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DRAFT

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No. 5.1 DATE 5 July 2017

TC/TG/MTG/TRG TITLE Fans

DATE OF MEETING 26 June 2017 LOCATION Long Beach, CA

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Franco Cincotti	7/01/16	Brian Reynolds	7/01/16	Adam Sterne
Armin Hauer	7/01/16	Zhiping Wang	7/01/16	Tim Mathson
Joseph Brooks	7/01/16	John Cermak	7/01/14	Brent Fullerton
Harold Dubensky	8/06/15	Chuck Coward	7/01/14	Michael Langton
Jay Eldridge	7/01/16	Tim Kuski	7/01/14	Asesh Raychaudhuri
Michael Feuser	7/01/16			Walter Mecozzi
Jay Fizer	7/01/16			Kim Osborn
Eric Tingloff	7/01/14			Kristin Sullivan
				Greg Meeuwsen
				Lauren Zelinski
				Zach Minear

DISTRIBUTION: ***All Members of TC/TG/MTG/TRG plus the following:***	
TAC Section Head:	SH5@ashrae.net Where x is the section number
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.)	David John davidjohntarpon@gmail.com Dr. Melikov,PhD akm@byg.dtu.dk James Bochat jim.bochat@cxconcepts.com James Arnold jarnold@live.com Folorentino Roson Rodriquez f.roson@supsercontrols.com.ar Michael Bilderbeck mbilderbeck@pickeringfirm.com

Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

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

Additional Attendance (cont's)

David Carroll
Sanaée Iyama
Chandra Gollapudi
Ken Kuntz
Mike Wolf
Ashish DeSai
David John
Paolo Tronville
Geoff Crosby
Lee Buddrus

Long Beach, CA | ASHRAE TC 5.1 Meeting
Convention Center Room
201A | Monday, 26 June 2017
4:15 PDT

Minutes

1. Call to Order – 4:19 pm

The meeting was called to order at 4:19 pm.

2. Roll Call

The following TC 5.1 voting members were present:

Franco Cincotti –Chair
Armin Hauer – Vice Chair
Joseph Brooks - Secretary
Harold Dubensky - Webmaster
Jay Eldridge
Michael Feuser
Jay Fizer (arrived late after all votes taken)
Eric Tingloff

The following TC 5.1 voting members were not present:

Brian Reynolds – Research S/C Chair
Zhiping Wang – Handbook S/C Chair
John Cermak
Chuck Coward
Tim Kuski

Non-Voting S/C Chairs (not present):

Rad Ganesh – Program S/C Chair
John Murphy – Standard S/C Chair

A quorum was present

3. Adoption of Agenda

The agenda was adopted by consensus.

4. Approval of the Minutes

The last meeting of this committee was held on 30 January, 2017 in Las Vegas, NV.

Motion TC 5.1 – 2017 – 02 Moved by: Armin Hauer
Seconded: Jay Eldridge

"Move to approve the minutes of the meeting held on 30 January 2017 as distributed."

Passed unanimously,
7-0-0, and 6-not present

5. Items of business

5.1 ASHRAE Code of Ethics

The attendees were reminded of the following excerpt of the ASHRAE Code of Ethics and encouraged to review the complete code: “In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests.” (See full Code of Ethics: https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics.)

5.2 TC 5.0 Section Head/Liaison Reports

The Section 5 section head was not present initially, but arrived later in the meeting and commented on these TAC items of interest:

- He expressed ASHRAE’s encouragement for conducting remote meetings. If the TC desired to do so, they would need to inform ASHRAE prior to October 1 for the Winter meeting.
- He reminded the chair to complete the activity report,
- Reminded those in attendance that the ASHRAE President would send thank you letters to any attendee,
- Seminar descriptions for the Winter meeting technical program are due 1 Aug 2017.

5.3 Chairman's report

The chair reported:

- RPM Remote Participation Meetings: 15 TCs have participated in Long Beach, 25% more than Las Vegas meeting. The requests must be made before October 2nd or sooner for the winter meeting and March for the annual meeting. TCs need to provide the reason why are requesting RPM meeting capabilities.
- Web subcommittee meetings are encouraged to eliminate potential conflicts during winter and annual ASHRAE meetings. Thus permitting to TC members that cannot travel to main meetings on a regular basis to contribute to the TC subcommittees.
- Technical bulletins can be approved, reviewed by RAC and then can be published on the TC website.

5.4 Old business

There was no old business.

6. Subcommittee reports

6.1 Standards subcommittee – John Murphy

John Murphy was not present. The only action reported was the status of an interpretation request made on ANSI/AMCA 210-16, ANSI /ASHRAE 51-16. The interpretation and request are attached.

6.1.1 ASHRAE 51/AMCA 210

It was reported that an interpretation on ASHRAE 51-16 was requested. The review committee met and developed a response that was included in the agenda, and attached herein.

The response was balloted by the committee with the following results:

11 – Yes,
1 – Yes with Comment
0 – No,
0 – Abstain, and
11 – Ballots not returned

The comment was, "This is a very complicated topic and someone needs to take a lead and address this issue to provide guidance to these applications and ways to calculate and quantify the performance. Maybe the next revision of AMCA 210 will consider this in more depth now that everyone is paying attention to the parallel fan configuration. We need to provide better guidance and reasonable options to the industry where ANSI/AMCA210/ASHRAE 51 falls short and I think this is one of those options. But there are many parallel configurations that I feel are not considered in either the AMCA or AHRI publications."

If the comment is considered editorial with no action required, the interpretation results will be forwarded to the requester. If is not considered an editorial comment, it would need to go back to the committee for resolution.

6.2 Handbook subcommittee – Zhiping Wang

Zhiping was not present and asked Joe Brooks to report on the activity of this subcommittee. The report is attached.

6.3 Research subcommittee – Brian Reynolds

Brian was not present and asked Franco Cincotti to report on the activity of this subcommittee:

On July 1st Section 5 will have a new Research Head: Dennis Loveday, which is a Professor of Building Physics at Loughborough University.

7 RTARs have been presented since the previous meeting: 1 Accepted – 3 Accepted with comments – 3 Rejected. It is very important for the author of the WS to address the comments made to the RTAR.

A. Work Statement (WS) 1769, Experimental Evaluation of the Efficiency of Belt Drives for Fans.

It was reported that a TC Letter Ballot approved WS #1769 with a vote of :

11 – yes,
0 – No,
0 – abstain, and
2 – didn't vote

B. RTAR 1829, Inlet and Outlet System Effects on Multiple Plenum Fans in a Parallel Arrangement (Fan Arrays) for Air and Sound Performance.

RAC approved this RTAR with comments. Authors will address the comments in the preparation of the WS. It is due 15 Oct 2017 (to Michael Vaughn copy David John) in order to be acted upon at the next RAC meeting.

C. Cosponsored RTAR with TC9.1 (Laboratory Systems), Characterizing the Performance of Entrained Flow Stacks.
The co-sponsorship was approved at the last meeting of this TC.

D. Cosponsoring of RTAR with TC2.4 (Particulate Air Contaminants and Particulate Contaminant Removal Equipment), Energy Implications of Air Filtration in Commercial Buildings - **Brent Stephens**

Brent Stephens discussed the research project that TC 2.4 would like to be approved and its effects and impact on fans.

Motion TC 5.1 – 2017 – 03 Moved by: Armin Hauer
Seconded: Eric Tingloff

"Move to co-sponsor RTAR #1626, 'Energy Implications of Air Filtration in Commercial Buildings,' with TC 2.4."

Passed unanimously,
7-0-0, and 6-not present

Jay Eldridge volunteered to assist with RTAR

6.4. Program subcommittee – Rad Ganesh
Rad was not present and the TC chair and the past Program Subcommittee chair commented on the activity of this subcommittee. It was suggested that the TC should consider a "panel" for future meetings. Committee will try to resubmit rejected seminar for this meeting. The past Program Subcommittee chair will assist. The suggested program would be chaired by Joe Brooks three speakers, Armin Hauer, Tim Mathson, and Dustin Meredith. Submission are due 1 Oct 2017 Asesh will request TC 5.9, co-sponsorship. Current title is, "Reduced fan power, just as you intended."

Rad Ganesh requested the committee to find an alternate subcommittee chair to take his place. Note: Walter Mecozzi volunteered for the position after the meeting

6.5 Efficiency Metric Working Group (for ASHRAE 90.1 MSC)
Tom Mathson provided a summary of yesterday's meeting. The chair thought that TC 5.1 should appoint a liaison with SSPC 90.1 MSC. Armin Hauer was appointed.

The group was currently organized as a working group. However, it was pointed out by some attendees at that meeting that the TC MOP does not recognize a "working group" therefore it was not possible to answer some questions regarding the number of votes it might take to pass a motion. The secretary will verify how ASHRAE would like to TC 5.1 to administer this group (via TAC).

7. Website Report – Harold Dubensky

Harold reported that all required documents were posted on the TC 5.1 website. He provided the usage data and it is attached (in pdf file).

8. New Business

8.1 Fan Law Deviation – Armin Hauer

Large differences between tested performance and predicted performance based on the fan laws were noted with a group of plenum fans. Armin presented results of several tests and the TC discussed possible reasons for the differences.

9. Time and Place of Next Meeting

The next meeting of this TC is scheduled during the Winter meeting of ASHRAE this January, 2018.

10. Adjournment

The meeting adjourned at 6:06 pm PDT.

Attachments:
1) ASHRAE 51/AMCA 210 Interpretation Request and Interpretation
2) Handbook subcommittee report
3) Website report

Interpretation 210-2016-1

ANSI/AMCA 210-16 and ANSI/ASHRAE 51-16 Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Ratings

Requested by: Armin Hauer (armin.hauer@us.ebmpapst.com), ebm-papst Inc., 110 Hyde Road, Farmington, CT 06034

Reference: This request for interpretation refers to the requirements presented in AMCA 210-16 and ASHRAE Standard 51-2016, Sections 1, 4.4.3.2, 5.3.1, 5.3.2, and 7.7 (See attached Table).

Background: How are arrays of parallel operating fans represented in Standard 51 [AMCA 210]

Interpretation: Testing of fan arrays according to AMCA 210-2016 is limited as follows:

1. By the minimal cross sectional areas of the inlet chamber and outlet chamber respectively.
2. If VFDs are used then each fan motor requires a separate VFD.
3. Differing patterns of parallel-arranged fans require separate tests.
4. Differing quantities of parallel-arranged fans require separate tests.

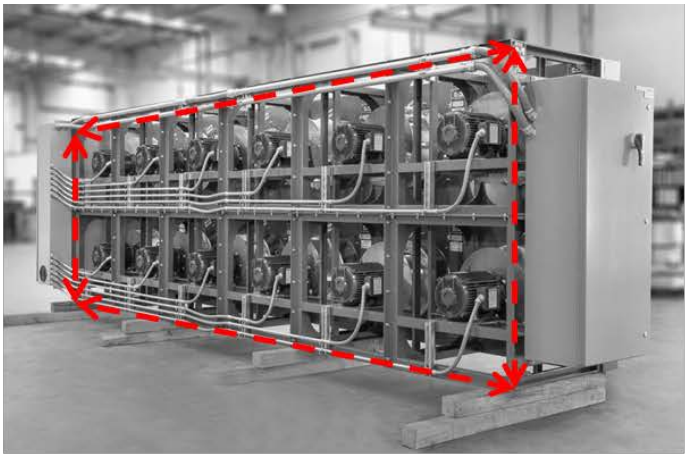
Question: Is this Interpretation correct?

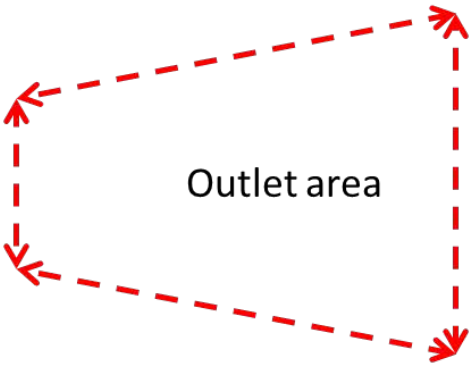
Answer: This request assumes that a fan array system is within the scope of AMCA 210 but it is not specifically included. Procedures of AMCA 210 could be used to determine the aerodynamic performance of a fan array system, however other standards (for example AHRI 430-14 (with Addendum 1)) should be used to address specific issues, including those raised by this requestor.

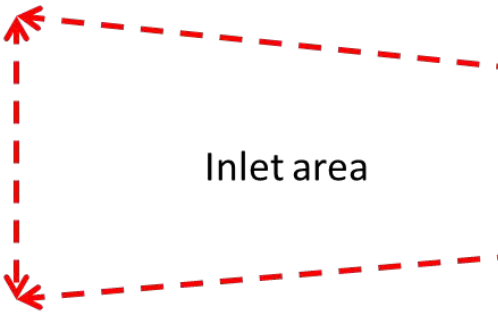
Comments: None

Reference attachment: Table submitted as part of requested interpretation

Standard extracts	Issue detail	Overall interpretation
1. Purpose and Scope This standard establishes uniform test methods for a laboratory test of a fan or other air moving device to determine its aerodynamic performance in terms of airflow rate, pressure developed, power consumption, air density, speed of rotation, and efficiency for rating or guarantee purposes.	An array of parallel operating fans is an air moving device. Therefore, fan arrays are principally in the scope of Ashrae 51.	Testing of fan arrays according to AMCA 210-2016 is limited as follows: 1. By the minimal cross sectional areas of the inlet chamber and outlet chamber respectively. 2. If VFDs are used then each fan motor requires a separate VFD. 3. Differing patterns of parallel-arranged fans require separate tests. 4. Differing quantities of parallel-arranged fans require separate tests.
4.4.3.2 Calibrated motors controlled by a variable frequency drive (VFD) Instead of calibrating the motor alone, as would be done if the motor was fed directly from the mains, the motor and variable frequency drive shall be calibrated as an assembly, using the same VFD and settings during the fan test as during the motor calibration, with input power measured upstream of the VFD. However, if the same VFD cannot be used during the fan test as during the motor calibration, the output of the VFD shall be filtered by a sinusoidal filter and the electric meter shall be placed between the sinusoidal filter and the motor.	This section of the standard is written strictly for a singular motor and a singular VFD.	
5.3.2 Inlet chamber An inlet chamber (Figure 13, 14 or 15) shall have a cross sectional area at least five times the fan inlet area.	An array of parallel operating fans mandates an inlet chamber cross sectional area of 16 times the fan array cross sectional area. (Attached illustration)	
7.7 Fan input power at test conditions	This section of the standard is written strictly for a singular motor and associated test apparatus.	
Miscellaneous: Extrapolation to multiple fans	The standard does not cover extrapolation to another number of fans than the measured number.	
Miscellaneous: Different relative arrangements / different form factors	The standard does not accommodate differences of relative arrangement of fans. Example 2x6 ≠ 3x4	







5.3.1 Outlet chamber
An outlet chamber (Figure 11 or 12) shall have a cross sectional area at least … sixteen times the area of the fan outlet … fan with axis of rotation parallel to the discharge airflow.

5.3.2 Inlet chamber
An inlet chamber (Figure 13, 14 or 15 have a cross sectional area at least fi the fan inlet area.

TC 5.1 Handbook Subcommittee Notes (06/25/2017)

By Zhiping Wang

- According to the ASHRAE publication schedule, our revised and TC approved Fan chapter for the 2020 ASHRAE Handbook volume will be due around May 2019. We have about 2 years to get it done from now.
- ASHRAE is still promoting the use of the ASHRAE Authoring Portal (authoring.ashrae.org) which is a new, officially approved collaborative authoring tool for developing Handbook content. But it has some technical issues right now. Our TC will not use the portal until it's actually working.
- The new ASHRAE Technology Portal was briefly reviewed. It hosts ASHRAE Journal articles and ASHRAE research reports along with ASHRAE transaction and conference papers and ASHRAE conference seminars. ASHRAE members have free access to download PDFs of ASHRAE Journal articles and research reports. Other content is available to members and nonmembers by subscription.
- Two outside reviewers' comments and suggestions about our chapter were partially reviewed and discussed. We will continue to review and discuss those comments in our upcoming handbook subcommittee meetings.
- As we were reviewing the Selection section, it was decided to revamp the Selection section. A small group of members (Craig Wray, Greg Wagner, Tim Mathson, and Kim Osborn) volunteered to review and revise this section. They agreed to have it complete before our next ASHRAE meeting.
- Because of many comments we received on Table 1, it was agreed to spend more time to update Table 1. A few good ideas were suggested and captured.
- As always, we are open for ideas, suggestions, and Handbook Online stuff.

List of Potential Topics for 2020 Version of the Fan Chapter

- **Fan Efficiency – New section to define and discuss total efficiency vs. static efficiency**
  - **Examples of proper fan selection to save energy**
  - **Fan Selection (Total pressure based vs. Static pressure based)**

  Actions: Wait after DOE publishes the new regulation on fans?
- **Fan Drive System – Direct Drive vs. Belt Drive, VFD, VSD, etc.**
  Actions: 05/23/14 – Greg S., Chuck, and Zhiping will draft up the content. Craig suggested Chpt.18 (9th ed.) of Fan Engineering covers information about motors and drives. AMCA 203 also has good information. AMCA 207 maybe, too.
- **Fan Part Load?**

Actions: 05/23/14 – Good topic but Committee decided to put it on the parking lots for now. Maybe for next revision cycle after we collect enough information.

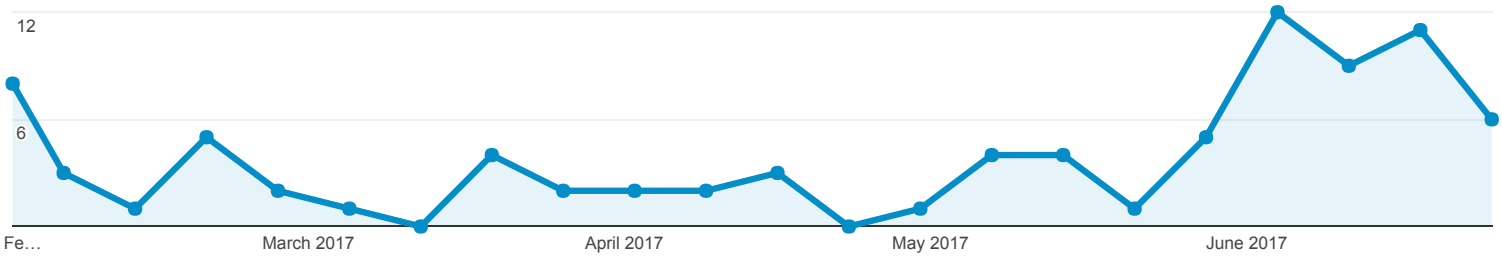
- **Airflow measurement by means of instrumented fan inlet rings (Armin Hauer)**
  Actions: 03/21/16 – Armin submitted the material after AMCA published the Publication 600-06. We now need to create the right content/format for the chapter.
- **Fan Stall (Greg Sanchez wrote some content during our last revision cycle and will investigate further)?**
  Actions: 05/23/14 - Greg will send out information before the Seattle meeting for the committee members to review.
  06/29/14 - Greg Sanchez will have the information ready by mid. July. 01/25/15 – No content yet. Will push back for next revision cycle.
- **Fan Noise (Greg S., predicting fan noise – AMCA 301, or aerodynamic noise?)**
  Actions: 05/23/14 - Good topic. Committed decided to put it on the parking lots for now. Maybe for next revision cycle. Reference Bill Cory's book and the Fan Engineering.
- **Fan Law Applications and System Curves** – Craig Wray already sent the revised content last year. Need to review the content.
- **Handbook Online** - Some ideas came out from our last HB meeting.
  - 3D models of different types of fans and interactive performance curves within Table 1;
  - Interactive curves to demonstrate the fan laws;
  - Interactive contents to show the stall/surge;

All Users
100.00% Sessions

Jan 31, 2017 - Jun 25, 2017

Overview

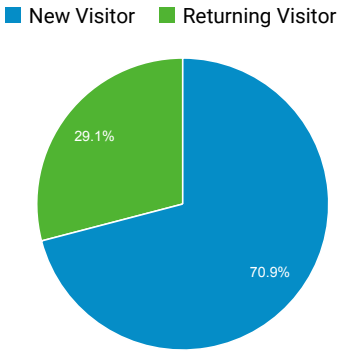
Sessions



Sessions	Users	Pageviews
86	63	156

Pages / Session	Avg. Session Duration	Bounce Rate
1.81	00:01:35	63.95%

% New Sessions
70.93%



	Country	Sessions	% Sessions
1.	United States	65	75.58%
2.	Chile	3	3.49%
3.	Germany	3	3.49%
4.	India	3	3.49%
5.	Brazil	2	2.33%
6.	United Kingdom	2	2.33%
7.	Mauritius	2	2.33%
8.	China	1	1.16%
9.	Spain	1	1.16%
10.	Hong Kong	1	1.16%