

# Newsletter



Air Infiltration and Ventilation Centre

## Foreword

 @AIVCnews

We are very pleased to announce that Greece and Ireland have joined as new AIVC member countries. The annual AIVC spring event is taking place in Dublin on March 27 and 28 in conjunction with the AIVC board meeting.

This year is the 40<sup>th</sup> anniversary of the AIVC and this will be celebrated at the 40<sup>th</sup> AIVC conference in Ghent (Belgium), which will be held on October 15 and 16. The deadline for submitting abstracts is April 7! Next year, the AIVC conference will take place in Athens on 14-16 September.

Enjoy your reading.

Peter Wouters, Operating Agent AIVC



## 15 -16 October 2019 – 40<sup>th</sup> AIVC - 8<sup>th</sup> TightVent & 6<sup>th</sup> venticool conference in Ghent, Belgium

In the past 40 years, since the first oil crisis in the seventies, energy and climate goals have been shaping many countries' policy and legislative agendas. The building sector plays a crucial role in achieving these goals, considering the energy use attributed to buildings and its huge potential for improved energy performance.

Whereas in the past most of the focus was on reducing the energy consumption, it is now clear that better performing buildings must ensure an acceptable Indoor Environmental Quality (IEQ), by providing higher Indoor Air Quality (IAQ) and comfort levels for their occupants. Building ventilation entails both challenges and opportunities to achieve this goal.

In 2019 the AIVC completes its 40<sup>th</sup> year of existence and the conference organisers thought that it would be good to pay a particular interest to the evolution during these 40 years.

This is the context defining the core theme of the joint 40<sup>th</sup> AIVC, 8<sup>th</sup> TightVent and 6<sup>th</sup> venticool Conference as: "From Energy crisis to sustainable indoor climate – 40 years of AIVC". The Conference will be held on 15 and 16 October 2019 at 'Het Pand', the congress centre of Ghent University in Ghent, Belgium.

The conference will consist of 3 parallel sessions largely devoted to:

1. Smart ventilation, Indoor Air Quality (IAQ) and health relationships
2. Airtightness
3. Ventilative cooling – Resilient cooling

The conference programme will include well-prepared and structured sessions focused on the conference topics, invited speakers, long and short oral presentations arising from the call, as well as 90 seconds industry presentations.

Abstract submission is open at: <https://www.dna.gr/aivc2019/> .

The deadline for the abstract submission is **April 7, 2019**.

The conference is organised by:

- Ghent University
- INIVE, the International Network on Ventilation and Energy Performance on behalf of the Air Infiltration and Ventilation Centre (AIVC), TightVent Europe (the Building and Ductwork Airtightness Platform), and venticool (the international platform for ventilative cooling)

For further information and updates visit us at: <https://www.aivc2019conference.org>



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## Towards a better integration of indoor air quality and health issues in low-energy houses: Development of a performance-based approach for ventilation

Gaëlle Guyot, Cerema, France

In future building regulations -2020- building performance is going to be extended to global performance, including indoor air quality (IAQ). Ventilation regulations throughout the world are still based on prescriptive approaches, setting airflows or air change rates requirements. The PhD thesis: "Towards a better integration of indoor air quality and health issues in low-energy houses: Development of a performance-based approach for ventilation", developed a performance-based approach to ensure that ventilation is designed to avoid risks related to occupants' health.

Given the European context with the generalization of nearly zero energy buildings, envelope airtightness is often included in Energy Performance (EP)-calculations, frequently through single-zone models with uniform air leakage. Due to the fact that more consideration is often given to EP than to IAQ issues, the impact of several zones interconnected by unevenly distributed leaks on the envelope and on internal partition walls, is a rarely investigated issue. We conducted an experimental study on 23 detached houses and developed an innovative database including air leakage data from 456 exterior and internal partition walls. The analysis of this database reveals that internal air leakage can become as significant as door undercuts and that the type of building structure has a significant impact. We proposed air leakage values and dispersion input data for multi-zone IAQ models. Then, through a case study, we quantified the impact of these air leakage data on IAQ. We modelled CO<sub>2</sub>, humidity and formaldehyde with two types of ventilation (exhaust-only or balanced). We highlighted significant impacts and concluded that detailed air leakage distributions should be used in IAQ

performance assessment methods.

An extensive review work combined with a complementary analysis, allowed us to come up with the development of a performance-based approach for house ventilation to be used at the design stage in a regulatory calculation. We selected the use of five relevant IAQ performance indicators, based on CO<sub>2</sub>, formaldehyde and PM<sub>2.5</sub> exposures, and RH-based indicators assessing both condensation and health risks.

Above all, we demonstrated that our proposed method was applicable, applying it to a low-energy house case study. We also demonstrated how such an approach could help with key choices at the design stage, such as the type of structure (regarding its impact on air leakage distributions), the type of ventilation system and the level of pollutant emissions. We also showed that such an approach could help with the ventilation design, notably the distribution of the air inlets and/or outlets, or even the airflows, in order to secure the fulfillment of IAQ requirements.

Further information, in French, can be found at:

<https://www.cerema.fr/fr/actualites/gaelle-guyot-soutenu-sa-these-performance-ventilation>

*Gaëlle Guyot (Buildings' Performance in their Environment research team, Cerema, France) defended her PhD thesis on the 3rd of December 2018 entitled "Towards a better integration of indoor air quality and health issues in low-energy houses: Development of a performance-based approach for ventilation". The Jury was composed of Dr. Patrice Blondeau (La Rochelle University), Dr. Suzanne Déoux (Médiéco Conseil et Formation), Pr. Arnold Janssens (Gent University), Dr. Xavier OLYN (Cerema), Pr. Jean-Jacques ROUX (INSA de Lyon) and the supervisors, Pr. Evelyne Gonze and Pr. Monika Woloszyn (LOCIE laboratory, Savoie Mont Blanc University).*

## 39<sup>th</sup> AIVC Conference 2018: Summaries of the ventilative cooling and airtightness tracks

More than 200 participants attended the joint 39<sup>th</sup> AIVC – 7<sup>th</sup> TightVent – 5<sup>th</sup> venticoool conference held in Juan-Les-Pins, France on September 18-19, 2018. The programme consisted of 3 parallel sessions with contributions from 27 countries and international organisations. Around 150 presentations were given covering the main conference topics namely: Smart Ventilation, Indoor Air Quality (IAQ) and Health relationships; Ventilation and (building) Airtightness; Ventilative cooling – Resilient cooling.

It has also been a major discussion place for on-going or recently launched projects and initiatives such as the Indoor Environmental Quality – Global Alliance, the IEA EBC annex 80 "Resilient Cooling" and the IEA EBC annex 78 "Supplementing Ventilation with Gas-phase Air Cleaning, Implementation and Energy Implications".

The "Ventilation and (building) Airtightness" track at the AIVC 2018 conference consisted of 34 presentations organised in 6 sessions, 3 of which were topical sessions with a number of invited presentations:

1. Analysing airtightness measurements
2. Ductwork airtightness (topical session)
3. Integrating uncertainties in declared airtightness results (topical session)
4. New methodologies and improvements for airtightness
5. Demand controlled ventilation
6. Performance of heat recovery ventilation in practice (topical session)

The article available here:

[https://www.aivc.org/system/files/Airtightness\\_track\\_Summary\\_2018.pdf](https://www.aivc.org/system/files/Airtightness_track_Summary_2018.pdf) provides a summary of the main trends and conclusions addressed during the presentations and discussions on the topic of building & ductwork airtightness. Selected presentations are grouped into 3 main themes: Airtightness measurement data; Solutions for ductwork airtightness and; Alternative methods for building airtightness testing.

The "Ventilative Cooling-Resilient Cooling"



track at the AIVC 2018 conference consisted of 14 presentations organised in 3 sessions:

1. Ventilative cooling
2. Improving the efficiency of ventilative cooling
3. IEA EBC Annex 80 on Resilient Cooling (topical session)

The article available here: [https://www.aivc.org/system/files/VTrack\\_summary.pdf](https://www.aivc.org/system/files/VTrack_summary.pdf) provides a summary of the main trends and conclusions addressed during the presentations and discussions on the topic of ventilative & resilient cooling.

## 39<sup>th</sup> AIVC Conference, 2018: Best paper, best poster awards

Paper and poster awards were given during the closing session of the joint 39<sup>th</sup> AIVC – 7<sup>th</sup> TightVent – 5<sup>th</sup> venticool conference: “Smart ventilation for buildings” held in Antibes Juan-Les-Pins, France on 18-19 September 2018.

### 1. Best paper award:

**Title:** “How should we characterize emissions, transport, and the resulting exposure to SVOCs in the indoor environment?”

**Authors:** Jianping Cao (Virginia Tech, USA), Clara Eichler (Virginia Tech, USA) and John Little (Virginia Tech, USA)

### 2. Best poster award

**Title:** “Impact of construction stages on Indoor Air Quality”

**Authors:** Charline Dematteo (INDDIGO, France), Barbara Le Bot (University of Rennes, France), Pierre Le Cann (University of Rennes, France), and Mariangel Sanchez (AQC -Construction Quality Agency, France)

### Note:

Cited papers will be available on AIVC’s AIRBASE (<https://www.aivc.org/resources/collectionpublications/aivc-conference-proceedings-presentations>) by the end of April 2019

## Highlights of the AIVC 2018 Conference at the REHVA Journal

The February 2019 edition of the REHVA Journal has been released, including a selection of articles presented at the 39<sup>th</sup> AIVC - 7<sup>th</sup> TightVent & 5<sup>th</sup> venticool Conference, 2018 “Smart Ventilation for buildings” held in Juan-Les-Pins, France on September 18-19, 2018.

Specific articles include:

- Are low-cost sensors good enough for IAQ controls? | Iain Walker, Woody Delp, Brett Singer (LBNL, USA)
- Including air-exchange performance in building regulation | R.C.A. van Holsteijn (VHK Research, Netherlands), H.J.J. Valk (Nieman Raadgevende Ingenieurs B.V., Netherlands), J. Laverge (Ghent University, Belgium), W.L.K. Li (VHK Research, Netherlands)
- IAQ in workplace in Belgium: alternatives to CO2 requirement | Samuel Caillou (BBRI, Belgium), Jelle Laverge (Ghent University, Belgium), Peter Wouters (INIVE EEIG, Belgium)



Best paper award, Max Sherman (left) & John Little (right) at the 39<sup>th</sup> AIVC - 7<sup>th</sup> TightVent – 5<sup>th</sup> venticool joint conference



Best poster award, Max Sherman (left) & Charline Dematteo (right) at the 39<sup>th</sup> AIVC - 7<sup>th</sup> TightVent – 5<sup>th</sup> venticool joint conference

Belgium)

- Key findings on ventilative cooling | Peter Holzer, Philipp Stern Institute of Building Research & Innovation, Austria)

To download and read the full journal please visit:

<https://www.rehva.eu/publications-and-resources/rehva-journal/2019/012019.html>

And don’t forget to stay tuned for the next issue of the REHVA journal with more highlights from the AIVC 2018 Conference!

## New release! AIVC Ventilation Information Paper n°39: A review of performance-based approaches to residential smart ventilation

Ventilation Information Paper n°39: “A review of performance-based approaches to residential smart ventilation” provides an overview of the regulations and standards proposing “performance-based approaches” in five countries to promote the use of smart ventilation strategies. It shows that a favorable context exists in many countries for the development of smart ventilation strategies.

The document is now available for download at:

<http://aivc.org/resources/collectionpapers/aivc-publications>





# Air Infiltration and Ventilation Centre

## Greece & Ireland join the AIVC

The AIVC is very pleased to welcome Greece & Ireland as new participating countries!

Greece will be represented in the AIVC board by Dimitris A. Charalambopoulos & Triantafyllos (Alkis) Triantafyllopoulos from the ASHRAE Hellenic Chapter.

Ireland will be represented in AIVC board by Simon Jones (Aereco).

The AIVC at present counts 17 countries composing the AIVC Board demonstrating the growing interest on air infiltration and ventilation issues in new and renovated buildings.

## 27 -28 March 2019, Dublin – AIVC & SEAI symposium “Quality ventilation is the key to achieving low energy healthy buildings”

Sustainable Energy Authority of Ireland (SEAI) together with the Air Infiltration and Ventilation Centre (AIVC) are organising a symposium entitled " Quality ventilation is the key to achieving low energy healthy buildings " to be held on 27-28 March 2019 in Dublin, Ireland. The workshop will take place at the RDS venue, close to Dublin City Centre.

The 2 day conference will provide a wealth of insights from experiences both nationally and internationally. It will inform approach on ventilation as a key component of delivering both new buildings and deep retrofit low energy buildings.

Further information on registration, programme etc. is available here:

<https://www.aivc.org/event/27-28-march-2019-symposium-dublin-quality-ventilation-key-achieving-low-energy-healthy>.

## AIVC • List of board members

Australia: Mat Santamouris, University of New South Wales • Wendy Miller, Queensland University of Technology

Belgium: Arnold Janssens, University of Ghent • Samuel Caillou, BBRI

China: Guoqiang Zhang, Hunan University • Weijun Chen, Hunan Shinilion Energy Saving Sci. and Tech. Corp. Ltd

Denmark: Bjarne Olesen, Technical University of Denmark • Alireza Afshari, Danish Building Research Institute, Aalborg University

France: François Durier, CETIAT • Nicolas Doré, ADEME

Greece: Dimitris A. Charalambopoulos, ASHRAE Hellenic Chapter • Alkis Triantafyllopoulos, ASHRAE Hellenic Chapter

Italy: Lorenzo Pagliano, Politecnico di Milano

Ireland: Simon Jones, Aereco

Japan: Takao Sawachi, Building Research Institute • Yoshihiko Akamine, NILIM

Netherlands: Wouter Borsboom, TNO

New Zealand: Manfred Plagmann, BRANZ

Norway: Kari Thunshelle, SINTEF Byggforsk

Republic of Korea: Yun Gyu Lee, Korea Institute of Construction Technology • Jae-Weon Jeong, Hanyang University

Spain: Pilar Linares Alemparte, The Eduardo Torroja Institute for Construction Science - CSIC • Sonia García Ortega, The Eduardo Torroja Institute for Construction Science - CSIC

Sweden: Paula Wahlgren, Chalmers University of Technology

UK: Benjamin Jones, University of Nottingham • Maria Kolokotroni, Brunel University London

USA: Andrew Persily, NIST • Max Sherman, LBNL

### Operating agent

INIVE EEIG, [www.inive.org](http://www.inive.org), [info@aivc.org](mailto:info@aivc.org)

Peter Wouters, operating agent • Rémi Carrié, senior consultant • Maria Kapsalaki, consultant • Stéphane Degauquier

### AIVC board guests

Francis Allard • Willem de Gids • Laszlo Fulop • Zoltan Magyar • Pawel Wargocki • Hiroshi Yoshino

### Representatives of organisations

Takao Sawachi, IEA EBC, [www.iea-ebc.org](http://www.iea-ebc.org)

Jaap Hogeling, REHVA, [www.rehva.eu](http://www.rehva.eu)

Jan Hensen, IBPSA, [www.ibpsa.org](http://www.ibpsa.org)

Ben Hughes, IJV, <https://www.tandfonline.com/loi/tjov20>

Carsten Rode, IEA EBC Annex 68, <http://www.iea-ebc-annex68.org/>

*DISCLAIMER: Conclusions and opinions expressed in contributions to AIVC's Newsletter represent the author(s)' own views and not necessarily those of the AIVC*