



## **MINUTES**

**DRAFT**

### **TECHNICAL COMMITTEE 5.1**

**2023 Winter Meeting**

**February 6<sup>th</sup>, 2023**

Note: These draft minutes have not been approved and not the official, approved record until approved by the Technical Committee.



# Fans

ASHRAE Technical Committee 5.1

## DRAFT TC/TG/MTG/TRG MINUTES COVER SHEET

TC/TG/MTG/TRG No. TC 5.1 April 14, 2023

TC/TG/MTG/TRG TITLE Fans

DATE OF MEETING February 6<sup>th</sup>, 2023 LOCATION Atlanta, GA

Attendees				
Name	Affiliation	Status	YEA	Notes & Subcommittee(s) of Interest
Mathson, Tim	AMCA	Voting	No	TC Chair
Dubensky, Harold	Johnson Controls	Voting	No	
Eldridge, Jay	Daikin Applied	Voting	No	
Osborn, Kim	Nortek Air Solutions	Voting	No	
Reynolds, Brian	Trane	Voting	No	Research S/C Chair
Stauter, Rich	Carrier	Voting	No	Program S/C Chair
Wagner, Greg	MPI	Voting	No	
Yeh, Jamie	AHRI	Voting	Yes	
Afshin, Mo	Q-Pac	CM	No	Would like to get more involved
Bissler, Robert	Morrison Products	CM	Yes	
Brooks, Joe	AMCA	CM	No	Standards S/C Chair
Chinoda, Patrick	Revcor	CM	No	Handbook S/C Chair
Cincotti, Franco	Comefri USA	CM	No	
Diaz, Brandon	Johnson Controls	CM	No	Webmaster
Fetting, Nathan	Greenheck	CM	No	
Fullerton, Brent	Loren Cook	CM	No	
Gebke, Kevin	DuctSox/Zoo	CM	No	
Hamamciogha, Sarp	AHRI	CM	Yes	
Kuntz, Ken	Greenheck	CM	No	
Lyda, Michael	Advanced Energy	CM	Yes	
Meredith, Dustin	Trane	CM	No	
Santini, Christopher	TCF	CM	Yes	
Theisen, Phil	Twin City Fan	CM	No	
Tinglof, Eric	Loren Cook	CM	No	
Valbracht, Bob	Loren Cook	CM	No	
VanderKooy, Mark	Greenheck	CM	Yes	Secretary
Wang, Gang	University of Miami	CM	No	

Attendees (Continued)				
Name	Affiliation	Status	YEA	Notes & Subcommittee(s) of Interest
Wang, Zhiping	MPI	CM	No	
Fiegen, Joe	Trane	PCM	No	
Gross, Greg	CPP Wind Engineering	PCM	No	
Nowak, David	AMCA	PCM	Yes	
Clark, Jordan	Ohio State	Guest	No	
Dommu, Jeremy	US DOE	Guest	No	
Dunbar, Nicky	NEEA	Guest	No	
Goray, Pranav	LBNL	Guest	No	
Gunzner, Aaron	AMCA	Guest	Yes	
Haurer, Armin	ebm-pabst	Guest	No	
Moshina, Nazme	CA IOUs	Guest	No	
Nomoto, Akihisa	UC Berkeley	Guest	Yes	
Shifflett, Ken	DistribAire	Guest	No	
Short, Frederick	Guidehouse	Guest	No	
Taber, Christian	BAF	Guest	No	
Watson, Troy	DOE	Guest	No	
Westphalen, Detlef	Guidehouse	Guest	No	

CM: Corresponding Member; PCM: Provisional Corresponding Member; MNQ: Member Non-Quorum.

<b>DISTRIBUTION: All Members of TC plus the following:</b>	
TAC Section Head:	<a href="mailto:SH5@ashrae.net">SH5@ashrae.net</a>
All Committee Liaisons, such as Research, Standards, Handbook, Staff, etc.	See ASHRAE email alias list for needed addresses.
Mike Vaughn, Manager Of Research & Technical Services	<a href="mailto:MORTS@ashrae.net">MORTS@ashrae.net</a>

Note: These draft minutes have not been approved and are not the official, approved record until approved by the TC.

## **ASHRAE TC 5.1 Fans**

### **Minutes of the In Person Meeting in Atlanta, GA**

**Monday February 6<sup>th</sup>, 2023**

#### **1. Call to Order at 2:30 pm ET**

Meeting was called to order at 2:30 pm ET.

#### **2. Roll Call**

##### TC 5.1 voting members:

Tim Mathson – Chair  
Harold Dubensky – Vice Chair  
Brian Reynolds – Research S/C Chair  
Dr. Rich Stauter – Program S/C Chair  
Kim Osborn  
Jay Eldridge  
Greg Wagner  
Jamie Yeh

##### Non-Voting S/C Chairs and Officers:

Mark VanderKooy – Secretary  
Joseph Brooks – Standards S/C Chair  
Z. Patrick Chinoda – Handbook S/C Chair  
Brandon Diaz - Webmaster

Eight out of 13 total voting members were present, and a quorum was established. All attendees were asked to report their attendance using the in-person sign-in sheet.

#### **3. Adoption of Agenda**

The draft agenda was posted to the TC 5.1 Basecamp prior to the meeting and distributed via email

The agenda was adopted by consensus.

#### **4. Approval of the Previous Meeting Minutes**

The last meeting of this committee was held on June 27<sup>th</sup>, 2022 in Toronto as a hybrid meeting. Draft meeting minutes were posted on TC 5.1 basecamp and website <http://tc0501.ashraetcs.org/>

**Motion 1:** To approve the minutes from the June 27<sup>th</sup>, 2022 meeting.

**Moved:** Kim Osborn

**Second:** Greg Wagner

**Motion passed unanimously.**

#### **5. Items of Business**

##### **5.1. ASHRAE Code of Ethics**

In this and all other ASHRAE meetings, the ASHRAE Code of Conduct requires us to act with honesty, fairness, courtesy, competence, integrity, and respect for others, and that “we shall avoid all real or perceived conflicts of interest whenever possible”. (See full Code of Ethics: <https://www.ashrae.org/about/governance/code-of-ethics>.)

## **5.2. Chair's Report – Tim Mathson**

### **5.2.1. TC Membership Report**

There are currently 13 voting members on TC 5.1. The TC has challenges achieving a balanced voting membership as many of the voting members are fan manufacturers, OEMs, or end users of fans. Current non-voting corresponding members interested in becoming a voting member should notify the chair of their interest in becoming a voting member. Provisional corresponding members who participate in TC meetings can be promoted to corresponding member status after two years of participation in the TC.

### **5.2.2. Other Items**

- The TC 5.1 main meeting will be scheduled after the TC 2.6 main meeting for future conferences as some TC 5.1 members also attend TC 2.6.

## **5.3. Liaison Reports**

Kevin Marple – Section 5 head:

- Updated FG MOP has been posted to basecamp. TC, TG, TRG are ASHRAE FGs. The FG MOP contains all information members need to know about how the TCs function.
- Membership changes will occur in July for 2023-2024 society year.
- TCs are required to fill out an activity form each year. This form is due after the winter meeting.
- ASHRAE is encouraging virtual meetings in between the annual and winter conferences. TCs should notify ASHRAE of virtual meetings so an announcement can be posted to the ASHRAE website.

Doug Scott – Research Liaison

- ASHRAE is back to normal funding for research projects, thus, it's a good time for new RTARs.
- ASHRAE's strategic plan should be considered when drafting new RTARs. Research topics should support ASHRAE's strategic plan and should be suitable for ASHRAE research rather than manufacturer research.

## **5.4. Old Business**

### **5.4.1. Follow-up on Mentoring Program for YEA Members**

- Limited interest has been expressed in this program by YEA members.

- YEA members interested in being paired with a veteran TC 5.1 member can contact the chair or Brent Fullerton.

## 5.5. Fan Regulatory Activities

Aaron Gunzner (AMCA) provided an update on fan regulatory issues:

- See attachment 1 for Aaron's slides.
- California Title 20 – CIBF takes effect November 16, 2023 (effective compliance date)
  - Regulation includes database (MAEDbS) filing requirements and name plating requirements.
  - Manufacturers must comply by effective date to sell regulated product into California.
  - CEC cannot accept data to the MAEDbS database at this time.
  - Fans must meet a minimum FEI of 1.00.
  - The regulatory language is available on CEC's docket: <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?doctetnumber=22-AAER-01>
- US Department of Energy (DoE)
  - Fan rulemaking remains in process as of this meeting.
  - A final determination of coverage for CIBF was released August 19, 2021: <https://www.federalregister.gov/documents/2021/08/19/2021-17715/energy-conservation-program-final-determination-of-fans-and-blowers-as-covered-equipment>
  - Anticipated future dates of regulatory interest:
    - February 2023 – Test procedure for fans and blowers; final action
    - October 2023 – Energy conservation standards for fans and blowers
    - Effective date of any regulation would be five years after publication.
    - June 2023 – Energy Conservation Standard for ceiling fans; NOPR
  - Test procedure for ceiling fans has been finalized.

## 5.6. Discussion on other Topics of Interest

Question was posed to the committee regarding return fans in air handlers and whether they could meet an FEI of 1.0. The chair asked the committee if any members were aware of fans designed specifically for this application. A contributing factor to these fans not being able to achieve an FEI of 1.00 are the size constraints with retrofit return fan applications.

## 6. Subcommittee Reports

### 6.1. Website Report – Brandon Diaz

- Meeting minutes and long-range planning documents were updated on the TC website.
- FAQs emailed to our TC are posted to the TC website.
- 257 website views total.
- Users spent the most time on the membership page of the website.

### 6.2. Standards Subcommittee – Joe Brooks

- An updated list of standards of interest was uploaded to Basecamp:

- Items of interest:
  - AMCA is starting the revision process for 210. TC members interested in joining the committee should reach out to Joe Brooks.
- UL standards will be added to the purview of the standards subcommittee

### 6.3. Handbook Subcommittee – Patrick Chinoda

- Fan terminology will be added to handbook. Terms have been collected and definitions have been gathered and written.
- **The Handbook Subcommittee Chair would like to thank and recognize the Handbook Terminology Working Group members for their efforts developing the Fan Terminology section of the handbook:**
  - **Nathan Shoemake**
  - **Zhiping Wang**
  - **Kim Osborn**
  - **Greg Sanchez**
  - **Joe Brooks**
  - **Tim Mathson**
  - **Jay Fizer**
  - **Z. Patrick Chinoda**
- Some of the proposed changes for this publication will not be complete in time and will be rolled into next publication.
- A completed draft of the chapter will be distributed to the TC prior to the summer meeting (likely by the end of March) with the goal of approving the chapter at the summer meeting so it can be submitted to ASHRAE in July.

**Action Item:** Add approval of chapter to summer meeting agenda.

### 6.4. Program Development Subcommittee – Rich Stauter

- Two seminars were submitted for the winter 2023 conference: Fan basics (partnering with AMCA), and a seminar on belt drive efficiency research project. Neither were accepted by ASHRAE.
- The seminar on belt drive efficiency will be resubmitted for the summer conference. Our TC will request TC 1.11, Motor and Controls to cosponsor and contribute a presentation on part load motor efficiency.
- Cosponsoring a seminar with TC 1.11; HVACR motor and control applications. Brandon Diaz will present for TC 5.1 on fan arrays and efficiency.
- Approximately half of seminar proposals for the winter 2023 conference were accepted.

### 6.5. Research Subcommittee – Brian Reynolds

- See attachment 2 for the research subcommittee report.
- A list of current research topic suggestions is posted to basecamp.
- ASHRAE is working on getting the research program back on track and expects steady funding for research projects in the future.

- RP 1769, Experimental Evaluation of the Efficiency of Belt Drives for Fans, was approved via TC letter ballot.
- Kevin will draft an RTAR proposing to investigate how effectively diffusers, destratification fans and LDCFs contribute to mixing in a space (e.g., mixing effectiveness compared with energy consumption).
- Ohio State has been awarded the research contract for project 1835, Characterizing the Performance of Entrained Flow Stacks.
- A potential research topic to investigate the impact of various versions of ASHRAE 90.1 on efficiency point of fan selections was discussed. AMCA may have data that could support this type of request. Additional clarification on this research topics is required.

#### **6.6. Long Range Planning Subcommittee – Tim Mathson**

- The long-range planning document posted to Basecamp was reaffirmed during the meeting:
- No items were suggested for addition to the long-range planning list.

#### **7. Time and Place of Next Meeting**

The next meeting will be held at the annual conference (June 2023) in Tampa Bay. S/C meetings will be Sunday afternoon and the main meeting will be hybrid and scheduled for Monday afternoon. A dinner social event will also be planned.

#### **8. Adjournment – The committee adjourned at 4:16 pm ET**



Attachment 1: Fan Regulatory Update

## TC 5.1 – Fan Regulatory Activities

Feb. 6, 2023

Aaron Gunzner, AMCA International

[www.amca.org](http://www.amca.org)

# California Title 20 – C&I Fans and Blowers

**November 16, 2023** – Effective/compliance date

Regulation parts:

[Definitions; scoping]

- 1) Database (MAEDbS) for compliance filing
- 2) Nameplating

# CA Title 20 – Compliance Filing

## Section 1606 Table X specifies compliance data

Appliance	Required Information	Permissible Answers
Commercial and Industrial Fans and Blowers manufactured after November 16, 2023	Fan type	Centrifugal housed, centrifugal inline, centrifugal unboxed, centrifugal PRV supply, centrifugal PRV exhaust, axial inline, axial PRV, inline mixed-flow, power roof/wall ventilators, axial panel, radial housed
	Fan impeller diameter (in.)	
	Type of Motor (if fans sold with a motor)	None, Single-phase induction, Polyphase induction, Synchronous DC (including ECM), Permanent magnet AC, or Other
	Motor nameplate horsepower (if fan sold with an induction motor) (hp)	

	Pressure type	S = Static pressure T = Total pressure
	Transmission type (if fan is sold with a transmission)	Direct, V-belt, synchronous-belt, flexible coupling, none
	Type of Controller (if fan sold with controller)	None, Variable frequency drive, or Other
	Maximum fan speed (RPM)	
	Airflow at maximum fan speed (CFM)	
	Pressure at maximum fan speed (inches water gauge)	
	FEP <sub>st</sub> at maximum fan speed (kW)	
	FEP <sub>tr</sub> at maximum fan speed (kW)	
	Maximum pressure (inches water gauge)	
	Airflow at maximum pressure (CFM)	
	Fan speed at maximum pressure (RPM)	
	FEP <sub>st</sub> at maximum pressure (kW)	
	FEP <sub>tr</sub> at maximum pressure (kW)	
	Maximum air flow (CFM)	
	Pressure at maximum airflow (inches water gauge)	

	Fan speed at maximum airflow (RPM)	
	FEP <sub>st</sub> at maximum airflow (kW)	
	FEP <sub>tr</sub> at maximum airflow (kW)	
	Is the model a Series tested fan?	Yes, No
	Associated Series Tested Fan Model Number (if not a series tested fan)	Fan product line and model, (Field is N/A if it is a Series tested fan)
	Method used to determine FEP <sub>st</sub> of test method in section 1604(d)(2), (ANSI/AMCA Standard 214-21)	Section 6.1, 6.2, 6.3, 6.4, or 6.5 of the test method in section 1604(d)(2), (ANSI/AMCA Standard 214-21)

# CA Title 20 – Nameplates

Required marking on all fans after compliance date (Nov. 16, 2023)

## Section 1607

(A) For Commercial and Industrial fans and blowers the label shall include the following information:

Fan Energy Index  $\geq 1.00$  Efficiency boundaries

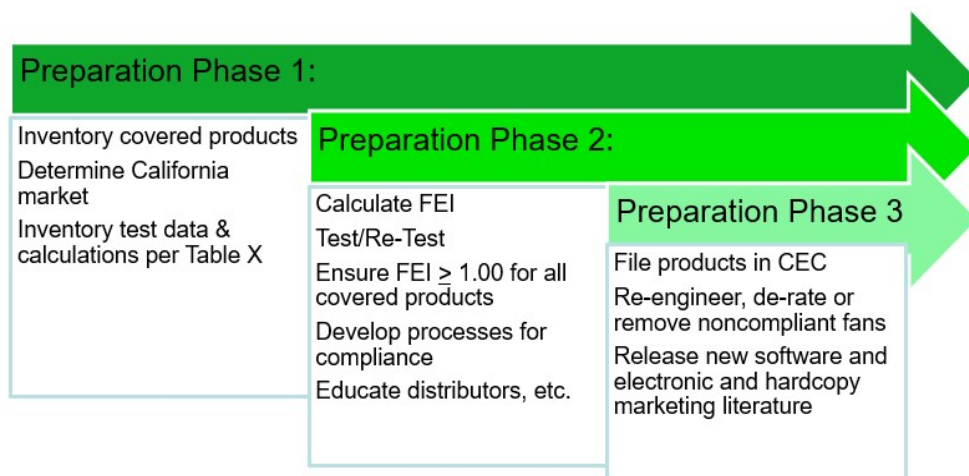
- a. maximum air flow (CFM);
- b. maximum fan speed (RPM);
- c. maximum pressure (inches water gauge); and
- d. type of pressure ("static" or "total").

NOTE: Operation outside of these boundaries will result in an energy inefficient operation.

# CA Title 20 – Manufacturers preparing for compliance date

**November 16, 2022**  
**1-year grace period begins**

**November 16, 2023**  
**CEC Compliance Deadline**



# U.S. Dept. of Energy – Fan Rulemaking History

- Several years in development
- **Remains in process as of today**
- Aug. 19, 2021: Final determination of coverage for commercial and industrial fans
- Definition of “fan or blower” (<https://bit.ly/2021-17715>):

*A rotary bladed machine used to convert electrical or mechanical power to air power, with an energy output limited to 25 kilojoule (kJ)/kilogram (kg) of air. It consists of an impeller, a shaft and bearings and/or driver to support the impeller, as well as a structure or housing. A fan or blower may include a transmission, driver, and/or motor controller.*



U.S. DEPARTMENT OF  
**ENERGY**

# Dept. of Energy – Agenda for Fans

## DOE Agency Rule List for Fall 2022 – [linked here](#)

Estimated dates and releases for upcoming rulemakings

- **Feb. 2023** – Test Procedure for Fans and Blowers; final action
  - Next stage after July 2022 NOPR
  - FEI is the metric?
  - AMCA 214-21 is referenced as test standard, but not all sections
  - Might cover circulating fans that are not ceiling fans, which is different from California
- **Oct. 2023** – Energy Conservation Standards for Fans and Blowers; NOPR
  - Would set a minimum FEI rating for fans
  - Also establishes compliance-filing and surveillance processes
  - Final rule takes effect 5 years after publication

# Dept. of Energy – Agenda for Ceiling Fans

## DOE Agency Rule List for Fall 2022 – [linked here](#)

Estimated dates and releases for upcoming rulemakings

- **June 2023** – Energy Conservation Standard for ceiling fans; NOPR
  - Proposed ELs
  - Standby power requirements
- Test Procedure is finalized
  - The final rule changes will be mandatory for product testing February 13, 2023.
  - Same date for compliance filing



# Summary

- California Title 20 - effective **November 16, 2023**
  - Be familiar with scope
  - Compliance filing leading up to effective date; MAEDbS listings
  - Updates to nameplates
- Department of Energy fan rulemakings – expected soon
  - C&I Fans test procedure final action likely Feb. 2023
  - C&I Fans energy standard NOPR likely Oct. 2023
  - LDCF energy standard NOPR likely June 2023
    - LDCF test procedure finalized

## Attachment 2: Research Subcommittee Report

### **TC 5.1 (Fans) Research Sub-Committee Report**

February 6, 2023 (Atlanta)

Notes from the Research Subcommittee Chair Meeting:

- Due to budget reductions, temporarily postponed several programs and delayed the submission of RFPs for approved work statements.
- We expect steady research funding for the foreseeable future.
- ASHRAE currently has 42 active research projects with an average cost of about \$150k for a total value of over \$6.2M
- Reminder that PMS meetings are open to the public. Invite Mike Vaughn and RL.

Research Liaison Report – Doug Scott

The TC 5.1 Research subcommittee meeting was held on February 5, 2023.

Tim Mathson and David Nowak, (AMCA) provided an update for RP 1769 (Experimental Evaluation of the Efficiency of Belt Drives for Fans)

The project has been completed and approved by TC letter ballot. Tim will submit the “Disposition of ASHRAE Sponsored Research Funds” form to MORTS.

- A program is tentatively scheduled for Tampa.

#### **WS & RTAR's**

TC 5.1 does not currently have and RTAR's or Work Statements in progress.

At the subcommittee meeting, Kevin Gebke agreed to prepare an RTAR “Efficient Room Air Mixing – AHU & Circulating Fans”.

Brian Reynolds, TC 5.1 Research Subcommittee Chair

February 6, 2023

## Attachment 2: Research Subcommittee Report

WS 1835 (Brad Cochran) - Characterizing the Performance of Entrained Flow Stacks from TC 9.1. TC 5.1 is co-sponsor. In the subcommittee meeting it was reported that a successful bidder has been selected (Ohio State). Tim Mathson is on the PMS.

- Mike Wolf suggested a possible Fan Research topic which was discussed at the subcommittee meeting.

“Market analysis regarding efficiency of fan specifications &/or sold before and after adoption of 90.1-2010, 2013, 2016, 2019, 2022...”

It was suggested that ComCheck could be another source for this data.

The subcommittee believes this data would have to come from AMCA or AHRI. BLR to check back with Mike.

### Are there any ideas, suggestions for Fan Research topics?

A call for Fan Research suggestions and RTAR authors went out before Toronto and Atlanta and also posted in Basecamp. Fan research topics need to be more suitable for ASHRAE research than for manufacturer research.

Here is a link to the complete list of MTG.HPAS (formally called MTG.EAS) ideas from 2012 and is publicly available at:

[https://urldefense.com/v3/\\_https://buildings.lbl.gov/publications/air-handling-system-modeling\\_!!LkoGuYl8\\_g!kYkZLB6HM-f3YNIUnn23Xo-w1cQmv90TKPekbYpALZkRQB6lqfwucOpyH0MDH94\\$](https://urldefense.com/v3/_https://buildings.lbl.gov/publications/air-handling-system-modeling_!!LkoGuYl8_g!kYkZLB6HM-f3YNIUnn23Xo-w1cQmv90TKPekbYpALZkRQB6lqfwucOpyH0MDH94$)

The MTG list could be a source for fan research ideas. Tim and I suggest that we could review the MTG list in the TC main meeting and at least cross off topics that are not of interest. Those remaining could be considered further. *Does the committee want to try that?*