

**AMERICAN SOCIETY OF HEATING, REFRIGERATING AND
AIR-CONDITIONING ENGINEERS, INC.**

**1791 Tullie Circle, N.E.
Atlanta, GA 30329
404-636-8400**

TC MINUTES COVER SHEET

TC/TG/TRG NO _____ TC 5.2 _____ DATE _____ September 10, 2013 _____

TC/TG/TRG TITLE _____ Duct Design _____

DATE OF MEETING _____ June 25, 2013 _____ LOCATION _____ Denver, CO _____

MEMBERS PRESENT	TERM TO	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Mark Terzigni	6/30/13	Johnny Andersson		Herman Behls (CM)
Larry Smith	6/30/15			Tim Eorgan (CM)
Bob Reid	6/30/14			Kevin Gebke (CM)
Mark Smith	6/30/16			Vikram Murthy (CM)
Pat Brooks	6/30/13			Robert Hassler (CM)
John Hamilton	6/30/13			Bill Stout (CM)
Chris Van Rite	6/30/13			Craig Wray (CM)
Wes Davis	6/30/16			Bruce Meyer (CM)
Ralph Koerber	6/30/16			Mark Modera (CM)
Steve Idem	6/30/16			Ed Koop (Guest, Ruskin) TC5.6 Liaison
Gary Miller	6/30/16			Scott Hobbs (Guest, McGill Airflow)
				Cindy Bittel (Guest, RCXBD)
				Joshua Kading (Guest, TAMU REEL)
				Emir Sirbubalo (Guest)
				Joe Brooks (Guest, AMCA)
				John Crosby
				Zhiping Wang (Guest, Morrison Products)
				Zach Minear (Guest, Morrison Products)
				Eric Emblem (Guest, ICEEP)
				John Sofra (Guest, Kinetics Noise)

DISTRIBUTION

All Members of TC plus the following:

TAC Section Head	Ken Peet
TAC Chair	William McQuade
2013 Handbook Liaison (Fundamentals)	James Aswegan
2016 Handbook Liaison (Systems)	Annette Dwyer
RAC Liaison	Piotr Domanski
Standards Liaison	Rick Larson
Special Pubs	Francis Mills
ALI/PDC	Donald Brandt
Chapter Tech Transfer	Robert Laneve
Manager of Research & Technical Services	Mike Vaughn

**AMERICAN SOCIETY OF HEATING, REFRIGERATION AND
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**1791 Tullie Circle, N.E.
Atlanta, GA 30329**

**ASHRAE Annual Conference, Denver, CO
TC 5.2 Duct Design**

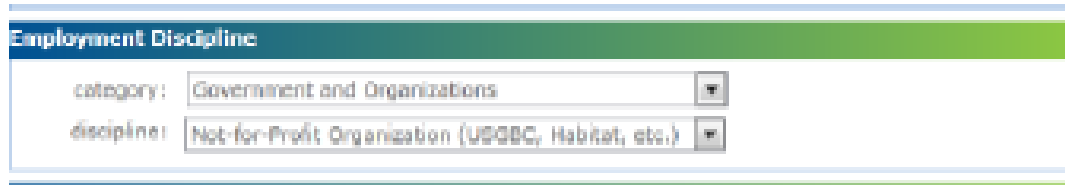
**Tuesday, June 25, 2013
Time: 3:30-6:00 PM**

**Location: Century, Tower Building (Mezzanine Level)
(Denver Sheraton)**

- 1) **Call to order:** Chairman Mark Terzigni called the meeting to order at 3:30 PM
- 2) **Introductions and Attendance**
 - i. Voting Members Present: Mark Terzigni, Larry Smith, Bob Reid, Chris Van Rite, John Hamilton, Pat Brooks, Mark Smith, Wes Davis, Ralph Koerber, Steve Idem, Gary Miller
 - ii. Voting Members Not Present: Johnny Andersson (non-quorum)
 - iii. Corresponding Members: see cover sheet for attendees
 - iv. Provisional Corresponding Members: see cover sheet for attendees
 - v. Guests: see cover sheet for attendees
 - vi. There is a quorum for the meeting (11 of 12 voting members present).
- 3) **Dallas (January 2013) Meeting Minutes**
 - i. Approval vote postponed to allow time for review.
 - ii. Minutes from the Dallas meeting were approved (8-0-4) by e-mail vote ending 7/8/2013.
- 4) **Awards** (Idem) -- none
- 5) **Section Head Report** (Terzigni)
 - i. Ken Peet is Section 5 head for 2013/2014.
 - ii. A new input field titled Employment Discipline has been added to ASHRAE online member (BIO)graphical input form and **TAC would like ALL TC members to self-declare their employment discipline prior to the start of the new Society year on July 1, 2013** by going to the members only section.
(<https://eweb.ashrae.org/eweb/DynamicPage.aspx?Site=ASHRAE&WEBKEY=8396a37a-9fc2-4f50-9332-5eebebe73494>) and enter their employment discipline information. The link should take you directly to the screen, which is located under demographics.

You will need your login and password to enter. Employment Discipline is located in the third section.

○



The screenshot shows a web form titled "Employment Discipline". It has two dropdown menus. The first is labeled "category:" and is set to "Government and Organizations". The second is labeled "discipline:" and is set to "Not-for-Profit Organization (USOBC, Habitat, etc.)".

Once you have made the necessary updates, save the changes and logout.

6) **Subcommittee Reports**

i. Handbook (Gebke)

- a. 2013 Handbook—Fundamentals, Chapter 21 (Duct Design). The HOF was published May 2013. Exhibit 1 documents the voting history for the changes to Chapter 21.
- b. 2012 Handbook—HVAC Systems & Equipment. The 2012 Handbook was published May 2012. No action. Next review will start in 2015 for the 2016 Handbook.

ii. Membership (Terzigni)

- a. New Voting Members are Herman Behls, Bill Stout, Craig Wray, and Kevin Gebke, Vikram Murthy (Non Quorum),
- b. Larry Smith is the incoming chair.
- c. Robert Reid is the incoming vice chair.
- d. Tim Eorgan will be the incoming secretary.
- e. Mark Smith will be the Membership Chair. One of the responsibilities will be putting together a program to educate new members about the TC and ASHRAE.
- f. The position of "Provisional Corresponding Member" (PCM) is a 2-year term after which the person will either move to "Corresponding Member" through participation in the work of the committee or roll off.

iii. Programs (Idem)

- a. The 2nd place CFD Shootout paper (CFD analysis of pressure losses in flat-oval duct fittings) is being presented Wednesday by Dr. Emir Sirbubalo from Sarajevo, Bosnia.
- b. Deadline for the January 2014 (New York) programs is 8/12/13.
 - Steve Idem will reapply for a seminar on Air Dispersion Systems for New York. Tentative speakers are Kevin Gebke, Gerry Iacouzze and Bob Reid.
 - Documentation will be submitted for the following seminar: "Matching Fan Selections with System Requirements." Recommended speakers are Gerry Iacouzze, Tim Kuski (Greenheck) and Tim Mathson (Greenheck).
- c. Deadline for the June 2014 (Seattle) conference papers, abstracts and technical papers is 9/23/13.

iv. Special Publications

- a. ASHRAE Duct Fitting Database (DFDB) -- (Behls)

- a1. No changes since Version 6.00.01. RP-1606 loss coefficient equations/tables need to be added.
- a2. We are looking for fittings that should be added to the database. We need to talk with plasma table companies and check their fitting libraries against the DFDB.
- a4. Kevin Gebke has volunteered to look into who is responsible for the DFDB app. TC 5.2 has not been involved.
- b. Duct Design Guide (Brooks/Behls)
 - b1. Subcommittee meeting was held Monday and progress reviewed (see Exhibit 2).
 - b2. We hope to have a chapter on specifications in the Duct Design Guide.
 - b3. We need reviews by practicing engineers.
 - b4. All comments to date have been addressed.

v. Research (Behls)

- a. RP 1606 – Lab Testing of Flat Oval Transitions (University of Illinois)
 - a1. The final report has been completed and submitted.
 - a2. Comments have been conveyed verbally. Contractually everything is there. Details will be handled in comments conveyed.
 - a3. We want to acknowledge the following suppliers who donated flat oval duct for this project: SPIDA, Eastern Sheet Metal (Bill Stout Jr.), Hamlin Sheet Metal (Bill Stallings III), Spiral Pipe of Texas (Reid Boydston), SEMCO (Phil Rivas/Josh Crichton), Northeastern Sheet Metal (Bill Busch)
- b. RP 1493-CFD Shootout
 - b1. This project is completed
 - b2. Four papers from this project have been submitted. Three have been published, and the fourth will be presented Wednesday. The title and authors are as follows:
 - **1st Place:** “A procedure for predicting pressure loss coefficients of duct fittings using computational fluid dynamics” by Wei Liu, Zhengwei Long, and Qingyan Chen. HVAC&R Research, 18(6): 1168-1181.
 - **2nd Place:** “CFD analysis of pressure losses in flat-oval duct fittings” by Emir Sirbubalo (Sarajevo, Bosnia), Haris Lulic, and Milovan Gutovic – (DE-13-030).
 - **3rd Place:** “Prediction of duct fitting losses using computational fluid dynamics” by Andy Manning, John Wilson, Nate Hanlon and Travis Mikjaniec. HVAC&R Research, 19:4, 400-411.
 - “Computational fluid dynamics to predict duct fitting losses: Challenges and opportunities” by Ahmad Sleiti, John Zhai and S. Idem. HVAC&R Research, 19:1, 2-4.
- c. RP 1682-“CFD Study to Identify CFD Models to Determine HVAC Duct Fitting Loss Coefficients” (Behls/Idem)
 - c1. TC Vote: 12-0-0 April 8, 2013, Reaffirmed (Rev.7) 12-0-0 August 14, 2013
 - c2. The Work Statement has been approved by RAC for bid.
 - c3. EXECUTIVE SUMMARY

This project is intended primarily to 'push the envelope' of CFD methods related to HVAC duct analysis. This is a follow-on study based on the recommendation of RP-1493 "CFD Shootout Contest – Prediction of Duct Fitting Losses." The goal of this project is to capitalize on the partial success of the CFD shootout contest by systematically identifying existing CFD methods that can be used to generate loss coefficients for individual duct fittings, analyze close-coupled fittings in duct systems, and verify these predictions by comparing to experimental data. An important aspect of this project is that detailed pressure loss measurements is to be performed in the laboratory on individual elbows and close-coupled elbows in order to assist with the development of the CFD models, and to corroborate the numerical predictions.

- c4. The PES is Bass Abushakra, Herman Behls, Kevin Gebke, Larry Smith, and Craig Wray.
- d. Future work statements. The following have been generated by MTG.EAS:
 - d1. WS #1: Air Terminal Unit leakage tests (Behls/Wray).
 - d2. WS #2: Cost analysis to justify system air leakage testing during construction (Behls/Boldt)
 - d3. WS #3: Cost analysis to justify air leakage testing of operating systems (Behls/Boldt/Wray)
 - d4. WS #4: Hot water coil casing air leakage tests (Behls)
- vi. Standards
 - a. SPC 120-2008R (Gebke) -- Standard approved for public review.
 - b. SPC 126-2008R (Gebke)
 - b1. The title changed from "Method of Testing HVAC Air Ducts and Fittings" to "Method of Testing HVAC Air Ducts" was approved by the SPC.
 - b2. The TPS was sent to the Standards Committee for approval.
 - c. 90.1 (Behls/Wray) -- the revision proposed by TC5.2 at the 2012 Annual Meeting (San Antonio) on HVAC System Air Leakage will remain on hold until the TC gets the green light from the Board of Directors (Bill Bahnfleth, President) and the Manager of Standards (Stephanie Reiniche).
- 7) **Website** (Mark Smith) --- Website is up-to-date.
- 8) **MTG.EAS - Energy Efficient Air-Handling Systems for Non-Residential Buildings (Behls/Wray)**
 - i. The MTG is a strategic collaborative body, whose mission is to coordinate research, handbook, program, and standards activities of various technical groups and organizations to facilitate the development of packages of tools, technology, and guidelines related to the design, operation, and retrofit of energy-efficient air-handling systems in new and existing non-residential buildings.
 - ii. Three conference call meetings were held June 14, 2012, December 5, 2012 and May 23, 2013.
 - iii. Mark Terzigni represents TC 5.2 and Larry Smith is an alternate. Bob Reid represents SPIDA.

- iv. To date we received 40 ideas from voting and alternate members.
- v. The link to the MTG is: <https://www.ashrae.org/standards-research--technology/technical-committees/section-mtg-multidisciplinary-task-groups/mtg-eas-energy-efficient-air-handling-systems-for-non-residential-buildings>

9) **Deadlines**

- i. January 2014 New York seminar and forum proposals -- 8/12/13
- ii. June 2014 Seattle deadlines -- 9/23/13

10) **Unfinished Business** -- none

11) **New Business**

- i. Mark Terzigni was presented with a Certificate of Appreciation for his service as Chair of TC 5.2.
- ii. Larry Smith discussed the Monday morning planning meeting for future projects and direction of TC 5.2.
- iii. Craig Wray discussed the need to start a mentoring program for new TC members and participants.

12) **Action Items**

TC 5.2 (Duct Design) Action Items			
Number	Description	Assigned to	Status
1	Investigate DFDB App (Staff Contact Person, who maintains, etc,)	Kevin Gebke	Active
2	Distribute TC 5.2 Vision Statement	Larry Smith	Active
3	Comparison of DFDB fittings vs. plaza machine libraries	Larry Smith, Mark Terzigni	Active
4	Submit "Air Diffusion System" seminar documentation for New York.	Steve Idem	Completed
5	Submit "Matching Fan Selections with System requirements" seminar documentation for New York.	Steve Idem	Completed

13) **Adjournment**

- Bob Reid made a motion to adjourn. The motion, seconded by Wes Davis, passed by acclamation.

**Next Meeting – 2014 ASHRAE Winter Conference (New York)
January 19 - 22**

Exhibit 1
2013 Handbook, Chapter 21 (Duct Design) – Vote Results

1: Yes															
0: No															
		Leakage													
Name	Comment														
	1	2	3	4	5	5 Rev 1	6	7	8	9	10	11	11 Rev. 1	12 Rev 1	13
Terzigni															
L. Smith	1	1	1	1	1	1	1	1	1	1	1		1	1	
Reid	1	1	1	1	0	1	1	1	1	1	1		1	1	
Idem	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Andersson	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
M. Smith													1	1	
Brooks	1	1	1	1	1	1	1	1	1	1	1		1	1	
Davis															
Hamilton	1		1	1	1	1	1	1		1	1	0			
Koerber	1	1	1	1	1	1	1	1	1	1	1		1	0	
Miller	1	1	1	1	1	1	1	1	1	1	1		1	1	
VanRite	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	9	8	9	9	8	9	9	9	8	9	9	3	9	8	
	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	NA	Pass	Pass	Editorial
Corresponding Members Commenting															
		Wray	Boldt			Boldt			Boldt				Boldt		

Exhibit 2 Duct Design Guide Progress Report

Chapter	Title	Rev	Sub-Sections	Draft to PJB	Reviewed by PJB	Comments Incorporated	To WEB Site
	Table of Contents	26					Rev 25 (4/23/13)
	Foreword						
1	Introduction			To be prepared by Herman Behls			
2	Sectioning a Duct System for Design and Duct Design Considerations	2		4/21/12 (also sent to Bob Reid)	4/22/12	4/23/12	4/24/12
		7		11/12/12	11/12/12	11/12/12	11/12/12
		9		2/12/13	2/15/13	2/15/13	2/17/13
		10		Updated to match 2013 Handbook 4/18/13			
3	Equipment Room Locations and Fan Room/Duct Layout	2		4/15/12	4/16/12	4/17/12	2/1/13
		3		2/10/13 Int-Hout & Boldt Comments Outstanding			2/12/13
		4		Boldt comments outstanding			2/13/13
		5		Updated to match 2013 Handbook 4/18/13: To Int-Hout & PJB			
4 (OPEN)	Sectioning a Duct System for Design (Move to Chapter 2)	1		1/14/12	1/16/12	Yes	1/17/12 ***** Removed

Chapter	Title	Rev	Sub-Sections	Draft to PJB	Reviewed by PJB	Comments Incorporated	To WEB Site
							2/1/12
5	Duct Design Methods	3		1/3/12	1/5/12	Yes	7/2/12
6	Duct Design – Equal Friction	1		1/3/12; Notes 1&3	1/5/12	Yes	7/2/12
7	Duct Design – Static Regain	1		1/3/12; Note 2	1/5/12	Yes	7/2/12
8	Duct Design – Local Exhaust Systems (Constant Velocity)	2		1/10/12	1/12/12	Yes (To G.Knutson 2/2/12; TC 5.8 2/12/12)	7/2/12
9	Air Dispersion Systems	2		<ul style="list-style-type: none"> • Rev 1 sent to K. Gebke 2/15/12 • Reminder sent to Kevin 5/31/12 • Rev 1 received 7/9/12 ***** • Rev 2 sent to K. Gebke 9/1/12 • Received responses to some comment, but not all Rev 3 sent to K. Gebke 9/11/12 Reviewed chapter 10/18/12 with Kevin Gebke at UL 	• Rev 2 comments from PJB 9/4/12	Rev 2 - Yes	
Not Assigned	Residential Duct Design (Remove this 1/12chapter from DDG)	1		.Draft to PJB 10/6/12 for acceptance as a Chapter Iain Walker's			

Chapter	Title	Rev	Sub-Sections	Draft to PJB	Reviewed by PJB	Comments Incorporated	To WEB Site
				leakage & insulation comments picked up To Wes Davis 10/11/12 for review Dallas (1/13): Delete this chapter from DDG			
10	Fan Selection	1		1/26/12	1/31/12	Yes: (To Craig Wray & John Murphy 2/3/12)	7/2/12
11	Acoustical Analysis of Duct Systems	1		4/1/12	4/6/12	4/8/12	4/10/12
		2			11/12/12	11/12/12	11/12/12
12	HVAC System Air Leakage	0		2/16/13 To CPW 2/16/13	2/18/13	2/18/13	a
		2		2/20/13	2/20/13		2/20/13
				Appendix (Surface Area)_ 2/20/13			
13	HVAC System Commissioning	1		1/26/12	1/29/12		1/31/12
		2		Iacouzze Comments	Yes	Yes	7/2/12
		3		Gary Miller Comments 2/1/13			
		4		4/21/13	4/22/13	Yes	4/23/13, including EXCEL Program

Chapter	Title	Rev	Sub-Sections	Draft to PJB	Reviewed by PJB	Comments Incorporated	To WEB Site
14	Master Specification for HVAC System Leakage			Assigned to Larry Smith 1/26/12 Michael King (ARCOM Master Systems) agreed to write 1/12			
Appendix A	Fundamentals	1		11/30/11	12/12/11	Yes	1/11/12
		2		Idem Comments	6/28/12	Yes	7/2/12
Appendix B	Design Tools	1		12/20/11 Comments for Tim Eorgan 7/24/12	1/2/12	Yes	7/2/12
		4		Tables 1 and B-3 (SI) Updated			2/13/13
Appendix C	Supplement to Chapter 8	0		1/10/12	1/12/12	Yes	7/2/12
Appendix D	Supplement for Chapter 11	1		4/1/12	4/6/12	4/8/12	4/10/12
		2			11/12/12	11/12/12	11/12/12
Appendix E	Specialty Topics		1. Materials 2. Duct Sizes 3. Controls, Static Pressure 3. Computer Programs - Elite	1. Materials: Reid 2. Std Sizes: Behls 3. Behls/Elite			
Appendix F-- CD	EXCEL Files		Master Spreadsheets: 1. Equal Friction 2. Static Regain 3. Constant				

Chapter	Title	Rev	Sub-Sections	Draft to PJB	Reviewed by PJB	Comments Incorporated	To WEB Site
			Velocity				
			Psychrometrics	H, Behls			
	Index						

Committee:

Pat Brooks, Chair
Herman Behls
Richard Evans
Kevin Gebke
Bob Reid

Reviewers:

TC members
Jeff Boldt

Guest Reviewer:

Stephen Wiggins
John Reints
Bob Chittenden, J.A.R. Engineering, Inc.

DFDB, V6.0.1 sent PJB 2/25/12.

Note 1: I-P equal friction sent to Robert Walton 3/2/12.

Note 2: I-P static regain sent to Scott Hobbs 3/2/12.

Note 3: I-P equal friction (flat oval/rectangular) sent to Dennis Flores 3/2/12. **Received May 23, 2012.**