

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

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TECHNICAL COMMITTEE 9.11 MEETING REPORT

TECHNICAL COMMITTEE (TC): **9.11** **TC TITLE:** **CLEAN SPACES**

DATE OF MEETING: **June 27th, 2011** **LOCATION:** **Montreal**

DATE RE-ISSUED: **Draft (Rev. 0)** **RECORDED BY:** **R. Charneau**

VOTING MEMBERS	YEAR		PRESENT (Y/N)	Sub-committee Chairs	
	On	Off			
Roland Charneau	07/07	06/12	Y	Handbook	Arthur Giesler
Arthur Giesler	07/09	06/13	Y	Research	Kishor A. Khankari
Kishor K. Khankari	07/08	06/11	Y	Programs	Peter B. Gardner
Shih-Cheng Hu	07/09	06/13	N	Web Page	David Poetker
James J. Coogan	07/09	06/13	Y	Journal	Roger Lautz
Larry Hughes	07/09	06/13	N	Design Guide	Wei Sun
Elizabeth A. Kolacki	07/07	06/11	Y	Short Course	Roland Charneau
Roger Lautz	07/07	06/11	Y		
Paul Lemestre	07/07	06/11	Y		
Kenneth Mead	07/09	06/13	N		
Victor Neuman	07/07	06/11	N		
Mitchell Swann	07/07	06/11	Y		
Ivan Thomas	07/07	06/11	Y		
Richard Velten	07/09	06/13	N		
R. Vijayakumar	07/09	06/13	N		
Christopher Weaver	07/09	06/13	N		
Charlie Shieh	07/10	06/14	N		

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CORRESPONDING MEMBERS (CM)	PRESENT (Y/N)	CORRESPONDING MEMBERS (CM)	PRESENT (Y/N)
Michael Amstadt	Y	Eric Z. Nejat	N
Robert E. Chase	N	Sharad V. Paranjape	N
Chris Malanga	N	Zivojin B. Perisic	N
Scott Alexander	N	Kent W. Peterson	N
Nejat Babur	N	David K. Poetker	N
Kimberly A. Barker	N	David Y.H. Pui	N
Cheryl Baylie	N	Mark A. Renn	Y
James R. Beasley	N	Christopher Robertson	N
Steve Blaine	N	Peter H. Rumsey	N
Reg Brown	N	Vincent A. Sakraida	N
Bernardo Cardenal	N	Emil Sandru	N
John P. Castelvechi	N	Raymond K. Schneider	N
Allan D. Chasey	N	Ted N. Schnipper	N
Kyung-Ju Choi	N	E. C. Schroeter	N
Donald J. Clarke	N	Anand K. Seth	N
Low Han Guan Den	N	Michael Shelton	N
Charles E. Dunn	N	Charles Chun-Lun Shieh	N
David S. Ensor	N	Charles W. Soltis	N
Christopher Flaherty	N	Thomas R. Spearman	N
William H. Frantz	N	Michael M. Starke	N
Daniel Albert Ghidoni	N	William Tschudi	N
Peter Gardner	Y	John O. Varley	Y
Ronald E. Hill	N	Fu-Jen Wang	N
Mohd Zaidi Hamdin	N	George E. Wells	N
Gabriel A. Jimenez	N	Richard B. White	N
Michael D. Jue	N	Philip J. Winters	Y
Hemant S. Kavathekar	N	Alfred W. Woody	N
Charles F. Kern	N	Cesar Luis LIM	N
Kevin D. Knappmiller	N	Jojo G. Castro	N
Tom Kuehn	N	David S. Bess	N
William A. Kumpf	N	Dennis L. Alejandro	N
D. Randall Lacey	N	Julian Rochester	Y
Matthew C. Lemieux	N	Vinod P. Gupta	N
Junjie Liu	N	Wei Sun	Y
Dawen Lu	N	Kevin Sweeney	N
Norm Maxwell	N	Marco Adolph	N
Roderick G. McLeod	N	Gary P. Shamshoian	N
Matt Middlebrooks	Y	Jim Wagner	N
Susan D. Morrison	N	Gordon Sharp	Y
Christopher O. Muller	N	Jose F. Palma	N
Gregory M. Munter	N	Don Hill	N
Sean O'Reilly	N	Julian Rochester	N
Taner F. Ozkaynak	N	Andrew Wengero	N
Riyaz A Papar	N	Farhan A. Mehboob	N
Philip J. Naughton	N	Richard L. Caldwell	N

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ADDITIONAL ATTENDEES

Li Song	Y
Jose Palma	Y
Andrew Duncan	Y

CORRESPONDING MEMBERS

SOCIETY LIAISONS, ETC.

		PRESENT (Y/N)
Thomas Lawrence	TAC Section 9 Head	N
Carl Huber	Section 9 Research Liaison	Y

Meeting Report:

**ASHRAE Summer Annual Meeting
Montreal, Monday, June 27, 2011, 2:25 – 4:20 PM**

1. Chairman Roland Charneau called the meeting to order at 2:25 PM. Nine (9) voting members including the chair were present, on a total of 17 voting members (including one international).

All voting members, corresponding members and guests were self introduced.

2. **Minutes:**

Art Giesler moved to accept minutes of Las Vegas Winter Meeting. Roger Lautz seconded. Meeting report from the Las Vegas Winter Meeting was approved as distributed without one correction.

(Vote: 8/0/0 CNV)

3. **TC Report:** (Roland Charneau)

TC Section 9 Breakfast Highlights

- Mr. Tom Lawrence is the section 9 chair;
- Mr. Carl Huber is the research liaison;
- Report activity form is due Tuesday night;
- Information from CEC
 - Evaluation of speakers will be done and action taken when score is lower than 3.5.
 - TC's will be asked to initiate programs.
 - TC's asked for webmasters training.
- Multidisciplinary task groups (MTG) has been created. Example : MTG. EECI "Energy efficient classification of general ventilation air cleaning devices" and MTS. "Energy targets".
- Thank you letters to employers from M. Ron Jarnagin are available.

4. **Membership:**

- 1) Membership continues to be strong. Many corresponding members will be added and provisional corresponding members have been added.

5. **Sub-committee reports:**

5.1 Handbook – Arthur Giesler

- The actual review is completed
- As Art will be involved in RAC, Gary Shamshoian accepted to lead the next review cycle

5.2 Journal – Roger Lautz

- No new articles on clean spaces
- Michael Amstadt accepted to replace Roger

5.3 Web page – David Poetker

- Google Site to be developed

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5.4 Research – Kishor Khankari

RP – 1604 "Demand controlled filtration for cleanrooms"

It is moved by Roger Lautz based on the recommendation of the PES committee that the research contract be awarded to Engysco. Seconded by Kishor Khankari

(Vote: 8/0/0 CNV)

WS-1399 "Survey of particles production rates from various cleanroom activities and processes"

It is moved by Mitch Swann that the WS-1399 be sent for re-bid. Seconded by Roger Lautz.

(Vote: 8/0/0 CNV)

RTARs that have not been approved by RAC:

A. "Primary / Secondary Air Loop Design for Cleanrooms"

Current Status – **RTAR needed.**

Contact – Wei Sun will prepare RTAR

Comments –

B. "Application of Established Contamination Control Strategies for Spaces other than Cleanrooms"

Current Status – **RTAR needed.**

Contact – Roger Lautz

Comments – Focus on health care facilities in collaboration with TC9.6. It was decided to keep on hold.

C. "Automated Room Air-tightness Test Technique By Using Room-Equipped Airflows Control Devices In Critical and Controlled Environments"

Current Status – **RTAR needed.**

Contact – Dr. Jin Wen, Drexel University

Comments – No correspondence after initial e-mail.

D. "How many rooms should be placed on one HVAC zone controller with terminal HEPAs"

Current Status – **RTAR needed send sample RTAR**

Contact – Gary Shamshoian

Comments –

E. "no shutdown" HVAC cleanroom system"

Current Status – **RTAR needed**

Contact – Gary Shamshoian

Comments –

F. "Development and validation of innovative ventilation arrangement for air circulation system in non-unidirectional airflow cleanrooms"

Current Status – **RTAR received**

Contact – Dr. Tim Xu, Lawrence Berkeley National Laboratory

Comments – TC members expressed certain reservations. Similar RTAR for electronic semi-conductor industry was suggested by Mitchel Swan. This RTAR can be considered after the proposed RP 1399 reaches at 50% completion.

Approved RTARs & Work Statements that are being resubmitted to RAC:

A. "Survey of Particle Production Rates from Various Cleanroom Activities & Processes" (1399-WS)

Current Status – **Released for bidding. Needs bidder to work on this project.**

PES – Mitch Swann (Chair), Pete Gardner, Ivan Thomas

Status of “Active” Research Projects

- A. "Analysis of Transient Characteristics, Effectiveness and Optimization of Cleanroom Airlocks" (**RP 1431**)

Current Status –100% complete. Waiting for the final report

P.I. – Mr. Wei Sun, Engsysco Inc.

PMS – Kishor Khankari (Chair), John Varley, Phil Winters

- B. "Cleanroom Pressurization Strategy Update – Quantification and Validation of Minimum Pressure Differentials for Basic Configurations and Applications" (**RP 1344**)

Current Status – 80% completion.

P.I. – Mr. Wei Sun, Engsysco Inc.

PES – Jim Coogan (Chair), Victor Neuman, R. Vijay, Kishor Khankari, Roger Lautz

5.5 Programs - Pete Gardner

Gordon Sharp present seminar on Wednesday

Chicago – January 2012

Type	Title	Chair	Co-spon
Seminar	"Optimizing cleanrooms for high performance, energy reduction and sustainability"	Gardner Speakers : Sun Mehboob Kavathekar Lampert	TC-9.10

San-Antonio – June 2012

Type	Title	Chair	Co-spon
Tech-paper	Results of projects 1341 and 1344	Sun	

Dallas – January 2012

Type	Title	Chair	Co-spon
Seminar	Design guide rollaut		
Seminar	Demand control ventilation		

5.6 Design guide – Wei Sun

- Almost 90% done
- Review to start in August
- Editing during fall
- Completion for Chicago

5.7 Short course - R. Vijayakumar

- Short courses are scheduled by society

6. Liaison Report

- 6.1 NFPA/IBC – Roger Lautz
- NFPA 99 published
- 6.2 IEST/ISO – R. Vijayakumar
- ISO 29463 (HEPA/ULPA filters) 10 people working group
 - ISO 29461 - Published
 - ISO 29462 – Another year for completion
- 6.3 ISPE – Peter Gardner
- ISPE has a green Pharma Group
- 6.4 Lawrence Berkeley Lab – Bill Tschudi
- No report
- 6.5 ISO142 – P. Winters
- Full filter gaz test
 - Standard early fall
- 6.6 CDC/Hiosh – K. Mead
- The first phase of airborne isolation cfd research with university of Cincinnati has been completed. A conference paper was submitted to ashrae and accepted for presentation at winter meeting in Chicago in the Track titled, "Specialized Applications – Healthcare, Laboratories, and Data Centers,". In short, the research models healthcare worker exposures to airborne infectious droplet nuclei within an AIIR patient room as well as a traditional patient room. The physical and HVAC operating parameters were both modeled after real patient rooms in use at a local hospital.
 - A full-scale mock AIIR has been constructed within our ventilation laboratories. Finalization of HVAC design has been on hold pending lab facility renovations. Upon completion, the mock AIIR will have positionable HVAC supply and exhaust combined with a modulated supply/exhaust flow rate control system to facilitate evaluation of a variety of test scenarios. Plan will be to model configurations of research interest then validate model(s) using tracer gas and tracer aerosol techniques. Research emphasis will focus primarily on healthcare worker exposure and aerosol distribution while also documenting room containment.
 - We should be receiving cfd model results from our ambulance study any day now. Our initial model results had some errors in the patient source boundary conditions and had to be reworked. We will qualitatively validate the model then use the results to identify intervention designs that mitigate emt worker exposures within the ambulance module. We will also be conducting a simple surface decon study within the ambulance module based upon portable UVGI source and measured energy doses observed at various points within the module. Based on these results, a more rigorous evaluation may be pursued.
 - A long-awaited study regarding efficacy of HEPA filtration for hazardous drug aerosol applications has finally begun (delayed significantly due to budget issues). A prototype recirculating test loop with custom Type C HEPA filter has been built within our lab. Currently working to identify protocol by which we will spike the filter surface with known dose of selected hazardous drugs, prior to initiating the recirculating test loop and subsequent bypass sampling. Results of this study could have an impact upon pharmacy design practice and selection of primary engineering controls for pharmacy compounding.

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- A relatively new nanoaerosol research project is in progress that is focusing on containment efficacy of nanoaerosol processes/handling activities. The focus is currently on determining real-world protection factor provided by selected commercially available products. Eventual intention is to develop a generic test protocol by which most primary engineering controls could be evaluated and a protection factor calculated.
- 6.7 TC-9.6 Healthcare – Roger Lautz
- Research on humidity, UV sterilization and hospital quarry infections
- 6.8 TC-9.10 Laboratory systems – P. Gardner
- Co-sponsoring projects
- 6.9 TC-2.3 Gaseous air contaminant removal – Matt Middlebrook
- SPC – 145 in review
 - RTAR on formaldehyde
- 6.10 TC-2.4 Particulate air contaminants removal – M. Renn
- Research projects on :
- What happens to filters during their life? How do they react?
 - Electric charge
 - Energy rating for filters

6.11 European Cleanroom Assoc./Activities

Prepared by Z. Perisic, Corresponding Member TC 9.11

Society : Association of Engineers for Microcontamination Control (ASENMCO), Russia

Contact : Mr Dr. Alexander Y. Fedotov

E-mail : asincom@mail.ent.ru

Activities : ASENMCO edits the magazine «Technology of Cleanliness» since 1992. Now we edit it on quaterly basis, four times a year, 500-700 copies depending on content.

Association pour la Prevention et l'Etude de la Contamination (ASPEC), France

Mrs Laure ALLOUL-MARMOR, Ph D

info@aspec.fr

The ASPEC participates in the commission X457 on nanotechnology of Commission ISO/TC 229 (AFNOR X457).

Associazione per lo Studio ed il Controllo della contaminazione (ASCCA), Italy

Mrs Letizia Guizzetti

cccs@cccs.org.cn

The ASCCA today promoting a lot of actions, such as organizing and taking part in conferences, meeting and exhibition, publishing its own A.S.C.C.A. News.

Cleanrooms and Contamination Control Association for Denmark, Finland, Norway and Sweden (R3 Nordic), Nordic Countries

R3Nordic Secretariat

info@r3nordic.se

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R3 published Branch Register (as "Who Is Who") with information's about equipment manufacturers, consulting companies, etc.

Irish Cleanroom Society (ICS), Ireland

Peter Fernie
emat@iol.ie

Main focus of ICS is to offer better knowledge and awareness of Cleanroom technology to professionals involved in semi conductors, medical technology, pharmaceutical, healthcare and food industries, by organising educational programmes, seminars, exhibitions and by providing up to date information via website.

Control (RACC), Romania

Mr Dan Cosasu
danc@edas.ro
(No information)

Schweizerische Gesellschaft fuer Reinraumtechnik (SRRT), Switzerland

Mr Hans Zingre
info@srrt.ch

*The **SRRT** organizes meetings, seminars and workshop in French, German and English. The **SRRT** representend Switzerland into standardization committees (European and internationally).*

Scottish Society for Contamination Control (S2C2), Scotland

Secretariat S2C2
admin@s2c2.co.uk

*S2C2 organize **Cleanroom Expert Days**, with particular aspects in cleanroom technology are undoubtedly the exchange of knowledge and the promotion of the latest technologies and practices.*

VDI Commission for Cleanroom Technology (VDICCT), Germany

Mr Dipl.-Phys. Thomas Wollstein VDI
wollstein@vdi.de

Association of German Engineers (VDI) is one of the largest technical-scientific associations in Europe.

The VDI and its very active Commission for Cleanroom Technology covers a wide range of technical topics and communicates this knowledge through studies, technical discussions and congresses or the VDI guidelines that create generally accepted technical rules.

Vereniging Contamination Control Nederland (VCCN), The Netherlands

Mr Paul A van Rij
p.vanrij@tvvl.nl

*The **VCCN** send to its member's regularly updated news on contamination control in home and foreign countries, hold conferences with prominent gust speakers and certified training courses.*

Österreichische Reinraumgesellschaft (ORRG), Austria

Mrs Angelika Reichl
office@oerrg.at

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The ORRG (2008) transfer knowledge in the field of cleanroom technology and its applications, especially standardization and training, and create of Austrian guidelines.

All these European societies are members of International Confederation of Contamination Control Societies (ICCCS)

Also, the REHVA as Federation of 26 European HVAC National Associations, publish a REHVA GUIDEBOOKS. For cleanrooms specialists will be of interest guidebook No.8: "Cleanliness of Ventilation Systems".

- 6.12 University of Minnesota – David Pui/T. Kuehn
 - No report
- 6.13 NEBB – D. Hill
 - Possibility of a merge of NEBB with ASHRAE
- 6.14 TC-2.9 UV – Matt Middlebrook
 - UVGI, radiation impact on materials

7. Old business

8. New business

- 8.1 USTAG TC-142 – Mark Renn
 - Meeting Saturday at 2h30 pm
- 8.2 Bim meeting, what do we want in Bim
Saturday 1h00-3h00 pm

Adjournment:

Meeting adjourned unanimously at 4:20 pm

Please review and discuss at Chicago meeting

Respectfully Submitted,
R Charneux
TC-9.11 Chair