Newsletter
Air Infiltration and Ventilation Centre

# Foreword

@AIVCnews

Welcome to the March 2024 issue of our newsletter offering insight into the AIVC's ongoing efforts to advance knowledge sharing within the ventilation and air infiltration community.

Get ready to mark your agenda for the following AIVC events:

• 21 March 2024, AIVC/venticool webinar: Design and performance assessment of Ventilative Cooling

• 26 March 2024, AIVC/venticool webinar: Exploring window opening behaviour for optimal cooling and thermal comfort

• 18-19 April 2024, AIVC/ASC Workshop, Singapore

• 9 - 10 October 2024, 44th AIVC conference, Dublin, Ireland

• 24-26 September 2025, 45th AIVC - ASHRAE IEQ conference, Montreal, Quebec, Canada

In addition, we're excited to share that over the past six months, we've released three new publications and gained valuable insights from our recent webinars. Lastly, stay informed with an article on the EPBD revision, now in its final stage of adoption.

We wish you a pleasant reading and look forward to seeing you in our future events. We would also like to encourage you to visit our website, follow us on X and LinkedIn and read our monthly newspaper "Energy Efficiency and Indoor Climate in Buildings".

Arnold Janssens & Peter Wouters, Operating Agents, AIVC

no 25
March 2024

## 9 - 10 October 2024 – 44th AIVC - 12th TightVent- 10th venticool conference in Dublin, Ireland

The 44th AIVC conference "Retrofitting the Building Stock: Challenges and Opportunities for Indoor Environmental Quality" will be held on 9 & 10 October 2024 in Dublin, Ireland together with the 12th TightVent and the 10th venticool conferences. The conference will take place at Croke Park.

**Conference Scope**

In a world striving to achieve carbon neutrality by 2050, it is imperative to strike a balance that sustains both our environment as well as the health and comfort of the individuals inhabiting buildings. Considering that 90% of the current buildings are projected to remain in the year 2050, retrofitting the existing building stock is paramount to reaching decarbonisation goals.

From the perspective of climate goals, reducing energy use in the built environment via energy retrofit and climate neutral newly constructed buildings are critical. However, it is crucial to prioritise indoor environmental quality when reducing energy usage to meet climate targets. Well-designed and executed retrofits are needed to reduce carbon emissions while ensuring healthy indoor environments. Building retrofit professionals, energy conservation experts, ventilation system designers & installers, and indoor air quality specialists must collaborate on innovative solutions to achieve these multifaceted objectives. AIVC 2024 will serve as a multidisciplinary platform to address the emerging challenges by exchanging cutting-edge ideas, research findings, policies and industrial experiences.

The conference organisers invite contributions centered around the pivotal role of ventilation, airtight building and ductwork designs, and ventilative cooling solutions in enhancing Indoor Environmental Quality (IEQ) and overall health in existing buildings. Case studies demonstrating innovative solutions are also welcome.

**Conference Concept**

The conference will consist of parallel sessions largely devoted to:

• Smart ventilation, Indoor Air Quality and health

• Building and ductwork airtightness

• Ventilative cooling – Resilient cooling

# In this issue

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**Conference topics**

*Smart ventilation, Indoor Air Quality and health:*

• Integration of ventilation in building energy retrofits

• Associated health benefits of energy retrofits

• Strategies to reduce exposure to outdoor and indoor air pollutants (filtration, air cleaning, source control)

• Resilient approaches in IAQ management (infection control, hazardous events, etc.)

• Inspection, monitoring, maintenance, reliability and durability of ventilation systems

• Model based data analytics and control strategies for smart ventilation, including the role of consumer-grade IAQ sensors

• Building Information Modelling (BIM), Life Cycle Assessment (LCA) and ventilation systems

• Standards, policies and legislation.

*Building and ductwork airtightness*

• Role of airtightness in building energy retrofits

• Energy and IAQ impact of envelope and ductwork leakage

• Innovative measurement and airtightening techniques

• Compliance schemes for airtightness

• Long-term performance: durability of airtightness

*Ventilative cooling - Resilient cooling:*

• Role of ventilative and resilient cooling in building energy retrofits

• Occupant IEQ perception and satisfaction

• Resilient approaches to extreme heat events and climate change

• Control strategies and personal comfort control

• Standards, legislation and compliance tools

**Conference organisers**

The conference is an initiative from:

• INIVE on behalf of the AIVC, TightVent, and venticool;

• the University of Galway;

• the Maynooth University; and

• the Sustainable Energy Authority Of Ireland (SEAI)

**Important dates**

• Abstracts Submission for non-peer reviewed papers due: **March 18, 2024**

• Abstracts Acceptance Confirmation due: **April 22, 2024**

• Papers' or Extended Summary Submission due: **July 1, 2024**

For further information please click here.


## 24-26 September 2025 – 45th AIVC - ASHRAE IEQ conference in Montreal, Quebec, Canada

The conference "IEQ 2025: Rising to new challenges: Connecting IEQ to a sustainable future", organised by ASHRAE and AIVC, will be held in Montreal, Canada on 24-26 September 2025. The conference will also be the 13th TightVent and 11th venticool conference.

This conference provides the opportunity to learn, network and engage with IEQ professionals dedicated to advancing the fields of indoor environmental quality. Emphasis is placed on the growing understanding of occupant response to indoor environment elements (thermal, air quality, lighting and acoustics) while enhancing resilience in a changing climate. Seminars are led by experts from around the world representing AIVC, ASHRAE and many other partnering organisations.

**Topics for Papers and Seminars**

• Performance Metrics: For all aspects of IEQ

• Occupant Behavior: How behavior impacts IEQ and how IEQ impacts behavior - psychological dimensions of IEQ

• Smart Sensors, Data and Controls: Sensor properties, data management, cybersecurity, applications, commissioning, equivalence

• Resilience and IEQ: Responding to climate change and disasters

• Ventilation: Mechanical, passive, natural and hybrid systems

• Air Tightness: Trends, methods and impacts

• Thermal Comfort: Dynamic approaches, health impacts and trends

• Policy and Standards: Trends, impacts, implications

• HVAC and IEQ in a post-COVID world

• Ventilation and building decarbonization

**Important dates**

• Abstracts for Conference Papers and Extended Abstracts Due: **November 11, 2024**

• Decisions on Abstracts for Conference Papers and Extended Abstracts Sent: **December 16, 2024**

• Registration Opens: **March 7, 2025**

• Papers and Extended Abstracts Due: **March 10, 2025**

• Paper Final Revisions Due: **May 12, 2025**

• Speaker Presentations Due for Commercialism Review: **September 8, 2025**

More information can be found here.

## AIVC's new publications

The AIVC is pleased to announce the release of 3 new AIVC publications!

**AIVC's Ventilation Information Paper no 45.9**: Trends in building and ductwork airtightness in Japan (February 2024).

This paper summarises current knowledge on trends in building and ductwork airtightness in Japan.

**AIVC's Literature List no 37**: Overview of Webinars in cooperation with TightVent Europe and venticool platforms (January 2024).

This document provides an overview of all webinars held since 2012, including information on each event with links to the online recordings and the pdfs to the presentations

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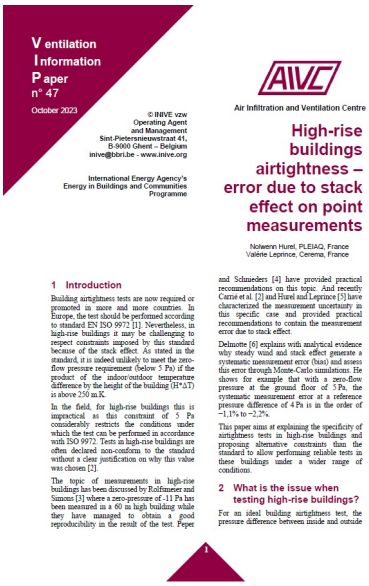
**AIVC's Ventilation Information Paper no 47**: High-rise buildings airtightness – error due to stack effect on point measurements (October 2023).

This paper gives guidance to perform a pressurisation test in high-rise buildings and suggests new criteria to replace standard requirements when they cannot be met.

All documents are freely accessible here.


Ventilation Information Paper n° 47
October 2023

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International Energy Agency's Energy in Buildings and Communities Programme

Air Infiltration and Ventilation Centre

High-rise buildings airtightness – error due to stack effect on point measurements

Nolwenn Hurel, PLEIAQ, France
Valérie Leprince, Cerema, France

1 Introduction

Building airtightness tests are now required or promoted in more and more countries. In Europe, the test should be performed according to standard EN ISO 9972 [1]. Nevertheless, in high-rise buildings it may be challenging to respect constraints imposed by this standard because of the stack effect. As stated in the standard, it is indeed unlikely to meet the zero-flow pressure requirement (below 5 Pa) if the product of the indoor/outdoor temperature difference by the height of the building ($H*\Delta T$) is above 250 m.K.

In the field, for high-rise buildings this is impractical as this constraint of 5 Pa considerably restricts the conditions under which the test can be performed in accordance with ISO 9972. Tests in high-rise buildings are often declared non-conform to the standard without a clear justification on why this value was chosen [2].

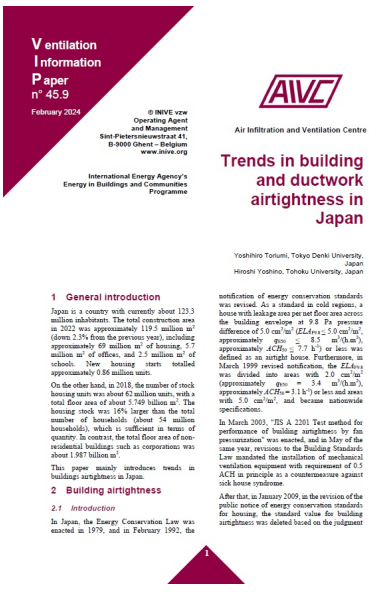
The topic of measurements in high-rise buildings has been discussed by Rolfsmeier and Simons [3] where a zero-pressure of -11 Pa has been measured in a 60 m high building while they have managed to obtain a good reproducibility in the result of the test. Feper and Schnieders [4] have provided practical recommendations on this topic. And recently Carrié et al. [2] and Hurel and Leprince [5] have characterized the measurement uncertainty in this specific case and provided practical recommendations to contain the measurement error due to stack effect.

Delmotte [6] explains with analytical evidence why steady wind and stack effect generate a systematic measurement error (bias) and assess this error through Monte-Carlo simulations. He shows for example that with a zero-flow pressure at the ground floor of 5 Pa, the systematic measurement error at a reference pressure difference of 4 Pa is in the order of −1,1% to −2,2%.

This paper aims at explaining the specificity of airtightness tests in high-rise buildings and proposing alternative constraints than the standard to allow performing reliable tests in these buildings under a wider range of conditions.

2 What is the issue when testing high-rise buildings?

For an ideal building airtightness test, the pressure difference between inside and outside


Ventilation Information Paper n° 45.9
February 2024

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Trends in building and ductwork airtightness in Japan

Yoshihiro Toriumi, Tokyo Denki University, Japan
Hiroshi Yoshino, Tohoku University, Japan

1 General introduction

Japan is a country with currently about 123.3 million inhabitants. The total construction area in 2022 was approximately 119.5 million m² (down 2.3% from the previous year), including approximately 69 million m² of housing, 5.7 million m² of offices, and 2.5 million m² of schools. New housing starts totalled approximately 0.86 million units.

On the other hand, in 2018, the number of stock housing units was about 62 million units, with a total floor area of about 5.749 billion m². The housing stock was 16% larger than the total number of households (about 54 million households), which is sufficient in terms of quantity. In contrast, the total floor area of non-residential buildings such as corporations was about 1.987 billion m².

This paper mainly introduces trends in buildings airtightness in Japan.

2 Building airtightness

2.1 Introduction

In Japan, the Energy Conservation Law was enacted in 1979, and in February 1992, the notification of energy conservation standards was revised. As a standard in cold regions, a house with leakage area per net floor area across the building envelope at 9.8 Pa pressure difference of 5.0 $cm^2/m^2$ ($EL_{A/Anet} \leq 5.0$ $cm^2/m^2$, approximately $q_{50} \leq 8.5$ $m^3/(h.m^2)$, approximately $ACH_{50} \leq 7.7$ $h^{-1}$) or less was defined to an airtight house. Furthermore, in March 1999 revised notification, the $EL_{A/Anet}$ was divided into areas with 2.0 $cm^2/m^2$ (approximately $q_{50} = 3.4$ $m^3/(h.m^2)$, approximately $ACH_{50} = 3.1$ $h^{-1}$) or less and areas with 5.0 $cm^2/m^2$, and became nationwide specifications.

In March 2003, "JIS A 2201 Test method for performance of building airtightness by fan pressurization" was enacted, and in May of the same year, revisions to the Building Standards Law mandated the installation of mechanical ventilation equipment with requirement of 0.5 ACH in principle as a countermeasure against sick house syndrome.

After that, in January 2009, in the revision of the public notice of energy conservation standards for housing, the standard value for building airtightness was deleted based on the judgment

## EPBD revision in final stage of adoption

*Peter Wouters, AIVC Operating agent*

The Energy Performance of Buildings Directive (EPBD) is since 2003 major European legislation with respect to the energy performance of buildings. As it is a directive, it means that each EU member state has to transpose this directive into national legislation, whereby allowing a certain degree of freedom and resulting in sometimes substantial differences in implementation by the member states.

The latest revision dates from 2018. A new revision is under way, for which the European Council and the Parliament have reached in December 2023 a deal on a proposal for revision. It is expected that the European Parliament will adopt the proposal in March and the European Council in April.

This proposed new revision contains various provisions on indoor environmental quality (IEQ), in particular:

- Multiple references across the EPBD
- Clear visibility in Article 1
- Definition of Indoor Environmental Quality (IEQ)
- IEQ to be addressed in new and renovated buildings
- Measurement and control devices for IEQ
- Integration of IEQ and BACS (Building Automation and Control Systems)
- Recommendations in Energy Performance Certificates (EPC)

Indoor environmental quality is defined as *"the result of an assessment inside a building based upon parameters such as relating to the temperature, humidity, ventilation rate and presence of contaminants, influencing the health and wellbeing of its occupants"*.

In article 11, it is specified that Member States shall set requirements for the implementation of adequate indoor environmental quality standards in buildings in order to maintain a healthy indoor climate.

Article 20 specifies that Member States shall lay down the necessary measures to establish regular inspections of the accessible parts of heating, ventilation and air conditioning systems with an effective rated output of over 70 kW. The effective rating of the system shall be based on the sum of the rated output of the heating and air-conditioning generators.

Article 20 also specifies that the Member States may set different inspection frequencies depending on the type and effective rated output of the system whilst taking into account the costs of the inspection of the system and the estimated energy cost savings that may result from the inspection. Systems shall be inspected at least every five years. Systems with generators of an effective rated output of more than 290 kW shall be inspected at least every three year. The inspection shall include the assessment of the generator or generators, circulation pumps, and where appropriate, components of ventilation systems, air and water distribution systems, hydronic balancing systems and control system. Where a ventilation system is installed, its sizing and its capabilities to optimize its performance under typical or average operating conditions relevant for the specific and current use of the building shall also be assessed.

Finally, it is specified in article 32 that Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with most articles, including articles 11 and 20, within 24 months after the date of entry into force of this Directive.

## Upcoming AIVC & venticool webinars - March 2024

AIVC & venticool are inviting you to register for the upcoming webinars:

1. **Design and performance assessment of Ventilative Cooling** - 21 March, 2024 (14:00-15:15 CET) – Register here

2. **Exploring window opening behaviour for optimal cooling and thermal comfort** - 26 March, 2024 (14:00-15:15 CET) – Register here

Participation is **free**, but prior registration is required.

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## 18-19 April 2024, AIVC/ASC Workshop, Singapore, "Ventilation, IEQ & Sustainability"

The AIVC in collaboration with the ASHRAE Singapore Chapter (ASC) is organising a 1 ½ -day workshop to be held on April 18-19, 2024 in Singapore. The event will take place at the Surbana Jurong Campus. The workshop will be led by experts from the AIVC and the ASHRAE Singapore Chapter. It is intended for engineers, architects, and other professionals who want to learn more about ventilation, IEQ and sustainability.

The workshop main themes include:

• Optimising Indoor Air Quality for Climate Resilience: Ventilation Strategies in the Face of the Climate Crisis

• Reducing Carbon Footprints: The Role of Energy-efficient Ventilation Technologies

• Smart Building Automation for Climate-Adaptive Ventilation

For further information please click here.

## Feedback from AIVC Webinars – December 2023 to February 2024

During the period October 2023 to February 2024, the AIVC organised 3 webinars:

**12 December 2023: Smart ventilation in non-residential buildings. How to assess? How to design?**

• 208 participants
• Organiser: AIVC
• Recordings & Slides available here

**26 January 2024: Airtightness tests for high-rise buildings**

• 98 participants
• Organiser: AIVC & TightVent
• Recordings & Slides available here

**12 February 2024: New standards, guidelines or regulations for ventilation due to COVID-19**

• 181 participants
• Organiser: AIVC
• Recordings & Slides available here

The full collection of past events' recordings and slides can be found here. Check them out and subscribe to our YouTube channel!

## AIVC • List of board members

Australia: Riccardo Paolini, University of New South Wales

Belgium: Hilde Breesch, KU Leuven • Samuel Caillou, Buildwise

China: Guoqiang Zhang, Hunan University • Zhengtao Ai, Hunan University

Denmark: Bjarne Olesen, Technical University of Denmark • Alireza Afshari, Aalborg University Copenhagen

France: Laure Mouradian, CETIAT • Gaëlle Guyot, CEREMA

Italy: Michele Zinzi, Enea • Marco Simonetti, Politecnico di Torino

Ireland: James McGrath, Maynooth University • Marie Coggins, NUI Galway

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

Netherlands: Wouter Borsboom, TNO

New Zealand: Manfred Plagmann, BRANZ • Yu Wang, BRANZ

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Republic of Korea: Yun Gyu Lee, Korea Institute of Construction Technology • Dong Hwa Kang, University of Seoul

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

Sweden: Jan-Olof Dalenbäck, Chalmers University of Technology

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USA: Andrew Persily, NIST • Iain Walker, LBNL

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Arnold Janssens and Peter Wouters, operating agents • Maria Kapsalaki, senior consultant

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