36th AIVC Conference

Effective ventilation in high performance buildings

23 - 24 September 2015
Madrid, Spain

5th TightVent Conference
3rd venticool Conference

FINAL PROGRAMME
09:00-10:45 Opening - Plenary Session (Part 1)
Chairpersons: Peter Wouters, José Antonio Tenorio

- Welcome on behalf of AIVC, venticool, TightVent
  Peter Wouters, Manager, INIVE EEIG, Belgium
- Welcome by Eduardo Torroja Institute for Construction Science - IETcc-CSIC
  Marta Castellote, Director, IETcc-CSIC, Spain
- Indoor Air Quality regulations. The Spanish case
  José Antonio Tenorio & Pilar Linares, Building Quality Department, IETcc-CSIC, Spain (p. 1)
- Energy efficient ventilation for NZEB in Mediterranean countries
  Servando Alvarez Dominguez, Professor, University of Seville, Spain (Invited speaker) (p. 3)

10:45-11:15 Coffee break

11:15-12:45 Plenary Session (Part 2)
Chairpersons: Yun Gyu Lee, Max Sherman

- Is ventilation necessary and sufficient for acceptable indoor air quality?
  Kwok Wai Tham, Professor, National University of Singapore, Singapore (Invited speaker) (p. 5)
- Ventilation projects within the International Energy Agency: objectives, approaches and expected results
  Per Heiselberg, Professor, Aalborg University, Denmark (Invited speaker) (p. 12)
- BIMs, sustainable buildings and effective ventilation
  Frank Hovorka, Head of real estate sustainable policy, Caisse des Dépôts, France (Invited speaker) (p. 14)

12:45-13:45 Lunch break
Wednesday 23 September 2015

A3 Aula de Formación

13:45-15:15 Parallel Session 1A - Topical session: Building airtightness testing: ground status from various countries
Chairpersons: Arnold Janssens, Paula Wahlgren

• Analysis of results from ATTMA lodgement - what are the realistic air permeability characteristics of UK housing
  Barry Cope, UK (Invited speaker) (p. 19)
• Building airtightness in Germany - what are the driving forces?
  Oliver Solcher, Germany (Invited speaker) (p. 21)
• 6 years of envelope airtightness measurements performed by French certified operators: analysis of about 65,000 tests
  Adeline Bailly, France (Invited speaker) (p. 22)
• Airtightness Data and Characteristics of 752 Residential Units of Reinforced Concrete Buildings in Korea
  Jo Jae-Hun, South Korea (p. 33)
• Airtightness and indoor air quality in subsidised housing in Spain
  Jesica Fernandez-Aguera, Spain (p. 43)

Auditorio

13:45-15:15 Parallel Session 1B - Topical Session: Ventilative cooling and Annex 62 (Part 1)
Chairperson: Per Heiselberg

• Evaluation tool of climate potential for ventilative cooling
  Annamaria Belleri, Italy (p. 53)
• Night time cooling by ventilation or night sky radiation combined with in-room radiant cooling panels including Phase Change Materials
  Bjarne W. Olesen, Denmark (p. 67)
• Stack driven ventilative cooling for schools in mild climates: analysis of two case studies
  G. Carrilho da Graca, Portugal (p. 78)
• Ventilative Cooling and energy use in supermarkets
  Zoi Mylona, London (p. 89)
Wednesday 23 September 2015

Salon de Actos

13:45-15:15 Parallel Session 1C - Long Oral Presentation Session: Ventilation in relation to IAQ and health
Chairpersons: Pilar Linares, Pawel Wargocki

• Effect of building and installation design on PM2.5
  Wouter Borsboom, Netherlands (p. 101)
• Experimental characterization of the efficiency and energy consumption of various central ventilation air cleaning systems
  Alain Ginestet, France (p. 107)
• CO2 and volatile organic compounds as indicators of IAQ
  Andrzej Szczurek, Poland (p. 118)
• Impact of ventilation and recirculation rates on exposure to and intake of ozone and its initiated chemistry products: Mass balance model evaluation
  Fadeyi Moshood Olawale, Singapore (p. 128)
• Assessment of ventilation systems efficiency in office buildings, related to indoor volatile organic compound concentrations
  Teodosiu Catalin, Romania (p. 139)
• Influence of moving objects on ventilation plan for smoking room
  Sihwan Lee, Japan (p. 149)

15:15-15:30 Room change

A3 Aula de Formación

15:30-16:30 Parallel Session 2A - Topical Session: Ventilation and energy use
Chairpersons: François Durier, Claus Haendel

• Ecodesign Directive for Ventilation Units
  Claus Haendel, Germany (Invited speaker) (p. 194)
• Primary energy used in centralized and decentralized ventilation systems measured in field tests in residential buildings
  Frank Scholzen, Luxembourg (p. 197)
• Spread in energy use in buildings dependent on choice of heating and ventilation system
  Par Johansson, Sweden (p. 204)
• Development of a compact single room ventilation unit with heat recovery dedicated to tertiary building
  Samuel Gendebien, Belgium (p. 213)
Wednesday 23 September 2015

Auditorio

15:30-16:30 Parallel Session 2B - Long Oral Presentation Session: Ventilative cooling and thermal comfort
Chairpersons: Bjarne Olesen, Wouter Borsboom

- Model Home 2020 – full-year measurements of daylight, energy and indoor climate in five single-family houses occupied by typical families: what has been learned
  Peter Foldbjerg, Denmark (p. 158)
- Optimization of indoor air quality through controlled cross ventilation in the retrofitting of residential buildings
  Miguel A. Padilla - Marcos, Spain (p. 167)
- Wind-induced pressure coefficients on buildings dedicated to air change rate assessment with CFD tool in complex urban areas
  Guillaume Caniot, France (p. 179)
- Field application of enhanced displacement ventilation system in an office of a Zero Energy Building in the Tropics
  David K.W. Cheong, Singapore (p. 188)

Salón de Actos

15:30-16:30 Parallel Session 2C - Topical Session: Annex 68: Design and Operational Strategies for Low Energy and High IEQ Buildings
Chairperson: Carsten Rode

- IEA EBC Annex 68 – Indoor Air Quality Design and Control in Low Energy Residential Buildings
  Carsten Rode, Denmark (Invited speaker) (p. 223)
- IEA EBC Annex 68 – Subtask 1: Defining the metrics
  Marc Abadie, France (p. 226)
- IEA EBC Annex 68 – Subtask 2: Pollutant Loads in Buildings
  Marc Abadie, France (p. 229)
- IEA EBC Annex 68 – Subtask 3: Modelling
  Gabriel Rojas, Austria (p. 232)
- IEA EBC Annex 68 – Subtask 4: Strategies for design and control of buildings
  Jakub Kolarik, Denmark (p. 235)
- IEA EBC Annex 68 – Subtask 5: Field Measurements and Case Studies
  Kristine Nore, Norway (p. 237)
- Discussion

16:30-17:00 Coffee break
17:00-18:30 Parallel Session 3A - Long & Short Oral Presentation Session: Airtightness - Airflow measurements
Chairpersons: Andrew Persily, Andrzej Gorka

- rCloud - Capturing the moment, a new era in automated testing
  Colin Genge, Canada (p. 239)
- Uncertainty in airflow rate estimation of daytime ventilation associated with atmospheric stability
  Lim Jongyeon, Japan (p. 241)
- Airtightness Quality Management Approaches in France: end and birth of a scheme. Previous and new schemes, overview and analysis
  Sandrine Charrier, France (p. 250)
- Thermal envelope quality versus nZEB parameters and long-term economics: the Eco-Silver House case in Ljubljana
  Luka Zupancic, Slovenia (p. 261)
- The zero pressure paradox
  Bink Niek-Jan, Netherlands (p. 272)
- Airtight duct systems [a simple way of improving a building's energy efficiency without increased investment]
  Santiago Pascual, Spain (p. 293)
- Estimating the average Air Change Rate for the heating season
  Laszlo Fulop, Hungary (p. 300)

17:00-18:30 Parallel Session 3B - Short Oral Presentation Session: Ventilative cooling and thermal comfort
Chairpersons: Maria Kolokotroni, Lorenzo Pagliano

- Experimental Analysis of Microscale Trigeneration Systems to Achieve Thermal Comfort in Smart Buildings
  Sawant Parantapa, Germany (p. 309)
- Impact of natural ventilation in energy demand and thermal comfort of residential buildings in Catalonia
  Jaume Salom, Spain (p. 320)
- Thermal comfort assessment in a sustainable designed office building
  Maria Nuria Sanchez Ejido, Spain (p. 331)
- Improvement of comfort and energy efficiency in existing buildings using Adaptive Thermal Comfort Algorithm
  Javier Garcia Ramos, Spain (p. 342)
• Electrothermal actuators with PWM control  
  Michal Szymanski, Poland (p. 352)
• Assessment of spatial and temporal distribution of thermal comfort and IAQ in low energy houses  
  Maria del Carmen Bocanegra-Yanez, UK (p. 358)
• Model Predictive Control (MPC) of hybrid ventilation systems in office buildings with dynamic glass facades  
  Christian Drivsholm, Denmark (p. 369)
• Thermal performance analysis of a solar chimney, based on the experimental study of the main driving variables in a physical prototype  
  Ricardo Enríquez, Spain (p. 385)
• Control Strategies of the Natural Ventilation for Passive Cooling for an Existing Residential Building in Mediterranean Climate  
  Alessandro Rinaldi, Italy (p. 396)
• Evaporative Cooling and Ventilation Control Strategies for a Kindergarten in Mediterranean Climate  
  Alessandro Rinaldi, Italy (p. 406)
• A modular, open system for testing ventilation and cooling strategies in extremely low energy lecture rooms  
  Ralf Klein, Belgium (p. 416)
• Cold storage in the thermal mass of buildings using night ventilation. Experimental analysis  
  Rafael Salmeron Lissen, Spain (p. 426)
• How safe is it to neglect thermal radiation in indoor environment modeling with high ventilation rates?  
  Sasan Sadrizadeh, Sweden (p. 436)
• 3D Fluid dynamic analyses of open joint ventilated facades applying experimental Stereo-PIV techniques  
  Maria Nuria Sanchez Egido, Spain (p. 441)
• A Study on the Reduction Effect of Ventilation and Heating Load by Installing Air-based Solar System in the Detached Houses  
  Choi Youngjin, Japan (p. 450)
• Implementation of Multi-zone Ventilation Methodology in the Spanish Energy Performance Certificate Tool  
  Javier Garcia Ramos, Spain (p. 460)
Parallel Session 3C - Short Oral Presentation Session: Ventilation in relation to IAQ and health
Chairpersons: Willem de Gids, Samuel Caillou

• Ventilation and health – a review
  Peter Foldbjerg, Denmark (p. 474)
• Evaluation of Ventilation and IAQ Parameters Measured in Social Housing in Madrid
  Sergio Rodriguez-Trejo, Spain (p. 482)
• Influence of air quality performance requirements on the demand of energy
  Jose Manuel Salmeron Lissen, Spain (p. 495)
• Radon concentration control by ventilation and energy efficiency improvement
  Borja Frutos, Spain (p. 508)
• How the filtration of the incoming air decreases the particle concentration within a school equipped with a balanced ventilation system
  Alain Ginestet, France (p. 518)
• Energy performance of active polarization filters vs. conventional filters in HVAC systems
  Eduardo Theirs, Spain (p. 527)
• The effect of CO₂ on the nocturnal restlessness of an Alzheimer patient
  Bart Cremers, Netherlands (p. 534)
• Air change rate measurements using indoor/outdoor ratio of PM2.5
  Li Lingshan, China (p. 540)
• Mitigating Occupant Exposure to PM2.5s Emitted by Cooking in High Occupancy Dwellings Using Natural Ventilation Strategies
  Benjamin Jones, UK (p. 549)
• Ventilation effectiveness comparison between extract ventilation and balanced ventilation in a scale model
  Bart Cremers, Netherlands (p. 559)
• Numerical evaluation of the impact of hemp lime concrete moisture-buffering capacity on the behaviour of relative humidity sensitive ventilation system
  Bassam Moujalled, France (p. 566)
• Optimal window opening based on natural ventilation measurements
  Yue Zhang, China (p. 575)
• Evaluation of the refurbishment potential of Mediterranean schools towards nZEB
  Niki Gaitani, Greece (p. 584)
08:45-10:15  Parallel Session 4A - Topical Session: Solutions and future developments for airtight envelopes and ductwork in new and renovated buildings

*Chairpersons: François Rémi Carrié, Edward Cooper*

- **How to construct a domestic pitched roof with high thermal quality?**
  Staf Roels, Belgium (Invited speaker) (p. 593)
- **Detailed numerical modelling of moist air flow through a complex airtightness defect**
  Clement Belleudy, France (p. 601)
- **Characterization of sealants and expanding foams**
  Filip Van Mieghem, Belgium (p. 612)
- **Laboratory investigation on the durability of taped joints in exterior air barrier applications**
  Jelle Langmans, Belgium (p. 615)

08:45-10:15  Parallel Session 4B - Topical Session: Ventilative cooling and Annex 62 (Part 2)

*Chairperson: Guilherme Carrilho da Graça*

- **Energy use consequences of ventilative cooling in a ZEB residential building**
  Maria Justo Alonso, Norway (p. 624)
- **Ventilative cooling strategies to reduce cooling and ventilation needs in shopping centres**
  Marta Avantaggiato, Italy (p. 633)
- **Overheating Assessment of a Passive House Case Study in Spain**
  Juan Maria Hidalgo Betanzos, Spain (p. 645)
- **Automatic natural ventilation in large spaces: a passive ventilation technology for passive buildings**
  Flourentzos Flourentzou, Switzerland (p. 656)
08:45-10:15 Parallel Session 4C - Topical Session: IAQ and ventilation in the Spanish regulation

Chairpersons: José Antonio Tenorio, Pilar Linares

- Energy and IAQ friendly variable ventilation rates, according with the proposed indoor air quality regulations included in the Spanish building code
  Sonia García-Ortega, Spain (p. 677)
- Energy saving as a consequence of the proposed change in Spanish regulations relating to indoor air quality
  Pilar Linares, Spain (p. 687)
- Impact on the formation of mould in the period of summer, that indicates change in existing housing ach. Climate zone D1
  Enrique Larrumbide Gomez-Rubiera, Spain (p. 695)
- Ventilation tool for improving the usability of ventilation levels related to Spanish regulations
  Rafael Villar Burke, Spain (p. 702)
- Impact of the new rite 2013 (regulation on thermal installation) on indoor air quality
  Paulino Pastor Perez, Spain (p. 709)

10:15-10:35 Coffee break

10:35-11:35 Parallel Session 5A - Long Oral Presentation Session: Air infiltration modelling

Chairpersons: Peter McDowall, Jelle Lagmans

- Infiltration and Ventilation in a Very Tight, High Performance Home
  Andrew Persily, USA (p. 719)
- Impact of air infiltration rates on moisture buffering effect of wooden surfaces
  Dimitrios Kraniotis, Norway (p. 727)
- Numerical evaluation of the airtightness impact on airflow pattern in mechanically ventilated dwellings in France
  Fabrice Richieri, France (p. 738)
- Characterization of high performance ductwork
  Lars-Ake Mattsson, Sweden
### Auditorio

**10:35-11:35**  
**Parallel Session 5B - Topical Session: Natural free cooling using PCM and thermal mass**  
*Chairpersons: Servando Alvarez, José Antonio Tenorio*

- **Concrete in ventilated facades for natural cooling of buildings.**  
  SINHOR project  
  Servando Alvarez & Cesar Bartolomé, Spain *(p. 750)*
- **PCMs as a tool increasing thermal inertia in Buildings**  
  Luisa Cabeza, Spain *(p. 1002)*
- **Advanced Materials to fight Urban Climate Change**  
  Theoni Karlessi, Greece *(p. 752)*
- **How cool roofs interact with PCMs: Investigating thermal-energy behaviour of a cool roof membrane with paraffin based PCM inclusion**  
  Anna Laura Pisello, Italy *(p. 753)*

### Salón de Actos

**10:35-11:35**  
**Parallel Session 5C - Topical Session: Indoor Environmental Quality- Ventilation and Health**  
*Chairpersons: Bjarne Olesen, Wouter Borsboom*

- **The Indoor Environmental Quality Alliance. Occupants behaviour and its impact on ventilation**  
  Bjarne Olesen, Denmark (Invited speaker)
- **Are women feeling colder than men in air-conditioning buildings?**  
  Bjarne Olesen, Denmark *(p. 756)*
- **A new AIVC Technical Note on Residential Ventilation and Health**  
  Wouter Borsboom, Netherlands (Invited speaker)

**11:35-11:50**  
**Room change**
Thursday 24 September 2015

A3 Aula de Formación

11:50-12:50 Parallel Session 6A - Long Oral Presentation Session: Airflow and airtightness measurements
Chairpersons: Benjamin Jones, Paula Walhgren

• Field trialling of a new airtightness tester in a range of UK homes
  Edward Cooper, UK (p. 759)
• Calibrating measurement gauges – expense and findings
  Paul Simons, Germany (p. 768)
• Multivariant measurements of airtightness of multifamily building
  Radoslaw Gorzenski, Poland (p. 778)

Auditorio

11:50-12:50 Parallel Session 6B - Topical Session: Demand-Controlled Ventilation
Chairpersons: François Durier, Jelle Laverge

• Demand controlled ventilation in practice: Case study
  Bart Merema, Belgium (p. 820)
• Residential demand controlled extract ventilation combined with heat recovery via a heat pump
  Ivan Pollet, Belgium (p. 830)
• Theoretical and real ventilation heat losses and energy performance in low energy buildings
  Flourentzos Flourentzou, Switzerland (p. 666)
• Discussion

Salón de Actos

11:50-12:50 Parallel Session 6C - Long Oral Presentation Session: IAQ and ventilation in standards and regulations
Chairpersons: William Bahnfleth, José Manuel Salmeron

• Status of the development of the CEN and ISO standards on energy performance of buildings assessment procedures
  Jaap Hogeling, Netherlands (Invited speaker) (p. 789)
• Analysis of indoor air quality & thermal comfort parameters in building regulations in 8 member states
  Eleni Kontonasiou, Belgium (p. 799)
• Indoor Carbon Dioxide Concentrations in Ventilation and Indoor Air Quality Standards
  Andrew Persily, USA (p. 810)

12:50-13:50 Lunch break
Thursday 24 September 2015

A3 Aula de Formación

13:50-15:20 Parallel Session 7A - Topical Session: Winning concepts and examples for high indoor air quality in renovated school buildings

*Chairperson: Lorenzo Pagliano*

- **The Renew-School project: introduction and overview**
  Lorenzo Pagliano, Italy (Invited speaker)
- **Ventilation, indoor air quality and learning in schools**
  Pawel Wargocki, Denmark (p. 949)
- **Evaluation of ventilation solutions for retrofitting of schools**
  Christian A. Hviid, Denmark (p. 959)
- **Minimal Invasive Ventilation Systems with Heat Recovery for School Buildings**
  Gabriel Rojas, Austria (p. 968)
- **Indoor climate assessment of a classroom with mechanical ventilation and operable windows**
  Yacine Allab, France (p. 980)
- **Ventilation strategies for the deep energy retrofit of a kindergarten**
  Francesco Causone, Italy (p. 991)

Auditorio


*Chairpersons: José Manuel Salmeron, Max Sherman*

- **Simplified Methods for Combining Natural and Mechanical Ventilation**
  Nolwenn Hurel, France (p. 840)
- **Development of a Seasonal Smart Ventilation Controller to Reduce Indoor Humidity in Hot-Humid Climate Homes**
  Sara Ticci, Italy (p. 851)
- **Thermodynamic analysis of buildings with natural ventilation and indoor air quality**
  Víctor Moreno Solana, Spain (p. 862)
- **Performances of a simple exhaust mechanical ventilation coupled to a mini heat pump: modeling and experimental investigations**
  Frederic Ransy, Belgium (p. 872)
- **Ventilation performance and indoor air pollutants diagnosis in 20 French low energy homes**
  Gaëlle Guyot, France (p. 885)
13:50-15:20 Parallel Session 7C - Long Oral Presentation Session: Ventilation and Indoor Air Quality
Chairpersons: Jaap Hogeling, Yun Gyu Lee

- Recommendable supply air rates for residential housing - A simulation study considering CO₂ concentration, relative humidity, TVOC emissions and mould risk
  Gabriel Rojas, Austria (p. 937)
- Reviewing legal framework and performance assessment tools for residential ventilation systems
  Rob van Holsteijn, Netherlands (p. 895)
- Capture efficiency of air curtain assisted residential range hoods
  Jelle Laverge, Belgium (p. 913)
- Impact of staff posture on airborne particle distribution in an operating theatre equipped with ultraclean-zoned ventilation
  Sasan Sadrizadeh, Sweden (p. 919)
- Mechanical ventilation performance assessment in several office buildings by means of Big Data techniques
  Ricardo Enriquez Miranda, Spain (p. 926)
- Effects of Carbon Dioxide With and Without Bioeffluents on humans
  Pawel Wargocki, Denmark (p. 904)

15:20-15:35 Coffee break
15:35-17:15  Closing session

Best paper & poster award
Max Sherman, USA

Summing up of ventilative cooling track
Maria Kolokotroni, Professor, Brunel University London, London (Invited Speaker)

Summing up of IAQ & health track
Willem de Gids, VentGuide, The Netherlands (Invited Speaker)

Summing up of airtightness track
Arnold Janssens, Professor, University of Ghent, Belgium (Invited Speaker)

Shifting the IEQ Paradigm from Comfort Silos to Holistic Health and Performance
William Bahnfleth, Professor and Director, Indoor Environment Centre Department of Architectural Engineering, The Pennsylvania State University, USA (Invited Speaker)  (p. 1006)

Announcement of 2016 conference - IAQ 2016 "Defining Indoor Air Quality: Policy, Standards and Best Practices", co-organized by ASHRAE and AIVC

Announcement of other events

17:15  End of conference