

**AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING
ENGINEERS, INC.
1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400**

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 7 July 2014

TC/TG/MTG/TRG TITLE Fans
DATE OF MEETING 1 July 2014 LOCATION WSSC Rm. 607

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Mike Brendel	7/1/2012	Rad Ganesh	7/1/2011	Chuck Coward
Joe Brooks	7/1/2010	John Murphy	7/1/2012	Harold Dubensky
Franco Cincotti	7/1/2012	David Rasmussen	7/1/2012	Jay Eldridge
Brent Fullerton	7/1/2010	Greg Sanchez	7/1/2012	Jay Fizer
Tim Mathson	7/1/2010			George Gamble
Kim Osborn	7/1/2010			Armin Hauer
Asesh Raychaudhuri	7/1/2012			Larry Hopkins
Brian Reynolds	7/1/2013			Steve Idem
Greg Wagner	7/1/2012			(continued on next page)

DISTRIBUTION

<i>All Members of TC/TG/MTG/TRG plus the following:</i>	
TAC Section Head:	<u>Mr. Ken Peet</u>
TAC Chair:	<u>Dr. Eric W Adams</u>
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters:	<u>Dr. Darrin W. Nutter, Mr. James A. Arnold, Mrs. Annette Dwyer, Mr. Ricardo Esbri, Mr. Rick Larson</u>
Manager Of Standards Manager Of Research & Technical Services	<u>Stephanie Reiniche Mike Vaughn</u>

Additional Attendance

Tim Kuski
Dustin Meredith
Craig Wray
Louis Starr
Eric Tinglof
Mike Wolf

Igor Maeuski
Jane Miller
Robert Smith
James Sweeney
Zhiping Wang

**ASHRAE TC 5.1 Meeting
Monday, 30 Jun 2014**

Washington State Convention Center, Seattle, WA

Room 607

Minutes

1. Call to Order

The Secretary, Joe Brooks, called the meeting to order at 4:30 pm. Both the chair and the Vice Chair sent their regrets and could not attend.

Motion TC5.1-04-2014

Moved by: Brent Fullerton

Seconded: Greg Wagner

“To nominate and appoint Franco Cincotti as chair pro tempore for this meeting.”

It was noted that Franco was elected as the new Vice Chair effective after the ASHRAE Annual Meeting. Other nominations were solicited and none received. The motion passed unanimously. Franco Cincotti acted as chair pro tempore for this meeting.

2. Roll Call

The following voting members of this committee were present:

- Joe Brooks -- Secretary
- Brian Reynolds – Research S/C Chair
- Ashesh Raychaudhuri – Program S/C Chair
- Brent Fullerton, Webmaster
- Mike Brendel
- Franco Cincotti
- Tim Mathson
- Kim Osborn
- Greg Wagner

The following voting members could not attend:

- Greg Sanchez -- Chair
- John Murphy – Standards S/C Chair
- Rad Ganesh
- David Rasmussen

3. Adoption of Agenda

Motion TC5.1-05-2014

Moved by: Brian Reynolds

Seconded: Mike Brendel

“To adopt the agenda as distributed with a corrected name spelling.”

Harold Dubensky pointed out the correct spelling of his name. The motion passed unanimously.

4. Approval of the Minutes

Motion TC5.1-06-2014

Moved by: Greg Wagner

“To approve the minutes from the Winter Meeting 2014 of this meeting held on 20 Jun 2014 as distributed.”

The motion passed unanimously.

5. Items of Business

5.1 TC 5.0 Section Head/Liaison Reports

Ken Peet, the section head for Section 5, provided a brief overview of material discussed at the chair's section meeting.

5.2 Chairman's report

The chair pro tempore briefed the committee on the information received at the Chair's meeting held on Sunday morning. The information provided is attached to the minutes.

5.3 Old business

5.3.1 Review of voting membership

The voting member status was reviewed. Changes to the roster become effective after the end of the ASRHAE 2014 Annual meeting. The following voting members will roll off after the Annual meeting 2014:

Greg Sanchez
Joe Brooks
Brian Reynolds
Brent Fullerton
Kim Osborn
Tim Mathson

The following members will be voting members after the Annual meeting 2014:

Patrick Chinoda (as chair)
John Cermak
Chuck Coward
Harold Dubensky
Armin Hauer
Tim Kuski
Eric Tinglof
Craig Wray

5.3.2 Multi Disciplinary Group – Energy-Efficient Air-Handling Systems for non- Residential Buildings (MTG-EAS) (TC liaison – John Murphy)

Craig Wray reported on the current activities of the MTG. Its name was changed to, “Multi-Disciplinary Task Group: High Performance Air Systems for Buildings except Low-rise Residential Buildings (MTG:HPAS).

6. Subcommittee reports

6.1 Standards subcommittee

The Standards Subcommittee chair was not present. Various status' were provided by attendees.

6.1.1 ASHRAE Standard 87.3-2001 (RA 2010)

ASHRAE staff could not locate the vote count and requested that the TC reiterate the recommendation to withdraw and submit with the vote count.

Motion TC5.1-07-2014

Moved by: Aresh Raychaudhuri
Seconded: Brent Fullerton

“That TC 5.1 recommends the withdrawal of ASHRAE Standard 87.3 (RA 2010).”

The motion passed unanimously (8-Yes, 0-No, 0-Abstain, and the chair pro tempore not voting).

It was noted that the reason for the recommendation of withdrawal was documented in the minutes of the last meeting of this committee.

6.1.2 ASHRAE Standard 149

It was reported that required editorial changes were made to this document. It was thought that it still needed to be approved by the TC. George Gamble will send the draft to the TC Secretary for a letter ballot if needed.

6.1.3 ASHRAE 68/AMCA 330

It was reported that AMCA has withdrawn this standard.

6.1.4 ASHRAE 51/AMCA 210

It was reported that ASHRAE 51 is in review and should be complete by the end of this calendar year.

6.2 Handbook subcommittee

The Handbook Subcommittee met yesterday. It was reported that ASHRAE is now offering members the option of obtaining the on-line version of the handbook or the hard copy version. It was also noted that the section of the handbook that TC 5.1 is responsible for is required to be completed by 30 May 2015. Notes from the Subcommittee meeting are attached.

6.3 Research subcommittee

The chair of the Research Subcommittee reported on the research activities of the TC. His report is attached. PMS 1420 met yesterday and submits the following motion:

Motion TC5.1-08-2014

Moved by: Franco Cincotti
Seconded: Mike Brendel

“That the PMS recommends that the RP 1420 research report (‘Inlet and Discharge Installation Effects on Airfoil (AF) Centrifugal PLENUM/PLUG Fans for Air and Sound Performance’ be approved by ASHRAE TC 5.1”

The motion passed unanimously (8-Yes, 0-No, 0-Abstain, and the chair pro tempore not voting).

6.4. Program subcommittee

The chair of the Program Subcommittee reported on possible programs for the next meeting in Chicago. Two possibilities are a RP1216/RP1420 Seminar that would be presented by Mark Stevens and a seminar on “Fan and System Integration for Peak Energy Efficiency,” authored by Mike Brendel and John Cermak. August 11 is the deadline for the Chicago meeting and February 9 is the deadline for the Atlanta meeting.

7. FAQ

The TC 5.1 FAQ contact was not present. However, it was noted that no new questions were asked. The TC suggested that this standing agenda item be deleted and only included if a question arose. Another suggestion was that, perhaps questions should be developed that illustrate the basic concepts within the fan industry.

8. Website Report

The TC 5.1 webmaster, Brent Fullerton, reported on the TC 5.1 web statistics (attached).

9. New Business

Comments on Fan Efficiency Grades and Fan/Motor Efficiency Grades that were e-mailed to the committee were presented.

10. Time and Place of Next Meeting

The next meeting will be held in conjunction with Winter Meeting to be held in Chicago, IL.

12. Adjournment

Motion TC5.1-09-2014

Moved by: Greg Wagner
Seconded: Aresh Raychaudhuri

"To adjourn."

The motion passed unanimously (8-Yes, 0-No, 0-Abstain, and the chair pro tempore not voting).
The meeting adjourned at 6:15 pm.

Attachments: 5.2 Chairman's report
6.2 Handbook subcommittee report
6.3 Research subcommittee report
8.0 Web stats

NOTES on SECTION 5 CHAIR'S MEETING

June 29 2014 6:30

(CEC Conference and Expositions Committee):

- There is a new format for the Presentations that is short and involve more participation.

- Workshop: it is a new format that enables TCs to provide a series of short presentations on a topic requiring specific expertise.
 - Increased emphasis in audience participation or training in specific skills.
 - PowerPoint presentations with Audio descriptions are posted in the Virtual Conference.
 - 60 min in length
 - Goal is to have at least 1 Workshop per track.
 - CEC Encourages TCs to submit conference paper and technical paper sessions whereby 2-5 authors agree to write papers to be presented as a group.

- TC's are welcome to suggest other formats for presentations.

- Program Statistics for Seattle: (submitted/Accepted)
 - Conference papers 216/116
 - Seminars 109/51
 - Forums 14/1
 - Workshops 35/17

- Presentations missing for upload in the due date (review for commercialism).

- 10 Speakers in NY had speaker ratings below 3.5. They have received a letter indicating that if they receive two additional low ratings they will be required to provide proof that they have received training before being permitted to speak again.

- TC should be informed of Programs that refer to their area of expertise but sometime the communication is missing.

- CEC is asking TCs for reviewers for upcoming conferences:
 - Call for reviewers for Seattle generated about 200 names
 - Objective is to have 5 reviewers from each TC with expertise in the Chicago and Atlanta tracks by July 7 2014
 - Responsibility include:
 - Non commercialism
 - Paper not previously published
 - Equations are accurate
 - Paper includes dual units (SI and I-P)
 - Technical merit
 - Relevance to ASHRAE
 - Acknowledge of the work of others by reference
 - Ready to be published

- Tracks for Chicago have been published.
 - Track 1: Systems and Equipment
 - Track 2: Fundamentals and Applications
 - Track 3: Industrial Facilities
 - Track 4: Large Buildings: Mission Critical Facilities and Applications
 - Track 5: Energy Efficiency
 - Track 6: Life Safety
 - Track 7: Design of Energy and Water efficient Systems
 - Track 8: Hospital Design and Codes

- Tracks for Atlanta have been published.
 - Track 1: Systems and Equipment
 - Track 2: Fundamentals and Applications
 - Track 3: Research Summit
 - Track 4: Refrigeration
 - Track 5: Building Operation, Maintenance and Optimization/Commissioning
 - Track 6: Indoor Air Quality
 - Track 7: Modeling throughout the Building Life Cycle
 - Track 8: High Performance Building
 - Track 9: Moving Advanced Energy Design Guidance to the Mainstream

- CEC is asking Program tracks ideas for Orlando 2016. Section 5 will ask to add a Track: **Air Movement and Control**; is not known if will be for the next two meeting or later.

- Outstanding TC Award (New): will recognize annually a single TC in each section with the highest measured performances. It is based on a set of weighted points assigned to activities that are collected through the updated TC activity form.
- Minutes to be sent out within 2 months of the meeting and Agenda to be sent out 1 month prior the meeting.
- A new MTG has been formed: Building Dampness.
- Employment Discipline has been added to the ASHRAE Bio; all TC members are asked to self-declare their employment discipline on line.
- Options to have TC Subcommittees Meetings via Conference call and Web Meetings.

TC 5.1 Handbook Subcommittee Report (Seattle, 06/30/2014)

Zhiping Wang

- The due date for the fully revised and TC-approved fan chapter remains as May 30, 2015.
- ASHRAE Handbook Online is now a free member benefit option including all four handbook volumes, plus all the extra features that formerly were in the “Online+” version.
- Revision Histories of every chapter are available from our Handbook liaison. Our last revision was deemed a major revision according to the records.
- Handbook Comments Database – So far, no comments received through this communication channel about our fan chapter.
- TC 5.1 Handbook Subcommittee met yesterday afternoon and we discussed the whole list of ideas/topics we are currently working on. Action items were assigned or reassigned to a few TC members. See attached meeting notes for details. Again, new ideas/thoughts/comments are always welcome throughout the entire revision cycle.
- One hour meeting time and room for the TC 5.1 handbook subcommittee will be requested for the Chicago meeting. In the meantime, web-based subcommittee meetings will be scheduled in the fall as we get some of the technical contents back.

TC 5.1 Handbook Subcommittee Meeting Notes (06/29/2014)

Zhiping Wang

List of Topics for Fan Chapter Revision – 2016 Version

- **Dustin's comment about FC Fan in Table 1**
Actions: 01/19/2014 - Mike Brendel will reword this portion and HB committee will review the content in our next mtg. Also, the total efficiency curve needs to be corrected. 05/23/14 – I will follow up with Mike on this.
06/29/14 – Mike Brendel will review the entire table 1 to clean up some of the redundancy and make it more consistent throughout. Contact Brian Reynolds to get the original FC graph for correction.
- **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: 01/19/2014 - For the above three bullet items, John Murphy, John Cermak, and Mike Brendel will put together some content for the committee to review and decide how to put into our chapter. 05/23/14 – John Cermak agreed to work with John and Mike to draft up the technical contents.
06/29/14 – No contents yet. Zhiping will follow up with them.
- **FEG/FMEG Section – Bring in more info from AMCA 205/ISO 12759 and provide a good understanding for the users**
Actions: 01/19/2014 - Rad Ganesh and Tim Mathson volunteered to draft up some content about this topic. 05/23/14 – I will follow up with Rad and Tim on the write up.
06/29/14 – Zhiping will clean up the current paragraph about FEG/FMEG. Tim Mathson will draft the material related 90.1 standard and application examples for the committee to review.
- **Under current “Testing and Rating” section, only lab testing per ASHRAE 51/AMCA 210 is covered. Should we add something to cover the field testing part (Reference AMCA Pub. 203)?**
Actions: 01/19/2014 - Committee agreed to include the field testing part in our chapter. Craig Wray, Joe Brooks, Patrick Chinoda, and Chuck Coward will draft the content. 05/23/14 - Joe Brooks will draft something up and reference AMCA 203.
06/29/14 – Joe Brooks will draft 1-2 paragraphs by Mid. July.
- **Fan Drive System – Direct Drive vs. Belt Drive, VFD, VSD, etc.**

Actions: 05/23/14 - Greg, 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.

06/29/14 – We will have the contents ready by next HB review meeting.

- **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.

06/29/14 – For next revision cycle.

- **Airflow measurement by means of instrumented fan inlet rings (Armin Hauer)**

Actions: 05/23/14 - Armin will put together information for committee to review. Chpt.36 in Fundamentals and Std.111 may have some useful information.

06/29/14 – Armin will provide the technical information in about 2 months.

- **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.

- **Parallel Fan Operation in the chapter, how about Series Fan Operation? (Patrick Chinoda)**

Actions: 05/23/14 – Patrick already wrote some content for this topic and the committee will review the content Patrick came up in our next meeting.

06/29/14 – Review Patrick's write up in next HB meeting.

- **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.

06/29/14 – For next revision cycle.

**TC 5.1 (Fans) Research Committee Meeting
June 29, 2014 (Seattle)**

Red notes added in Seattle subcommittee meeting

RP's

- RP 1420 – Plenum fan inlet and discharge system effect
 - All requirements have been met?
 - Deliverable - **final report submitted to PMS (approved by TC in Seattle). Technical paper to follow.**
- RP 1216 – AF fan inlet system effects
 - Develop a seminar (or technical paper). Asesh to confirm direction.
 - **final report submitted & approved (?). Technical paper can follow quickly (almost the same)**
 - **Conference paper deadline is July 7. Or seminar, need abstract. Do 1420 and 1216 in one seminar (try for Chicago).**

RTAR's in progress

1. Series & Parallel fans system effects (Patrick) – New RTAR (in latest format) prepared by Patrick. Forwarded to liaison in March, received comments today. Significant revisions needed.
2. Experimental Evaluation of the Efficiency of V-Belt Drives used on Fans – new RTAR from Tim Mathson and Craig Wray
 - **Tim to update before sending to liaison review**
3. Fan load profile data (Tim Kuski, Michael Ivanovich, Craig Wray). Would help DOE. Discussed in NYC.
 - **Review database from Steve Wiggins (Newcomb & Boyd). Then decide about RTAR.**

MTG.HPAS

Energy-Efficient Air-Handling Systems for Non-Residential Buildings (HPAS)

- Roughly 40 ideas, several from TC 5.1

Presented recommendations to Herman Behls following the New York meeting.

1. 019-10 Develop Method of Test (MOT) for Large Circulating Fans – **coordinate with TC 5.3 and AMCA.**
2. 020-10 Investigate Fan Stall - **Greg Sanchez will review handbook. Make recommendation. Update HB or RTAR?**
3. 021-10 Fan Efficiency at Low Flow and Low Speed Operation - **No action from 5.1**
4. Suggestion to combine the next three MTG ideas:
 - 023-00 Overall Fan System Efficiency with VFD
 - 024-10 Fan Belt Drive Efficiency – **TC 5.1 (Tim Mathson & Craig Wray) will prepare an RTAR.**
 - 025-10 Motor and Variable Speed Drive (VSD) Efficiency

- Wire to gas AMCA 207 committee to address the three MTG fan drive efficiency ideas. Start with currently available information to provide a tool. (shaft power, v-belt, motor, VFD) Mike Brendel
 - Coordinate with TC 1.11 (Armin Hauer)
 - AMCA committee may identify research to improve tool (i.e. belt efficiency)
5. 026-10 Energy Impacts from Air Handler Casing Leakage – AHRI is developing a new standard (1350) for Mechanical Performance of Central Station Air Handler Unit Casings. It includes a MOT for casing leakage. (Brian Reynolds, Chair)
 6. 018-10 Study of Air Curtains – TC 5.3 is the lead, possibly coordinate with 90.1 & 5.1, 4.3, & SPC ?

Possible Research Topics

(in search of RTAR authors)

1. Develop criteria for improving the design of flow settling means utilized in multi-nozzle chamber performance testing defined in AMCA standard 210/ASHRAE standard 51.
 - See what happens in the next revision of AMCA 210. Not ready for an RTAR.
 - Limited audience, manufacturer specific.
 - Maybe remove from list?
2. Round robin test program to establish the accuracy of AMCA 300 tests.
 - Might remove from list pending round robin conclusions from AMCA (almost complete).
 - Staff has almost completed analysis for presenting to AMCA Fan committee.
3. Fan outlet discharge effects would be the next logical step for future research projects?
 - RP 1420 (plenum) includes discharge effects.
4. Develop practical process to determine velocity pressure. Accurately determine the energy flux leaving the fan.
 - Project should measure outlet velocity profile. But that is difficult to measure.
 - Possible program to predict the outlet velocity profile of a fan. Obtain data for validation. Need an estimate for cost of the analysis. Could lead to a prediction tool.
 - Could improve how fans are designed or applied.
 - **John Murphy** will draft an RTAR (centrifugal). (Axial is predictable today)
5. Develop method for testing/rating/comparing air curtains (on MTG list)
 - Air curtain companies hired an expert CFD consultant to write a report. Then decide next step. It is a code issue. TC 5.3 (Room Air Distribution) is the sponsor.
 - Check back later in the year. Could be a good joint project.
 - WG 9 is developing a technical report on energy effectiveness of air curtains impact on other AC.
6. Develop method for testing/rating/comparing large circulating fans (on MTG list)
 - Mike Brendel paper describing issue.
 - The space these fans are applied in is significantly smaller than the space needed to test them.
 - Need to have a representative from a large circulating manufacturer report and author an RTAR.
 - Modifications are being made to AMCA 230 which may address the subject.
7. Fan stall research (on MTG list)
8. Fan efficiency effects and/or fan predictability effects at low-flow/low-speed operation?
 - MTG list
9. Fan efficiency related RTAR's on MTG idea list.
 - a. Overall fan system efficiency when used with VFD.
 - b. Belt drive efficiency
 - c. Motor & inverter efficiency, predict bhp from kW

New ideas for research (New York)

1. Effect of impeller tip clearance on performance (added in NYC)

2. Improved fan noise predictions (added in NYC). AMCA 301? Needs better definition.
3. Fan Curve Fitting Development-Technique and curve models for axial and centrifugal fans. (Greg Sanchez)
 - This research will evaluate a selective number and sizes of fans using data collected from manufacturers to develop the fan performance curve, which may include stalling. Then curve fit the performance curve and develop a model (equation) that would represent this measured data. I find this information to be supplemental to the ideal graphical representation shown in Figure 1 of the handbook. We will of course need to disclose the detail information of the fan in regards to dimensions, layout, power, pressure, airflow.
4. Parallel/series jet fans (Greg Sanchez)

Other Fan research ideas? Or send ideas to TC 5.1 Research Chair (Brian Reynolds)

TC 5.1 Research

June 30, 2014

Seattle

Research Subcommittee Chairs Breakfast meeting (notes) 6:30 AM

- New section 5 liaison (Ricardo Esbri), 4 year term
- Liaison can attend TC meeting or subcommittee meeting on request
- There are 63 active RP's. (total value \$10.8 M)
- 16 projects were completed
- 20 new projects approved for funding
- 12 TRP's released for bid
- At Seattle RAC evaluated 9 RTAR's (5 accepted with commented, 4 rejected with comments)
- RAC evaluated 8 WS (4 conditionally accepted, 4 returned with comments)

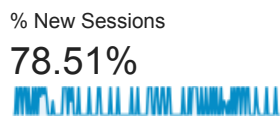
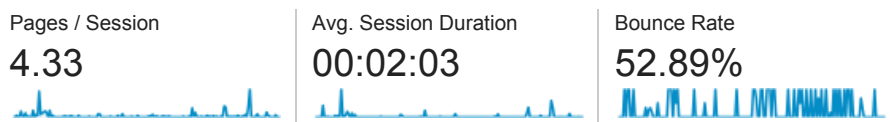
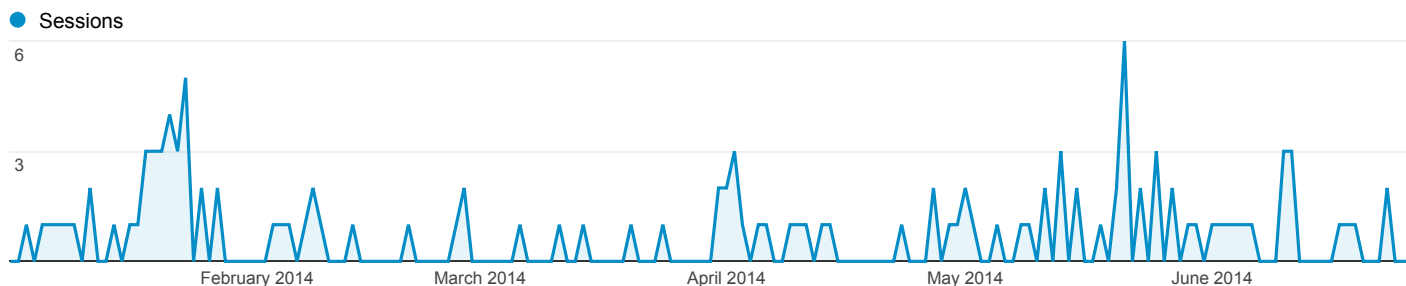
Jan 1, 2014 - Jun 26, 2014

Audience Overview

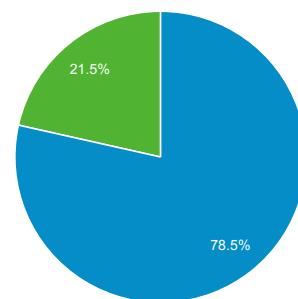
All Sessions
100.00%

+ Add Segment

Overview



■ New Visitor ■ Returning Visitor



Language	Sessions	% Sessions
1. en-us	87	71.90%
2. pt-br	15	12.40%
3. it-it	4	3.31%
4. de	2	1.65%
5. en-gb	2	1.65%
6. es	2	1.65%
7. es-es	2	1.65%
8. zh-tw	2	1.65%
9. en	1	0.83%
10. fa-ir	1	0.83%