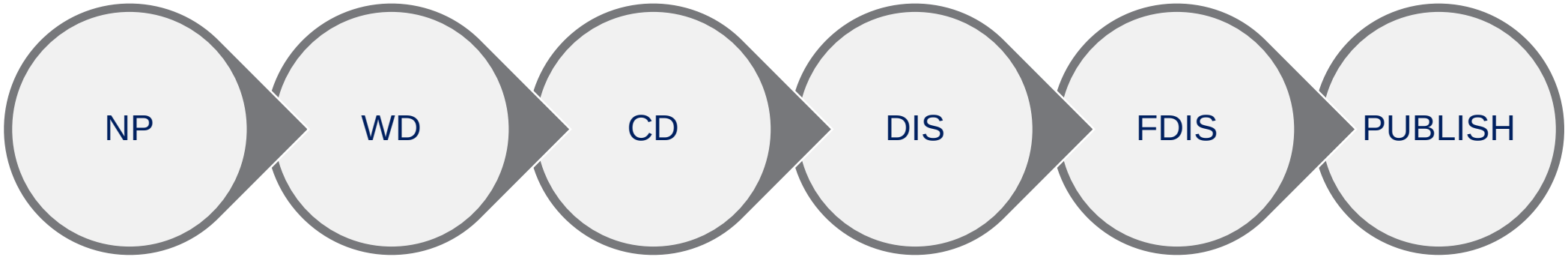
- A definition – the act of making systems [standards] the same or similar in different countries so that they can work together more easily
- Proposal for initiation of a NWIP for ISO
  - Approval by US TAG
  - Approval by originating developer
  - Proposal to fast track a national standard
- National adoption of an ISO or IEC standard

ISO Approval Process



International Standards Process

ISO Drafts



AMCA – ISO Harmonization Examples

AMCA	ISO	Subject
204	14694	Balance Qual./Vibration Levels
205	12759-3	Fan Efficiency Class
207	12759-2	Fan Input Power Calculation
210	5801	Fan MOT for Aero. Performance
220	27327-1	Air Curtain Unit MOT for Aero. Performance
250	13350	Jet Fans MOT for Performance
300	13347-2	Fan Sound, Reverb Rm. MOT
320	13347-4	Fan Sound Intensity MOT

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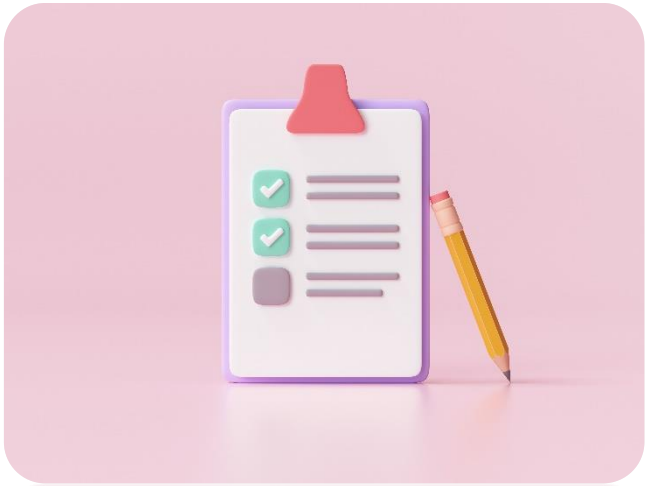
ASHRAE Harmonization **Process**

Project Initiation

In addition to ANSI requirements, we answer a checklist:

- Would the standard (or guideline) be duplicative?
- Is ASHRAE the proper authority to issue it?
- Could we accomplish the same end result through adoption or revision of an ISO standard?



Public Review

- ASHRAE submittal process dictates that drafts be checked for text, figures, or tables that originally appeared in an ISO standard
- ANSI submittal process asks if the draft includes excerpts from ISO or IEC standards

ASHRAE Harmonization
Support

CIS – Code Interaction Subcommittee

1) Subcommittee of Standards Committee that currently has 8 voting members
2) Main goal is to promote uniform adoption of ASHRAE standards within the U.S. model codes
3) CIS also unites interested parties from the code development community
4) Can also consult with ASHRAE staff to recommend appointments to ICC standards or codes committees, and IAPMO technical committees

ASHRAE Harmonization
Support

Government Affairs

- Facilitate outreach between ASHRAE members and their communities
- Develop tracking systems for where/what is being adopted
- Monitor federal legislation and rulemakings

- Provide information and expertise that aligns with local goals
- Identify emerging patterns or gaps
- Ensure consistent development of standards like 90.1

ASHRAE Harmonization
Examples

90.2 and ANSI/RESNET/ICC 301

To help ensure consistency across industry standards, 90.2 utilizes a modified version of the energy performance calculation methods from RESNET 301

15.2 and UL/CSA 60335-2-40

UL/CSA 60335-2-40, North American product safety standards for residential products, allows lower-flammability A2Ls since 2019. ASHRAE Standard 15.2 was developed in parallel with UL/CSA 60335-2-40

ASHRAE Harmonization

International Efforts

2019 →

MOU with the United Nations Environment Programme (UNEP).

Goal: Advancement of standards and codes related to responsible management of refrigerants

Since 2004…

Alignment between Standards 55, the ASHRAE Handbook and ISO 7730 in how thermal comfort is calculated and modeled.

CASE STUDY:

AMCA 210 & ISO 5801

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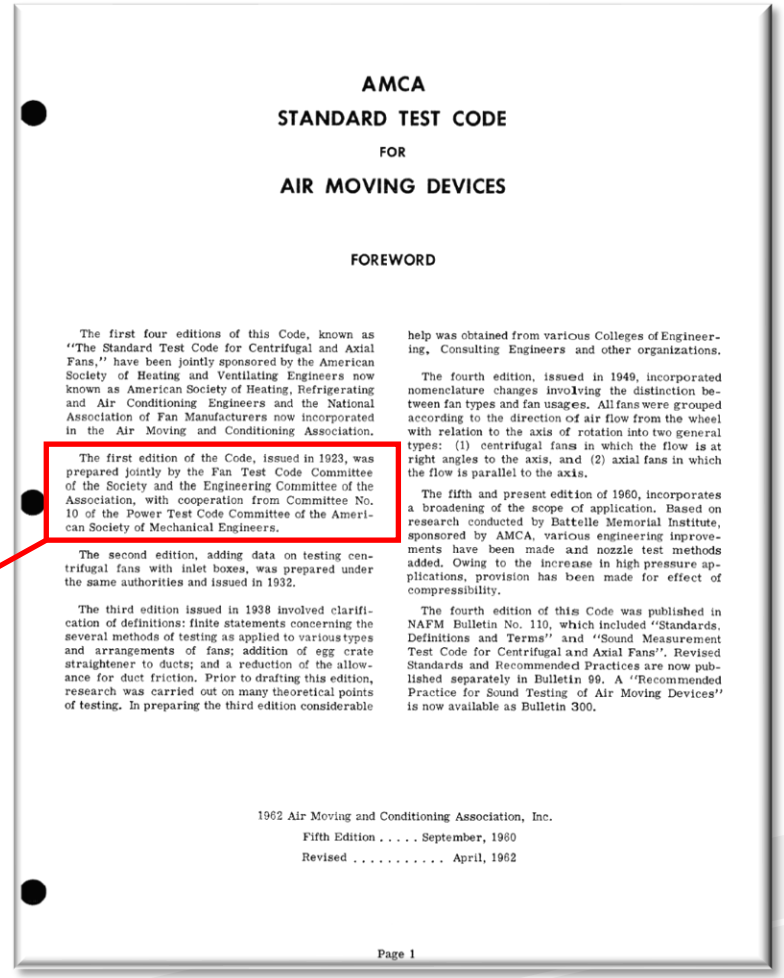
The Origin of AMCA 210

- AMCA was formed over 100 years ago to promote the interests of air moving and conditioning device manufactures, as well as the interests of the public by providing standards relating to these devices.
- AMCA also built a laboratory, allowing fan manufactures, and those purchasing fans to have a fan independently tested to verify its performance.
- AMCA 210 was developed to formalize how fans would be tested.
- AMCA went on to develop a laboratory accreditation program, that verifies a laboratory is operated in accordance with AMCA 210, good engineering practice, and produces accurate measurements of fan performance.

The Origin of AMCA 210

- The earliest version of AMCA 210 on record was published in 1962.
- The 1962 edition states that the first edition of AMCA 210 was published in 1923, 100 years ago.
- Since that time the AMCA 210 has been revised and re-issues, with the latest version issued in 2016.



AMCA
STANDARD TEST CODE
FOR
AIR MOVING DEVICES

FOREWORD

The first four editions of this Code, known as "The Standard Test Code for Centrifugal and Axial Fans," have been jointly sponsored by the American Society of Heating and Ventilating Engineers now known as American Society of Heating, Refrigerating and Air Conditioning Engineers and the National Association of Fan Manufacturers now incorporated in the Air Moving and Conditioning Association.

The first edition of the Code, issued in 1923, was prepared jointly by the Fan Test Code Committee of the Society and the Engineering Committee of the Association, with cooperation from Committee No. 10 of the Power Test Code Committee of the American Society of Mechanical Engineers.

The second edition, adding data on testing centrifugal fans with inlet boxes, was prepared under the same authorities and issued in 1932.

The third edition issued in 1938 involved clarification of definitions: finite statements concerning the several methods of testing as applied to various types and arrangements of fans; addition of egg crate straightener to ducts; and a reduction of the allowance for duct friction. Prior to drafting this edition, research was carried out on many theoretical points of testing. In preparing the third edition considerable help was obtained from various Colleges of Engineering, Consulting Engineers and other organizations.

The fourth edition, issued in 1949, incorporated nomenclature changes involving the distinction between fan types and fan usages. All fans were grouped according to the direction of air flow from the wheel with relation to the axis of rotation into two general types: (1) centrifugal fans in which the flow is at right angles to the axis, and (2) axial fans in which the flow is parallel to the axis.

The fifth and present edition of 1960, incorporates a broadening of the scope of application. Based on research conducted by Battelle Memorial Institute, sponsored by AMCA, various engineering improvements have been made and nozzle test methods added. Owing to the increase in high pressure applications, provision has been made for effect of compressibility.

The fourth edition of this Code was published in NAFM Bulletin No. 110, which included "Standards, Definitions and Terms" and "Sound Measurement Test Code for Centrifugal and Axial Fans". Revised Standards and Recommended Practices are now published separately in Bulletin 99. A "Recommended Practice for Sound Testing of Air Moving Devices" is now available as Bulletin 300.

1962 Air Moving and Conditioning Association, Inc.
Fifth Edition . . . . . September, 1960
Revised . . . . . April, 1962

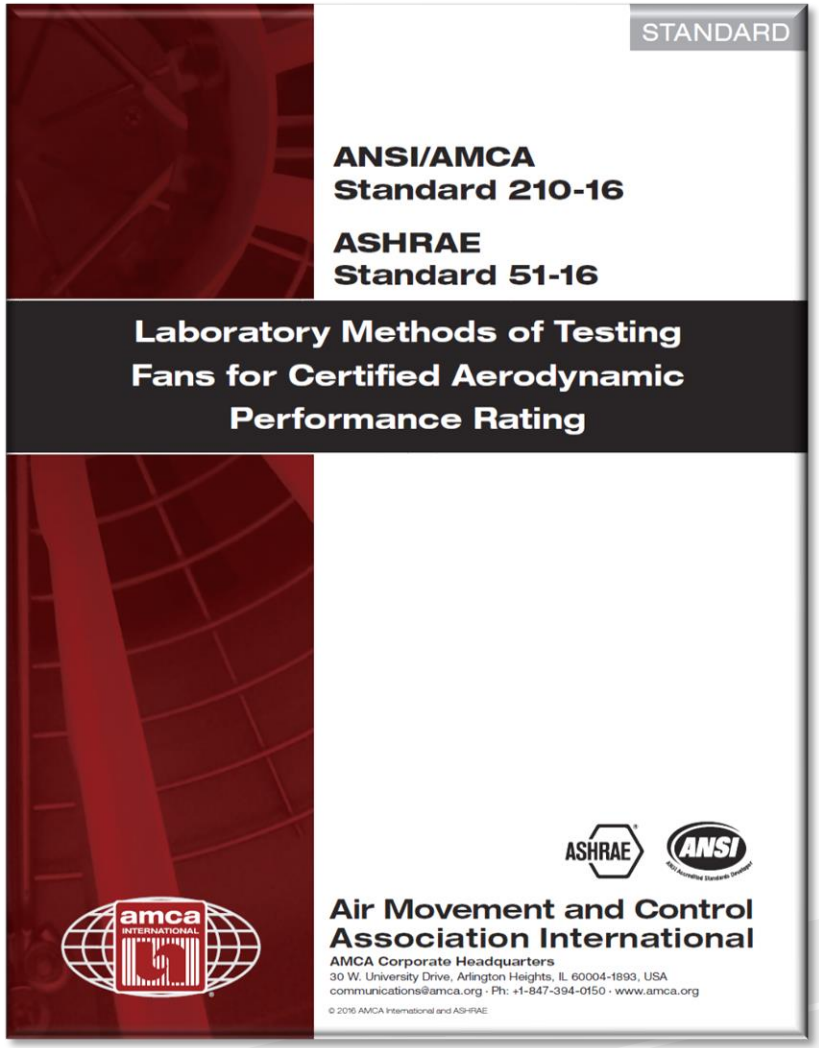
The first edition of the Code, issued in 1923, was prepared jointly by the Fan Test Code Committee of the Society and the Engineering Committee of the Association, with cooperation from Committee No. 10 of the Power Test Code Committee of the American Society of Mechanical Engineers.

The Origin of ISO 5801

- During the late 1960's, TC117 (the ISO technical committee responsible for fan standards) started the process of developing a fan performance measurement standard intended to supersede national standards.
- There were four national standards ISO 5801 was intended to replace:
  - A British BS standard.
  - A German DIN standard.
  - A French standard.
  - AMCA 210, treated as a USA national standard.
- TC117 struggled to reach agreement, in the late 1990's finally accepting that rather than superseding the national standards, ISO 5801 would consolidate all test systems allowed in each national standard into the first edition of ISO 5801.

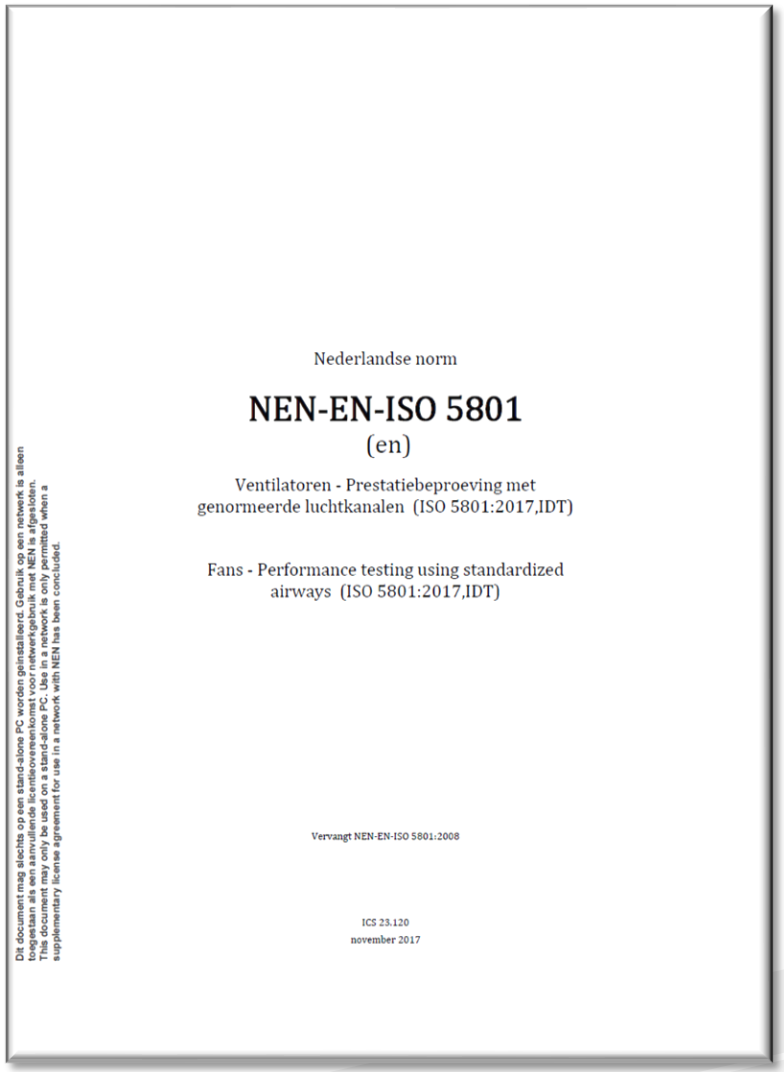
AMCA 210

- Within the USA, laboratory test systems are generally expected to be AMCA accredited in accordance with AMCA 210.
- This requirement is generally a client requirement, included in contract specifications.
- Hence, accreditation of laboratory test systems in accordance with AMCA 210 is generally considered a mandatory requirement in the US.



ISO 5801

- Within Europe, laboratories are generally accredited in accordance with the requirements of ISO 5801.
- The rest of the world (outside the USA and Europe) typically requires either AMCA 210 or ISO 5801 laboratory accreditation.
- Those organization who sell globally typically find that some clients require their laboratory to be AMCA 210 accredited, and some require it to be ISO 5801 accredited.



Nederlandse norm

NEN-EN-ISO 5801

(en)

Ventilatoren - Prestatiebeproeving met genormeerde luchtkanalen (ISO 5801:2017,IDT)

Fans - Performance testing using standardized airways (ISO 5801:2017,IDT)

Vervangt NEN-EN-ISO 5801:2008

ICS 23.120

november 2017

Harmonization

- It is the stated objective of AMCA that AMCA 210 and ISO 5801 should be harmonized.
- Although many previously included discrepancies have been eliminated, the two standards are not fully harmonized.
- However, it is possible to pick key test system dimensions that match the “worst-case” requirement of AMCA 210 and ISO 5801.
- There are six known issues where the two standards are not harmonized, listed on the following slide.
- Each known issue has been reviewed with AMCA staff, and an acceptable approach to designing a test system to comply with both AMCA 210 and ISO 5801 requirements agreed.

List of Discrepancies

- **ISO 5801**: 2017 Section 9.4.2 states that the inlet area of the fan can't be more than 20% the chamber area. This 20% is also in AMCA 210: 2016. However, ISO 5801: 2017 also states that for a square chamber, the height and / or width must be more than two times the diameter of the fan being tested. This issue can be avoided with a round chamber.

- **Section 9.4.1 of ISO 5801**: 2017 say that the height-to-width ratio can't be greater than 2/3 or less than 3 halves. Again, can be avoided by designing a round chamber.

- **AMCA 210**: 2016 Figure 15 Defines 30% of chamber diameter from the end of chamber to the measuring plane. In ISO 5801: 2017 Figure 9 its 30% of the distance from the furthermost protrusion of the fan into the chamber. AMCA staff are pragmatic; they propose adding length to the chamber to ensure when fitted the chamber has the required 30% distance from the furthest most point of the fan with the largest fan you are likely to test, with the largest protrusion into the chamber.

List of Discrepancies

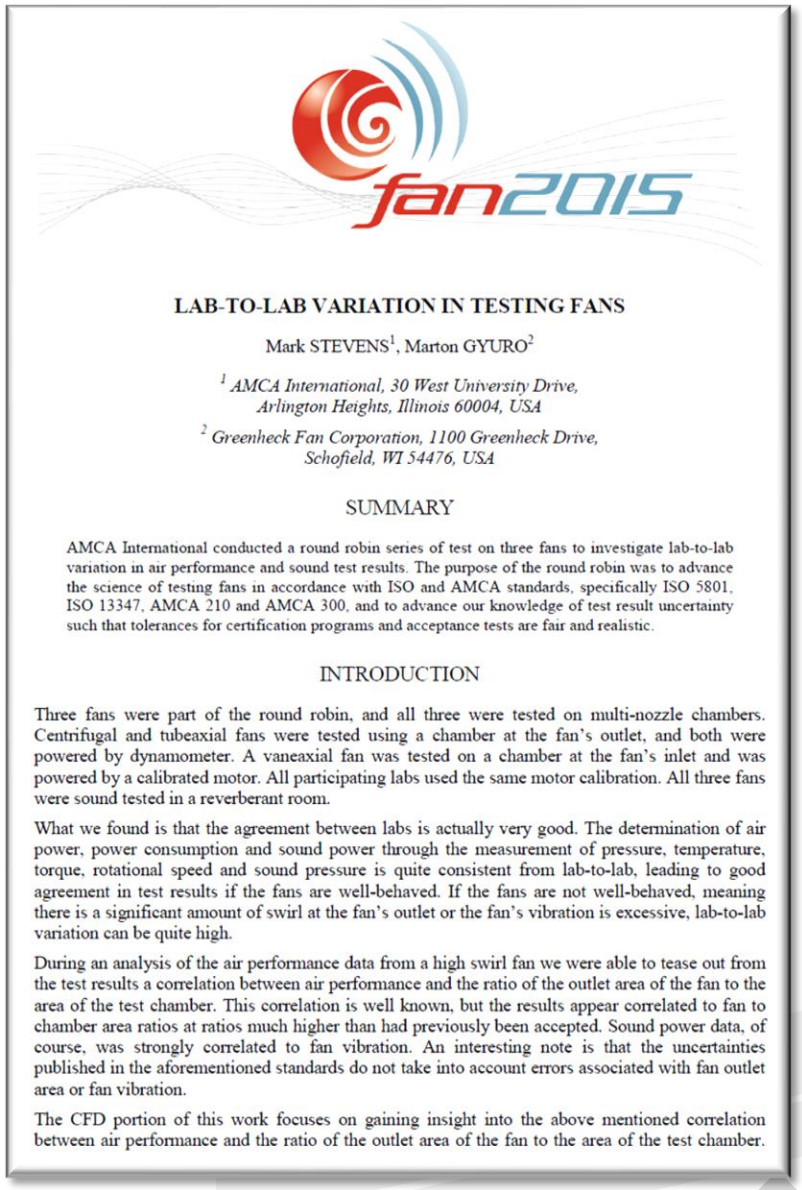
- **In AMCA 210**: 2016 there is Figure 15 Plane 8, and a statement that one total pressure tube in needed. In ISO 5801: 2017 Section 12.8.1 it states that there should be four total pressure measurement tubes with Figure 8 showing 4 statics and one total. AMCA staff recommend going by the text of ISO 5801: 2017; fit four total pressure measurement probes. AMCA staff have seen this done one time previously in an accredited ISO 5801 test system and would like to be self-consistent with the new test systems.

- **Figure 15 in AMCA 210**: 2016 shows a dimension from the end of the chamber (from the left) to the exit of the settling means. ISO 5801:2017 shows the dimension to the inlet. AMCA staff accept that this is a difference between 210 and 5801, however it is a deliberate aspect of the 210 standard, not an error. AMCA 210: 2016 does go to the outlet as this allows settling screens to be added to the inlet if needed to get the flow quality. This allows the outlet of the screens to nozzle plane to remain unaffected as screens are added, and hence avoid major changed to the chamber when adding screens.

- **ISO 5801**: 2017 required 5 fan diameters of open space downstream of the fan. However, ISO 5801: 2017 mentions it in Annex I (capital i not 1) Table I.1 that this 5-diameter requirement is informative. AMCA staff comment that there must be 5 diameters clear space to get ISO laboratory accreditation. Clear space is defined as space with no racking, storage or temporary equipment of any kind. The clear space must be at least the width of the chamber and to the ceiling of the building within which the chamber is installed.

A Practical Problem

- In 2015, Mark Stevens (then Executive Director of AMCA) published a technical paper at the Fan 2015 conference.
- AMCA conducted a round-robin series of test on three fans to investigate lab-to-lab variation in air performance.
- The purpose of the round robin was to advance the science of testing fans in accordance with ISO 5801 and AMCA 210, and to advance knowledge of test result uncertainty.



fan2015

LAB-TO-LAB VARIATION IN TESTING FANS

Mark STEVENS[1], Marton GYURO[2]

[1] *AMCA International, 30 West University Drive, Arlington Heights, Illinois 60004, USA*

[2] *Greenheck Fan Corporation, 1100 Greenheck Drive, Schofield, WI 54476, USA*

SUMMARY

AMCA International conducted a round robin series of test on three fans to investigate lab-to-lab variation in air performance and sound test results. The purpose of the round robin was to advance the science of testing fans in accordance with ISO and AMCA standards, specifically ISO 5801, ISO 13347, AMCA 210 and AMCA 300, and to advance our knowledge of test result uncertainty such that tolerances for certification programs and acceptance tests are fair and realistic.

INTRODUCTION

Three fans were part of the round robin, and all three were tested on multi-nozzle chambers. Centrifugal and tubeaxial fans were tested using a chamber at the fan's outlet, and both were powered by dynamometer. A vaneaxial fan was tested on a chamber at the fan's inlet and was powered by a calibrated motor. All participating labs used the same motor calibration. All three fans were sound tested in a reverberant room.

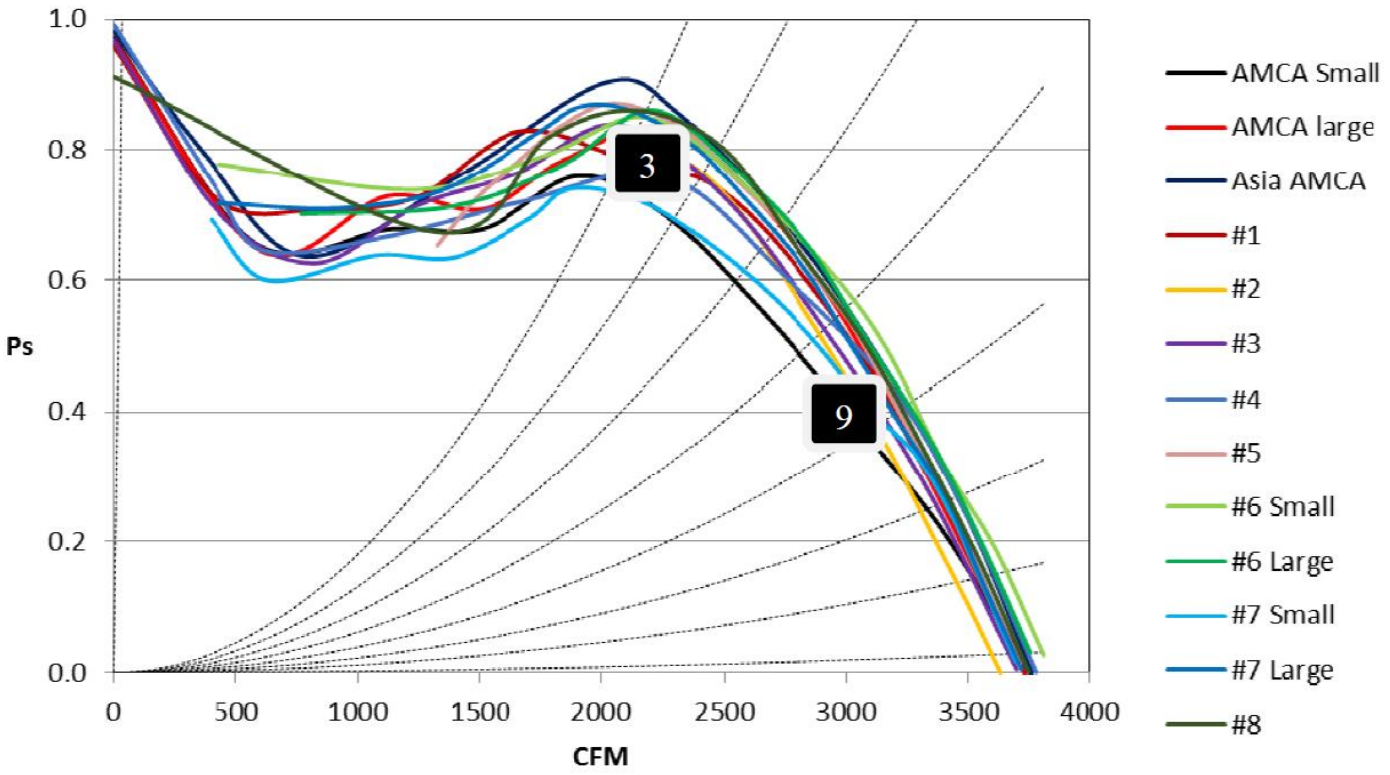
What we found is that the agreement between labs is actually very good. The determination of air power, power consumption and sound power through the measurement of pressure, temperature, torque, rotational speed and sound pressure is quite consistent from lab-to-lab, leading to good agreement in test results if the fans are well-behaved. If the fans are not well-behaved, meaning there is a significant amount of swirl at the fan's outlet or the fan's vibration is excessive, lab-to-lab variation can be quite high.

During an analysis of the air performance data from a high swirl fan we were able to tease out from the test results a correlation between air performance and the ratio of the outlet area of the fan to the area of the test chamber. This correlation is well known, but the results appear correlated to fan to chamber area ratios at ratios much higher than had previously been accepted. Sound power data, of course, was strongly correlated to fan vibration. An interesting note is that the uncertainties published in the aforementioned standards do not take into account errors associated with fan outlet area or fan vibration.

The CFD portion of this work focuses on gaining insight into the above mentioned correlation between air performance and the ratio of the outlet area of the fan to the area of the test chamber.

A Practical Problem

- The discrepancy in measured performance, for the same tube-axial fan tested in nine different laboratories, was significant.
- Mark Stevens concluded that ISO 5801 and AMCA 210 should contain recommendations that high swirl fans be tested on an inlet chamber.
- If testing a high swirl fan on the inlet is not possible in all situations, increase the minimum area-ratio for outlet chamber tests to a much larger ratio than sixteen.
- An international consensus would have to be reached on what that ratio should be, because some labs will have difficulty adapting for space and / or financial reasons.

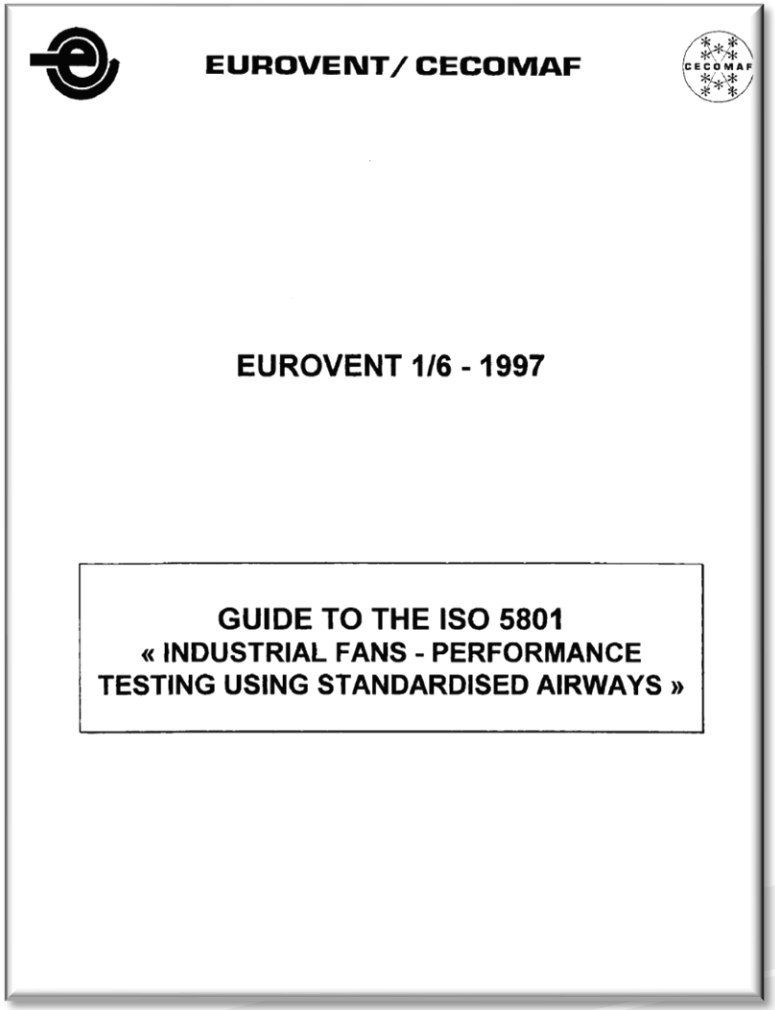


Tensions and Differences

- As ISO 5801 consolidated every test system allowed in a national standard, there are differences between the results obtained when testing the same fan in different test systems.
- Each nation has argued in the past that its test systems are the most accurate.
- In practice the differences are small enough that as an industry we can live with them.
- From a practical perspective, the test systems in each national standard developed to reflect the fans built, and therefore tested, in a particular country.
- Again from a practical perspective, AMCA will duel-certify a test system in accordance with AMCA 210 and ISO 5801, should that prove to be necessary.
- Attempts to resolve discrepancies between AMCA 210 and ISO 5801 are ongoing, and are likely to be for the foreseeable future.

Guidance Documents

- AMCA 210 is relatively easy to read, with figures defining each allowable test system.
- In contrast, ISO 5801 is less intuitive, and in comparison difficult for the newcomer to navigate.
- Eurovent have published a guidance document to assist those who wish to use ISO 5801.



APPLICABILITY TO INDUSTRY STAKEHOLDERS & THE PUBLIC

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How does this all apply to the Industry?

- Standards describe specific, best industry practices
  - In a sense, “self-regulation”
- Thorough & rigorous development processes
- When appropriate, standards should be referenced & utilized
- **Are you an SME? Get involved with standards development!**

  → Apply to committees at various organizations

How does this all apply to the Public?

- Many benefits:
  - Sets a minimum product/performance baseline
  - Provides traceability
  - Aggregates & simplifies messaging
  - Builds trust in industry products and/or performance
  - Etc.

- *Essentially, standards (and harmonization) are crucial for the HVAC industry as well as many other industries!*

How can I find out more?

- Additional resources
  - https://www.ashrae.org/technical-resources/standards-and-guidelines
  - https://www.ahrinet.org/standards
  - https://www.amca.org/publish/standards/

- Follow-up questions? → Reach Aaron at agunzner@amca.org

Q & A

Survey QR Code:

Thank you for your time!

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If you have any questions, please contact Lisa Cherney, Education Manager, at AMCA International *(lcherney@amca.org)*.


NEXT SESSION- Tomorrow @ 9:00AM:
Louvers 101 – Selection & Application