AIR INFORMATION REVIEW

VOL 28, No. 4, September 2007 A quarterly newsletter from Air Infiltration and Ventilation Centre



# Report of the International Workshop on Residential Mechanical Ventilation May 2007, Tsukuba, Japan

*M. Tajima and T. Sawachi (NILIM)*

On 31 May and 1 June 2007, "International Workshop on Residential Mechanical Ventilation" and an attached expert meeting for deeper discussion were organized by NILIM (National Institute for Land and Infrastructure Management), BRI (Building Research Institute) and IBEC (Institute for Building Environment and Energy Conservation).

Since 1 July 2003, Japanese Building Standard Law requires mechanical ventilation of 0.5 times air change per hour for habitable space in residential buildings and selection of components including fan(s) by means of flow rate/pressure loss calculation. The latest large scale survey of residential indoor air quality shows the decrease of formaldehyde and other VOCs concentration, and it seems that the revision of the building regulation including pollution source control as well as mandatory requirement of mechanical ventilation has succeeded in solving the most serious problem. However, from the view point of further utilisation of the mechanical ventilation systems, it seems that there are still problems to be solved. This workshop is aimed at stimulating Japanese practitioners in the field using the help of international eminent experts so that the movement towards much more reliable and cost effective mechanical and hybrid ventilation systems can be realised. In addition, through smaller scale expert meeting on the second day, it was intended to activate an exchange of knowledge, experience and philosophy among experts from different countries.

The topics of the Workshop were the following:

- Measurement method for DP-Q characteristics of components of ventilation systems
- Design practice of residential ventilation
- Installation of residential ventilation
- Verification of airflow rate of ventilation system
- Maintenance of residential ventilation
- Energy conservation for residential ventilation
- Standards, regulations and guidelines for residential ventilation
- Actual situation and problem of residential ventilation
- Actual situation and problem of residential ventilation

*Dr. Sherman introduced AIVC's activities and presented about ASHRAE'S Residential Ventilation Standard*


## AIR Information Review

The newsletter of the AIVC, the Air Infiltration and Ventilation Centre. This newsletter reports on air infiltration and ventilation related aspects of buildings, paying particular attention to energy issues. An important role of the AIVC and of this newsletter is to encourage and increase information exchange among ventilation researchers and practitioners worldwide.

Published by: Air Infiltration and Ventilation Centre - Operating Agent and Management
INIVE EEIG - Lozenberg 7 - BE-1932 Sint-Stevens-Woluwe - Belgium
Tel: +32.2.655.77.11 - Fax: +32.2.653.07.29 - *inive@bbri.be* - *http://www.inive.org*

Preparation: Christophe Delmotte & Peter Wouters - Editing: Erika Malu

On 31 May, the open workshop, the agenda of which is shown in Table 1, was held with about 150 participants. There were lively discussions, for example on energy saving measures, strategies for better maintenance, use of flexible ducts. Exhibitions of ventilation related products were organized.

*Table 1: Agenda of the Workshop*

**Workshop with simultaneous interpretation (in English / Japanese)**
**31 May at EPOCHAL TSUKUBA**

1. **Welcome Remarks**
   H. Yamanouchi (Chief Executive of BRI)
2. **Session 1, Regulation and Standard**
   Chair: H. Osawa (BRI)
   1. M. Tajima (NILIM, Japan): Topics of Energy Saving Code for Residential Ventilation in Japan
   2. T. Sawachi* (NILIM, Japan): New Regulation of Ventilation for Apartment Houses in Korea
      *On behalf of Dr. Yun-Gyu Lee (KICT, Korea)
   3. M. Riley (NRCan, Canada): Canada's Residential Mechanical Ventilation Situation
   4. M. Sherman (LBNL, USA): ASHRAE'S Residential Ventilation Standard: 62.2-2007
3. **Session 2, Development, Product and Practice for Advanced Ventilation**
   Chair: T. Sawachi and M.Tajima (NILIM)
   5. M. Jardinier (Aereco, France): Characteristics of humidity controlled exhaust only ventilation system
   6. P. Op 't Veld (Cauberg-Huygen Consulting Company, Netherlands): RESHYVENT - EU Cluster project on Demand Controlled Hybrid Ventilation for Residential Buildings
   7. M. Sándor (Systemair, Sweden): Ventilation in Sweden
   8. H. Yoshino (Tohoku university, Japan): Study on Performance Evaluation of Mechanical Ventilation Systems for Occupied Houses
   9. C. Welinder (Swema, Sweden): Air Flow measurement and distribution adjustment for ducted ventilation systems
4. **Discussion & Summary**
   Chair: T. Sawachi and M.Tajima (NILIM)
5. **Social Dinner**
   Opening Remarks: T. Ogawa (Deputy Director-General of NILIM)
   Closing Remarks: M. Enai (Hokkaido University)

On 1 June, the closed expert meeting was held with 30 participants at NILIM, no participants were allowed to wear a tie for the campaign called "Cool Biz", proposed by Ministry of the Environment for saving cooling energy.

In the expert meeting, the latest results of practical research projects were introduced by six Japanese experts, and discussions followed (Table 2). In the late afternoon, a technical tour in BRI and NILIM was arranged and the expert meeting was concluded.

During the workshop and the expert meeting, participants shared the information on the topics above mentioned. Next year, the AIVC2008 conference will be held in Kyoto, Japan, and Japanese experts will have another chance to meet more international experts. The authors would like to return our thanks to the presenters, the audience and staff.

*Table 2: Agenda of the Expert Meeting*

**Expert meeting (in English)**
**1 June at NILIM**

1. **Remarks**
   T. Ogawa, Deputy Director-General of NILIM
2. **Short Presentations on Japanese Situation of Residential Ventilation**
   Chair: M. Tajima (NILIM)
   1. Y. Ito (Matsushita Ecology Systems, Japan): Residential Ventilation in Japan
   2. S. Onishi and H. Noda (Mitsubishi Electric Corporation, Japan): Whole house air-conditioning and ventilation system with ducts
   3. T. Inomae (Topre Corporation, Japan): An Innovative & Compact Ventilation Unit
   4. S. Murata (Hokkaido Northern Regional Building Research Institute, Japan): The Subjects of Mechanical Ventilation Systems in the Cold Region
   5. I. Ota (Misawa Homes Institute of Research and Development, Japan): Development of PV System with Vent-Heating Function
   6. T. Sawachi (NILIM): Study on the design method for residential ventilation system with ducts
3. **Discussion**
4. **Technical Tour in BRI and NILIM**
5. **Closing**

nceub
Network for Comfort and Energy Use in Buildings

## The adaptive approach to comfort in buildings

Comfort is a goal to achieve, not a product to define

Thermal adaptation is essentially dynamic. Comfort is not a 'product' which is provided for building occupants, it is a goal which they achieve provided they are able to exert the necessary control over their environment. The control they can exert over the environment will partly be decided by the building they occupy and its services, including openable windows and blinds as well as mechanical services. The environmental conditions needed to achieve this comfort goal also change with time and there are undoubtedly limits to the range of indoor climates that any group of people can adapt to, related as much to their thermal experience and their climatic, social, economic and cultural position as to their physiology.

This dynamic model for comfort requires a different approach to providing comfort than one that assumes only a single temperature is acceptable. Change and movement, typically within the context of well understood patterns of behaviour, is the essence of the adaptive approach: stasis, the existence of a static relationship between occupant and environment, is only achieved in very specific circumstances. Buildings need to allow people opportunities for adjustment, in an understandable way, in a variable and varying context.

*Occupant control*

Adaptation is assisted by providing thermal control and convenient and effective means of control should be provided, so that the occupants can adjust the thermal environment to their own requirements. This 'adaptive opportunity' may be provided, for instance, by ceiling fans and openable windows in summertime, or by local temperature controls in winter.

A control band of ±2K (or an equivalent band of air speed) should be sufficient to accommodate the great majority of people. Individual control is more effective than group-control.

*Customary thermal environments and comfort*
People adapt more readily to thermal environments they are familiar with.
The building should therefore be designed to provide a thermal environment that is within the range customary for the particular type of accommodation, according to climate, season and cultural context.
Such 'customary' temperatures can often be found in guides and textbooks, established from the experience of building services professionals but may need to be modified in the light of climate change.

*Drift of comfort conditions*
These customary temperatures are not fixed, but are subject to gradual drift in response to changes in conditions both outdoors and indoors and are modified by climate and social custom. A sudden departure from the current customary temperature is likely to provoke discomfort and complaint, while a similar change, occurring gradually over several days may not be so likely to do so.

*Dress codes*
The extent of seasonal variation in indoor temperature that is consistent with comfort depends on the occupants' ability to wear cool clothing in warm conditions and warm clothing when it is cool. Strict dress codes can therefore affect thermal comfort in offices and any code should therefore incorporate adequate seasonal flexibility and personal choice.

*Temperature drift during a day*
Field-studies have found that in offices and schools people adjust their clothing relatively seldom during the working day, so the temperature during occupied hours in any day should not vary much from the comfort temperature. Temperature drifts within ±1 K of the customary temperature would attract little notice. ±2 K would be likely to attract attention and could result in mild discomfort among a small proportion of the occupants.

*Temperature drift over several days*
Clothing and other adjustments in response to day-on-day changes in weather and season occur gradually and may take a week or so to complete. So it is desirable that the day-to-day change in mean indoor Operative temperature during occupied hours should not normally exceed about 1 K, nor should the cumulative change over a week exceed about 3 K. These figures apply to sedentary or lightly active people. If these simple suggestions are followed, people can be comfortable in naturally ventilated buildings in many climates during the whole, or part of the year, thus reducing the need for the use of fossil fuel driven air conditioning.
These simple rules about acceptable temperature change can be formalized into a mathematical relationship as is explained in the section below on 'time and the relationship of comfort temperatures to climate'.

Predicting the most likely customary temperature from the outdoor temperature

In a survey of data from all over Europe the relationship between the indoor comfort temperature and outdoor temperatures in free-running buildings was strong and linear.

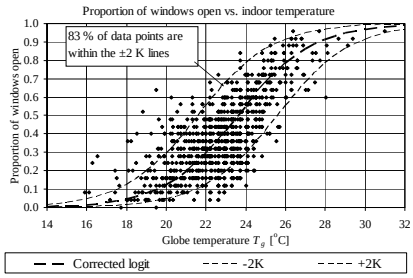
The comfort temperature followed the relationships

$T_{comf} = 0.33T_{rmout} + 18.8$ (for more detail on the exponentially-weighted running mean see e.g.EN15251 or CIBSE Guide A).
Where $T_{comf}$ is the comfort temperature and $T_{rmout}$ is the exponentially-weighted running mean outdoor temperature calculated from the daily mean temperature. For buildings which are heated or cooled the relationship is

$T_{comf} = 0.09T_{rmout} + 22.6$ (Rijal, H, Tuohy, P, Humphreys, M.A. Nicol, F., Samuel, A. and Clarke, J. (2007) Using results from field surveys to predict the effect of open windows on thermal comfort and energy use in buildings, Energy and Buildings 39 (7) 823-836).

In both cases discomfort will be minimal if the temperature is within 2 K of the comfort temperature.

The idea behind adaptive comfort has been used to build a model of the likelihood of window opening in buildings. By assuming that window opening is a response to feeling too hot (and closing to cold) a stochastic model of window opening has been developed which, when implemented in a simulation package, reflects the actual window opening behaviour of buildings occupants. It will be clear that these 'adaptive' ideas have great relevance to the study of ventilation.




*Proportion of windows open as a function of temperature illustrating the 'dead band' of ±2 K within which the use of windows is indeterminate*

## Conference: Airconditioning - Can it be sustainable? 27-29 July 2008, Windsor, United Kingdom

The EU has set ambitious targets for energy savings and is aiming for significant carbon emission reductions from buildings. In Europe primary energy consumption by buildings is at least 40% of total energy consumption and this is typical of developed countries. Some 50% of this energy is used in the provision of indoor climate control for occupant comfort. In the US 70% of the generated electricity is used to air-condition buildings. Buildings without AC typically use less than half as much energy. Recent years have seen an explosive development of in air-conditioning markets in Europe even in climates that should not need air-conditioning. Europe is moving towards the US model.

Reliance on mechanical cooling is also creating a general reduction of designer skills in the climatic design of buildings. Basic knowledge about the massing and layout of buildings to avoid overheating or the placement of windows to optimise the cooling effect of cross ventilation are not necessary if the services engineer can just provide mechanical cooling.

The kind of questions addressed by this conference will include:

- When is AC essential?
- Are there ways to make it more efficient?
- What conditions should it be providing in the building?
- What will be the effect of climate change and rising energy prices?
- How can thermal comfort standards reflect concerns for sustainable buildings?
- What are the cultural consequences of reliance on AC?

For a copy of the Call for Papers contact F. Nicol: _____
or visit the NCEUB website http://www._____ and look in 'future conferences' heading in the 'noticeboard' section.

*Windsor thermal comfort conferences*
The Windsor conferences have been held periodically since 1994. Each has aimed to offer an opportunity for a thorough scientific discussion on a specific comfort-related theme in the tranquil surroundings of the Cumberland Lodge conference centre (http://www.cumberlandlodge.ac.uk). Because they are residential the conferences provide a perfect environment for frank and detailed discussion.

The first Windsor conference in 1994 laid the foundation for many of the recent changes in the theory of thermal comfort. In 2001 the second Windsor conference influenced international standards. In 2004 the Post Occupancy Evaluation of buildings was covered and in 2006 what 'works well' in low energy buildings for the future. In 2008 the discussions will centre on the alternative approaches to the climatisation of buildings in the 21st Century.

Proceedings of the 1994 Windsor conference are published as Nicol, F., Humphreys, M., Sykes, O. and Roaf, S. (eds.) (1995) Standards for thermal comfort: indoor air temperature standards for the 21st century. London, E & FN Spon.

Selected articles resulting from the 2001 conference can be found in *Energy and Buildings* Vol 36(4) (2002), from the 2004 conference in *Building Research and Information* Vol 33(4) (2005) and from the 2006 conference in *Energy and Buildings* Vol 39(7) (2007). Many of the conference papers from 2001 and most of the papers from 2006 are available for download from the NCEUB website: http://_____.

## What is NCEUB?

The Network for Comfort and Energy Use in Buildings (NCEUB) is a network of researchers, consultancies, designers and manufacturers concerned with building-related energy issues and requirements for human thermal comfort. Inaugurated in September 2004, its aim is to define and promote the research effort needed to understand and enhance the thermal comfort of building occupants whilst also minimising the energy use of building, in particular those without year-round mechanical heating and cooling. It has been funded for its first 3 years by the EPSRC (Engineering and Physical Sciences Research Council) in the UK.

Network outputs will include research to underpin new norms and standards for indoor climate and design guidance for building controls. It provides a centre for information in this field of research and advice on the implications of the work for the training of building professionals.

In seeking to improve the quality and coherence of research and product development in comfort and energy use in buildings, the NCEUB works in three ways: proactively, reactively and interactively. Work groups have been set up to proactively survey existing research, identify gaps, present the need for further research and promote wider membership. Topics have included building simulation, standards and a proposed national temperature monitoring survey.

Part of our reactive work is the extensive and growing database on the well-established website of papers and research by members. Our interactive work includes informal workshops and seminars, a six-monthly general meeting for discussion of business and presentation of research papers and an international conference held in April 2006 (Windsor 2006). Since the inaugural meeting at Oxford Brookes, meetings have been hosted at Strathclyde, Bath, Sheffield and London Metropolitan Universities.

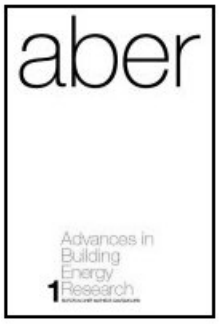
*Join the network*
The network has nearly 200 members, about one third of whom are from outside the UK. The members are largely academic, but 27% are consultants and other professionals. If you are interested in becoming involved as a Network member, you can join online at http://www._____.

## Advances in Building Energy Research (ABER), is a new review journal

*Advances in Building Energy Research* (ABER) is a new review Journal, aiming to provide expert and authoritative reviews and analyses of the most important developments across the rapidly expanding fields of energy efficiency and environmental performance of buildings. It also provides a unique forum by bringing together invited contributions from the foremost international experts, to examine new technologies and methodologies with the latest research on systems, simulations and standards.
Annually published and peer-reviewed, it delivers an invaluable resource for architects, building engineers, environmental engineers, industry professionals, students, teachers and researchers in building science.

Topics covered by ABER include:
- invaluable thermal comfort in the built environment
- advanced materials to improve energy efficiency of buildings
- indoor air quality
- energy efficient lighting and daylight
- visual comfort in the built environment
- thermal and air flow studies in the urban environment
- passive solar heating of buildings and passive cooling in buildings
- energy efficient HVAC systems for buildings
- urban energy systems
- design and retrofitting of energy efficient buildings
- use of renewable energies in the built environment
- natural , mechanical and hybrid ventilation
- monitoring and measurement techniques in buildings
- energy rating and classification of buildings
- intelligent control of buildings
- building physics
- environmental impact and sustainability in the building sector
- legislative and educational aspects for energy efficient buildings

*Advances on Building Energy Research* is published with the support of :
- The International Union of Architects, (Renewable Energies Section),
- REHVA, (The European Association of Heating and Refrigeration Engineers), and
- AIVC, The Air Infiltration and Ventilation Center.
- INIVE, The International Network on Infiltration Ventilation and Energy




Editor-in-Chief: M. Santamouris
University of Athens, Greece
Asssociate Editors
- Prof O. Seppanen, Technical University of Helsinki, Finland Associate Editor for REHVA
- Dr. M. Sherman, Lawrence Berkeley Laboratory , USA, Associate Editor for AIVC
- N. Fintikakis, Athens, Associate Editor for UIA
- Dr. P. Wouters, Belgium Building Research Institute, Belgium, Associate Editor for INIVE

*Advances in Building Energy Research* is now available online at http://www._____

*Contents of Volume 1, Number 1, 2007*

## REHVA

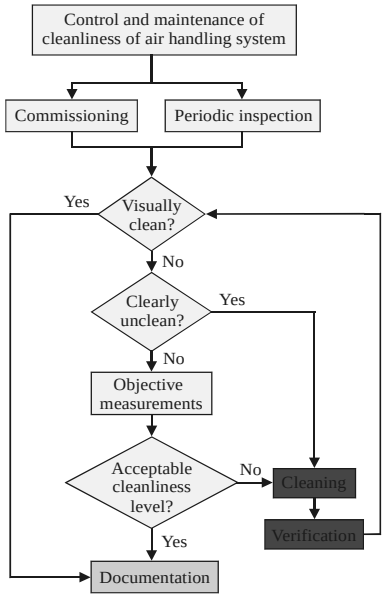
*the Federation of European Heating and Airconditioning Associations -*

has published a series of new guidebooks, providing the latest technical knowledge and guidance on specific HVAC technologies. Teams of European experts have worked within REHVA to produce these publications. REHVA Guidebooks are appreciated for their solid scientific quality and are also easily understood by the practitioners.
REHVA represents more than 110.000 building engineers in 29 European countries.
All REHVA Guidebooks can be ordered online on http://_____ or by contacting REHVA secretariat at info@_____.

REHVA GUIDEBOOK No 8
**Cleanliness of ventilation systems**
P. Pasanen (ed), B. Müller,
R. Holopainen, J. Railio, H. Ripatti, O. Berglund, K. Haapalainen

A growing body of evidence shows that indoor environmental conditions substantially influence health and productivity. Ventilation is an important contribution to air quality. Its purpose is to maintain good indoor air quality. But air handling systems may also be a source of pollution if not properly constructed and maintained. This guidebook presents criteria and methods on how to design, install and maintain clean air handling systems for better indoor air quality. The ventilation system should be cleaned according to a cleaning plan. The plan consists of a selection of methods suitable for the different components and surface materials. The methods should be selected so as to avoid damage to surfaces and components being cleaned.

The guidebook is useful for practitioners who like to follow the recent international practices. With its illustrations and examples it is also an excellent text book for the vocational training of various building professionals. The guidebook offers a wide approach to the factors affecting indoor air quality and is aiming to conform to the European standards of HVAC system maintenance.



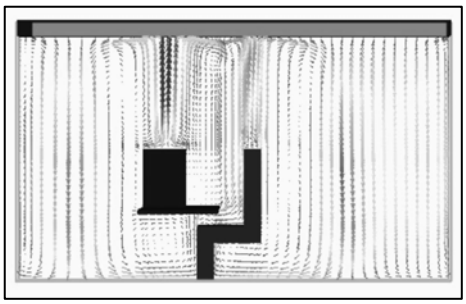

REHVA GUIDEBOOK No 9
**Hygiene requirement for ventilation and airconditioning system and -units**
(Based on VDI 6022)

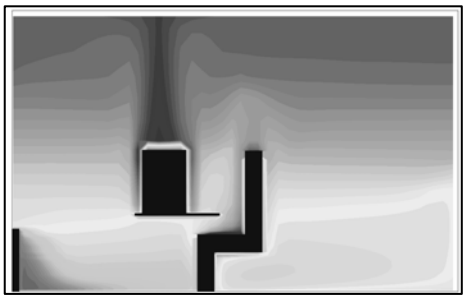
This Guidebook is intended to provide a holistic formulation of hygiene-related constructional, technical and organisational requirements to be observed in the planning, manufacture, execution, operation and maintenance of ventilating and air-conditioning systems. These requirements for ventilating and air-conditioning systems primarily serve to protect human health; they may, however, also be the consequence of technical conditions.

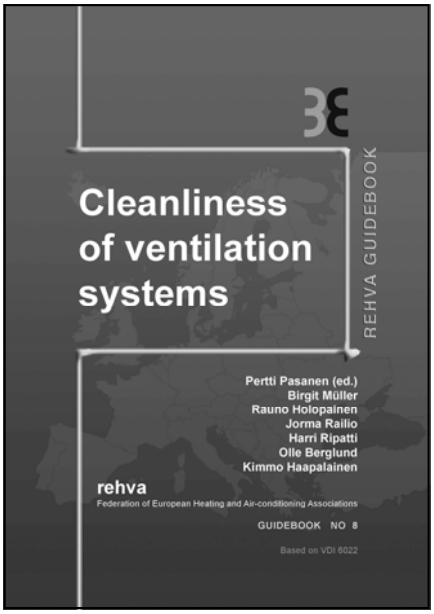
The guidebook complements the REHVA guidebook no 8 Cleanliness of ventilation systems, published at the same time. The guidebook is based on VDI Guideline 6022, one of the most popular Guidelines published by VDI. Since 1998, more than 10.000 copies of VDI Guidebooks have been printed and thousands of people went to the training described in the guidebook. As the result the hygiene standard in air-conditioning systems today is much better than 10 years ago. REHVA´s Swiss member SWKI accepted the VDI 6022 Guideline as SWKI-2003-5, in 2003. The REHVA working group revised and updated the German Guidebook with some new ideas and procedures.

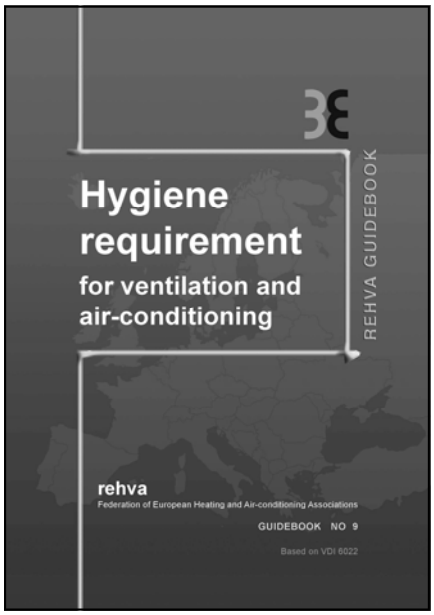
REHVA GUIDEBOOK No 10
**Computational Fluid Dynamics in Ventilation Design**
P. V. Nielsen (ed), F. Allard,
H. B. Awbi, L. Davidson, A. Schälin

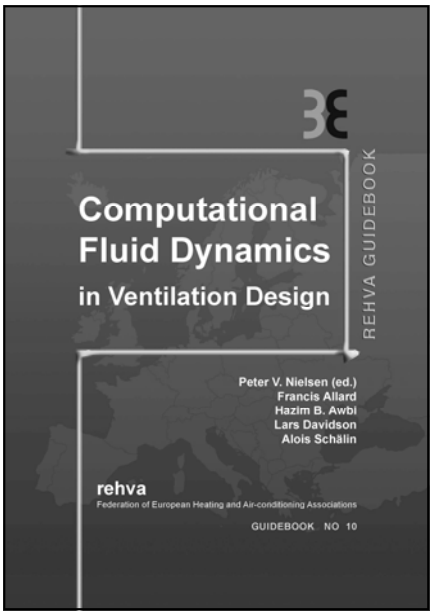
Both the development of CFD models for room air movement and progress in the general fluid dynamics research are strongly influenced by the increased computer power that has been available for the past few decades. This guidebook is written by a working group of highly qualified international experts representing research, consulting and design. CFD-calculations have rapidly been accepted as a powerful tool for the analysis of air and pollution distribution in various spaces. However, the user of CFD-calculation should be aware the basic principles of calculations, and specifically the boundary conditions.
The reliability of the results depend very much on the skills of the person who performs the calculations. The guidebook is intended for users of CFD-programs, designers, manufactures and building owners. It gives also guidelines for those who order CFD-calculations from the experts. With its illustrations and examples it is also an excellent text book for universities and also the vocational training of various building professionals.








## Natural Ventilation highlighted in IAQ 2007 Workshop

ATLANTA – Natural ventilation has been promoted as a cure-all to reduce cost and energy consumption and to improve indoor air quality and occupant comfort.
The reality of natural ventilation, however, is more complicated.
A workshop discussing the design and performance of natural systems will be featured at ASHRAE's IAQ 2007: Healthy and Sustainable Buildings conference, 14-17 October, Baltimore.

In the workshop, What's So Great About Natural Ventilation, Steve Emmerich and Andy Persily, both with the National Institute of Standards and Technology, will discuss how natural ventilation systems relate to existing ventilation, thermal comfort and energy standards, and present experiences in Europe and Asia along with actual performance measurements. Other IAQ 2007 speakers on natural ventilation will join the workshop for a panel discussion on the topic.

"The design of natural ventilation systems for air distribution and reliability of ventilation rates over a range of weather conditions is more complex than many designers realize," Emmerich said. "Also, issues of outdoor air quality, including moisture impacts, are not always addressed in system design."

Limited data is available on the performance of these systems in terms of outdoor air ventilation rates, thermal comfort parameters and indoor pollutant levels, according to Emmerich.

Other workshops at IAQ 2007 are:

- *Development of an Advanced IAQ Design Guide*, presented by Andy Persily, chair of ASHRAE's Advanced IAQ Design Guide Steering Committee
- *How to Produce, Label, and Select Sustainable Green Building Products*, Bob Thompson, U.S. Environmental Protection Agency (EPA)
- *Ozone and Implications Within the Indoor Environment*, Charles Weschler, University of Medicine and Dentistry of New Jersey
- *EPA's Building Assessment Survey and Evaluation Study (BASE): Lessons Learned*, John Girman, EPA.

The conference addresses what tools and metrics can be used to quantify buildings' health and sustainability and how indoor air quality can be certified as sustainable.

More information:
http://www._____.

# AIVC Conference 2008

## Kyoto, Japan, 14-16 October 2008

In 2008, when the target period of the Kyoto Protocol begins, the 29th AIVC Conference will be held at Kyoto International Conference Centre, Kyoto, Japan, where the protocol was negotiated in December 1997.

The conference will provide a valuable best opportunity for researchers and engineers worldwide to convene for '**Advanced building ventilation and environmental technology for addressing climate change issues**'.

The increase in Carbon Dioxide due to energy use in buildings is a common issue for most countries in the world.

Above all, it is expected that the energy use for indoor environmental control including ventilation, heating and air-conditioning must be substantially reduced to mitigate the global warming issue, while there are increasing demand for better indoor health and comfort.

For the 29th AIVC Conference, in collaboration with ECBCS, papers are invited for the following research and development topics:

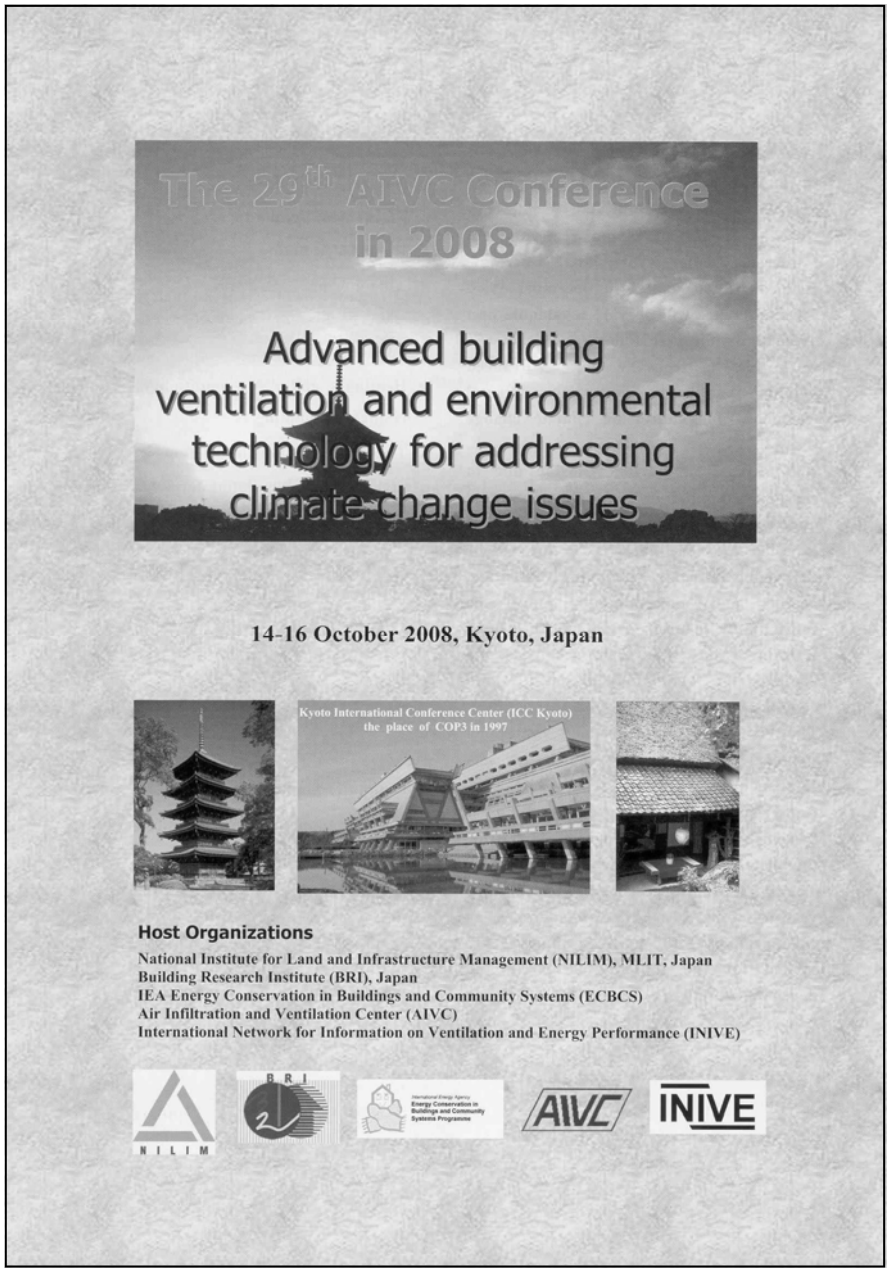
- Natural Ventilation
- Mechanical Ventilation
- Hybrid Ventilation
- Air Filtering
- HVAC System for Non-residential building
- Heating and Air-conditioning for residential building
- Thermal Environment
- Standard and Regulation for Ventilation and HVAC
- Control Technology
- Commissioning
- Integration of Building Envelope and Services
- Envelope Air Tightness
- Condensation Prevention
- Energy Retrofitting
- Computer Simulation
- Post Occupancy Evaluation and Surveys
- Case Study Building
- Air distribution

Interested contributors are kindly asked to submit their abstracts electronically by 18 January 2008.
An abstract of up to 300 words should be submitted, stating clearly the scope of the paper to be presented, the scientific methodology applied and the results obtained.
All abstracts will be reviewed and the authors will be notified about acceptance of their abstract by 22 February 2008.

A book of the conference proceedings will be published and will be available to the participants during the conference.
Final papers due: 31 May 2008.

http://www.aivc2008.jp/
info@AIVC2008.jp

AIVC Online First announcement



## Toward Sustainable Built Environment – The IAQVEC 2007 Sendai

H. Yoshino
Conference Chair of IAQVEC 2007

One problem that we are facing at the start of this new millennium is that a higher living standard has resulted in increased energy consumption, global warming, climate change and depletion of energy resources. This may be partially attributed to rapid urbanization and emergence of modern mega cities. In order to ensure comfortable indoor environment in the midst of warmer environment due to urban heat island effect, the inhabitants of these modern cities tend to reply on mechanical systems for indoor thermal comfort control. Newly constructed buildings, especially those in the cold regions, are now being designed with increased insulation levels and air tightness. This places greater importance on the correct design of mechanical ventilation systems.
Inadequate ventilation could increase indoor air pollutant levels either through an insufficient provision of outdoor air to dilute the indoor polluting gases and particles, or through the ineffective removal of contaminants. Without sufficient and effective ventilation, pollutants will become trapped and recirculate repeatedly, causing a build up of pollutants.

Indoor air quality (IAQ) is undoubtedly an important subject in the built environment, yet, whilst most people are aware that outdoor air pollution can affect their health, many overlook these facts. Since most people spend as much as 90% of their time indoors, poor indoor air quality can have severe implications on the health, well-being and work efficiency of occupants. Healthy buildings can maximize the efficiency in utilization of natural resources, such as passive cooling or daylight, and minimizing reliance on mechanical systems. This will not only minimize adverse impacts on the environment, but the liveability of such buildings will also be greatly enhanced.

In order to solve the above problems, every individual on this planet should work hand in hand toward a sustainable built environment, and we should ACT NOW! The international forum, the Sixth International Indoor Air Quality, Ventilation and Energy Conservation in Buildings Conference (IAQVEC 2007), is a timely event for building practitioners, experts and scientists from all over the world to exchange valuable knowledge, experience and expertise on the important global issue of “indoor air quality, ventilation and energy conservation in buildings”. The theme selected for this conference, “Sustainable Built Environment”, aptly addresses the current issues of the indoor environment, IAQ topics, sustainability, system integration, energy conservation and energy efficiency, design and simulation tools, and many other challenges facing us ahead.

IAQVEC 2007

The IAQVEC 2007 will be held in Sendai, Japan, on 28-30 October 2007. It is the sixth holding of this triannual international event, whereby prior to this it has been successfully held in Montreal (1992, 1995), Lyon (1998), Changsha (2001), and Toronto (2004). This event is hosted by the Tohoku University of Japan, and co-hosted by the Society of Heating, Air-Conditioning and Sanitary Engineers of Japan (SHASE) and the Architectural Institute of Japan (AIJ).

An official website (http://www.iaqvec2007.org/) has been set up to feature the detail of the IAQVEC 2007 Conference, and the electronic copy of the Second Announcement Flyer is available on this website. Besides, electronic copies of the some selected keynote addresses and papers of the previous IAQVEC Conferences are also available on this website.
The IAQVEC 2007 is expected to be attended by over 360 delegates from more than 30 countries over the world and the 3-day schedule will be fully packed with 8 distinguished lectures by the world well-known experts in various fields of built environment, 36 oral presentation sessions, 3 poster sessions and 12 special sessions.

It is a pleasure to notice that many honourable guests, distinguished speakers, building professionals, participants and supporters will attend this conference. Together, they will share their experience, expertise, innovative thoughts and ideas to identify how we can respond to the above mentioned environmental issues and benefit from achieving a built environment that is not only comfortable, healthy and safe for us, but also, perhaps most importantly, for the well-being of our future generations. The organizer would like to extend a warm welcome to you to the IAQVEC 2007 and the beautiful and historical city of Sendai.

## 3rd European BlowerDoor Symposium

Building air-tightness, thermography, and dwelling ventilation
30 & 31 May 2008, Kassel, Germany

The 3rd European Blower-Door-Symposium will focus on air-tightness, ventilation and mould.

The Energie- und Umweltzentrum am Deister e·u·[z·] (Deister Energy and Environment Centre) with its co-organisers, the Verband für Wohnungslüftung e.V. (Dwelling Ventilation Association) and the Verband für Angewandte Thermografie e.V. (Applied Thermography Association) would like to invite you to submit contributions to the below-mentioned subjects. Whether you are an architect, craftsman, BlowerDoor user, thermographer, building expert, contractor, energy consultant, scientist, researcher, adviser, planner or decision-maker in the construction-related authorities – we would like to encourage you to bring forward your knowledge and experience.

*The symposium will cover the following subjects:*

1. Airtightness examination methods: (Blower Door, Thermography, leakage locating, dynamic methods)
2. Airtightness in the building process: planning, design, construction
3. Airtightness concepts and durable links in new and existing buildings
4. Effects of unsufficiant airtightness (energy consumption, thermal comfort, air quality, humidity, noise, fire
5. Airtightness and economy
6. Airtightness of the dwelling envelope – requirements, practical measurement, interpretation of measuring results, test reports, expert opinions and special measurements
7. Mechanical ventilation in residential buildings – requirements and practical implementation, efficiency, good standard solutions / best practices, economy
8. mould - causes and prevention – elimination – interrelation to building physics, leakages, contruction defects
9. Training and education, qualification, and quality assurance
10. Current standards and directives, technical regulations, legal aspects

If you would like to submit an abstract, please send an email to b_____. We will provide you with the necessary documents.

*Dates and deadlines*

- 30 November 2007: Deadline for submitting abstracts
- 31 January 2008: Notification of acceptance or non-acceptance of abstracts
- 29 February 2008: Dispatch of the detailed programme
- 11 April 2008: Deadline for submitting full papers for the conference reader
- 11 April 2008: End of registration period for reduced fees
- 16 May 2008: Deadline for submitting PowerPoint presentations*

*Presentation guidelines*
Papers may be presented in German or English. Simultaneous interpretation is provided. For each accepted contribution, one speaker will be registered for the conference free of charge.

For *further information* please contact Bernd Rosenthal (contact person for abstracts and papers)
Phone: +49 50 44 – 9 75 25
Fax: +49 50 44 – 9 75 66
E-Mail: _____

Sabine Haake, secretary
Phone: +49 50 44 – 9 75 20
Fax: +49 50 44 – 9 75 66
E-Mail: _____

Website: http://_____
(in German).

## China has become the second highest overall R&D investor, will this also happen in the area of HVAC in buildings?

For the first time, China will spend more on research and development (R&D) than Japan, becoming the world's second highest investor in R&D after the United States, according to OECD (Organisation for Economic Cooperation and Development (http://www._____) projections based on recent trends outlined in the OECD Science, Technology and Industry Outlook 2006.

"The rapid rise of China in both money spent and researchers employed is stunning," said Dirk Pilat, Head of the OECD Science and Technology Policy division. "To keep up, OECD countries need to make their research and innovation systems more efficient and find new ways to stimulate innovation in today's increasingly competitive global economy."

Based on recent trends, China will spend USD 136 billion on R&D in 2006, just over Japan's forecast USD 130 billion. The United States is predicted to remain the world's leading investor in R&D in 2006, spending USD 330 billion, while the EU-15 is predicted to spend USD 230 billion.
China's spending on R&D as a percentage of GDP, or R&D intensity, has more than doubled from 0.6% of GDP in 1995 to 1.2% in 2004. In current prices, this represents an increase of USD 17 billion in 1995 to USD 94 billion in 2004, outpacing the economy (9-10% per year).

The Science, Technology and Industry Outlook 2006 notes two clear trends in non-OECD countries in strengthening R&D and innovation activities and policies: rapid absolute growth (from low starting points) in R&D and patenting, and significantly growing shares in global R&D and patenting.

The report gives a comprehensive review of key trends and developments in science, technology and innovation policy in OECD countries:

- In China, the number of researchers increased by 77% from 1995 to 2004. China now ranks second worldwide with 0.9 million researchers, just behind the United States (1.3 million). Russia ranks fourth. Singapore employs more researchers per thousand employees than the OECD average.
- The total number of globally important patents originating from non-OECD economies is small compared to the OECD total, but the numbers have grown rapidly in recent years. In 1991, Brazil, China, India and South Africa accounted for 0.15% of the total share; by 2002 this had increased to 0.58% of the total.

In relation to the market of ventilation systems and the related energy use in buildings, there is no doubt that the Chinese market will become of increased importance.

Whereas at present, the major driver for innovation in ventilation systems is found in OECD countries, the above information highlights the potential increased involvement of China in the development of new ventilation systems.

## IEEA has changed to EACI

The Intelligent Energy Executive Agency (IEEA) was established by a Decision of the European Commission to manage the Intelligent Energy-Europe programme for 2003-2006 ("IEE I"). As such, IEEA is managing the SAVE projects. Many of these projects deal with the energy performance of buildings, social housing, … whereby ventilation is often a topic of interest.

The European Parliament and the Council of Ministers adopted on 24 October 2006 the Competitiveness and Innovation Framework Programme for 2007-2013 ("CIP") which aims at fostering the competitiveness of enterprises, promoting all forms of innovation, including eco-innovation; accelerating the development of an information society; and promoting energy efficiency and new and renewable energy sources. Those objectives are to be pursued through the implementation of the following specific subprogrammes the Entrepreneurship and Innovation Programme ("EIP"); the Information and Communication Technologies Policy Support Programme and the Intelligent Energy- Europe Programme("IEE II"), which is the successor of IEE I.

Since the IEE II Programme has been integrated into the CIP, and in order to ensure consistency in the manner in which projects are implemented under the CIP, the Commission has adopted a decision entrusting the IEEA with certain implementation tasks related to the EIP in addition to the execution of the IEE II Programme. Moreover the Commission has decided to delegate to the IEEA certain implementation tasks related to the Marco Polo II Programme, since it shares common objectives with the CIP, and in particular with the IEE programme.

More information can be found:
*http://_____*
*http://_____*

## Start-up of SAVE ASIEPI project

As part of the SAVE programme, the ASIEPI project (ASsessment and Improvement of the EPBD Impact) has been approved and will run from 2007 till 2010. This project, coordinated by INIVE EEIG and involving a whole range of partners (INIVE (represented by BBRI, NKUA, TNO, Fraunhofer-IBP, SINTEF, CSTB), FEUP, CETE de Lyon, REHVA, ENEA, AICIA, NAPE, VTT, E-U-Z, ENVIROS, SBi + subcontractors: KAUNAS University, EA Luxembourg, University Budapest, University Bucharest, BRE + associates/ sponsors : EURIMA, PCE, ES-SO, EuroAce, FIEC, Acciona I) aims to increase the effectiveness of implementation of the European Energy Performance of Buildings Directive (EPBD) and has several ventilation related issues.

The objectives of ASIEPI are the following:

1. To develop a concept for intercomparison and benchmarking of EPBD requirements in the Member States in order to allow a continuous monitoring of the EPBD requirements for new and renovated buildings in the Member States, during the project but also after it.
2. To obtain a good overview of the way compliance and control of legislation is done in the individual Member States.
3. To raise awareness about the difficulties and possible solutions for a correct stimulation of some of the most important challenging aspects as listed in the Annex of the EPBD:
   i. limiting thermal bridges
   ii. improvement of building and ductwork airtightness
   iii. improvement of summer comfort
   iv. using the EPBD implementation as driving force for innovation in energy efficient technologies
4. To raise awareness with respect to the difficulties and the possible solutions of the EPBD as driver for innovation in energy efficient technologies.

ASIEPI will help the envisaged update of the EPBD in 2009 and to report of building related performances in the context of the Energy Services Directive. ASIEPI should provide input for several of the measures foreseen by the EC in the Action Plan for Energy Efficiency. The focus is NOT on the development of technical solutions, but on the optimisation of the effectiveness of the building regulations.

The expected main outcome of ASIEPI is a set of instruments improving the impact of the EPBD for new constructions and renovations:

- a benchmarking method in order to compare the current EP requirement levels in the MS and able to follow the evolution of the requirements in time.
- information papers, internet conferences, presentations on demand, databases, reports, participation to conferences and workshops focussing on how the EPBD can be correctly implemented with emphasis on a better implementation of technical issues and on compliance and control.

This outcome should result in:

- Accelerate awareness raising of potential problems with national approaches (primarily during the first half of the project);
- Accelerate identification of appropriate solutions in order to improve national approaches;
- Accelerate increased impact of EPBD implementation (second half of project and after project).

It is envisaged to regularly report in AIR about the outcomes of the ASIEPI project, whereby also several Ventilation Information Papers are planned.

## AIVC Contacts

**Belgium**
P. Wouters & Ch. Delmotte
Belgian Building Research Institute
Lozenberg 7
1932 Sint-Stevens-Woluwe - Belgium
Tel: +32.2.655.77.11
Fax: +32.2.653.07.29
aivc@bbri.be
http://www.bbri.be

**Czech Republic**
M. Jicha
Technicka 2
61669 Brno - Czech Republic
Tel: +42.541.14.32.71
Fax: +42.541.14.33.65
jicha@dt.fme.vutbr.cz

I. Plockova
Ministry of Industry and Trade
Construction dept.
Na Františku 32
110 00 Praha 1
Czech Republic
Tel: +420.224.85.22.11
Fax: +420.224.85.32.16
plockova@mpo.cz

**Denmark**
P. Heiselberg
Aalborg University
Indoor Environmental Engineering
Sohngaardsholmsvej 57
DK-9000 Aalborg
Denmark
Tel: +45.9.635.85.41
Fax: +45.9.814.82.43
ph@civil.auc.dk

B. W. Olesen
Technical University of Denmark
Building 402
DK-2800 Lyngby
Denmark
bwo@mek.dtu.dk

**France**
P. Deroubaix
ADEME
Département Bâtiment et Collectivités
500 Route des Lucioles
Sophia Antipolis
06560 Valbonne - France
Tel: +33.4.93.95.79.56
Fax: +33.4.93.65.31.96
pierre.deroubaix@ademe.fr
http://www.ademe.fr

Contact for the diffusion of AIR in France:
francois.durier@cetiat.fr

**Greece**
M. Santamouris
Building Environmental Studies
Applied Physics Section
Department of Physics
University of Athens
University Campus, Building Physics 5
15784 Athens - Greece
Tel: +30.210.727.68.47
Fax: +30.210.729.52.82
msantam@phys.uoa.gr
http://grbes.phys.uoa.gr

**Japan**
T. Sawachi
National Institute for Land and Infrastructure Management - NILIM
1 Tachihara Tsukuba
305-0802 Japan
Tel: +81.29.864.43.56
Fax: +81.29.864.67.74
sawachi-t92ta@nilim.go.jp
http://www.nilim.go.jp/english/eindex.htm

H. Osawa
Building Research Institute
1 Tachihara Tsukuba
305-0802 Japan
Tel: +81.29.864.6667
Fax: +81.29.864.6775
osawa@kenken.go.jp
http://www.kenken.go.jp/english/index.html

**South Korea**
Yun-Gyu Lee
Building & Urban Research Department
Korea Institute of Construction Technology - KICT
2311 Daehwa-Dong, Ilsan-Gu, Goyang-Si Gyeonggi-Do, 411-712 Republic of Korea
Tel: +81.31.91.00.351
Fax: +81.31.91.00.361
yglee@kict.re.kr
http://www.kict.re.kr

**Norway**
P. Schild
SINTEF Building Research
Forskningsveien 3b
PO Box 124, Blindern
0314 Oslo - Norway
Tel: +47.22.96.58.54
Fax: +47.22.96.57.25
aivc@sintef.no
http://www.sintef.no/byggforsk

**Netherlands**
W. F. de Gids
TNO Built Environment and Geosciences
Division of Building and Systems
PO Box 49
2600 AA Delft - Netherlands
Tel: +31.15.26.95.300
Tel direct: +31.15.269.52.80
Fax: +31.15.269.52.99
wil.degids@bouw.tno.nl
http://www.bouw.tno.nl

**USA**
M. Sherman
Indoor Air Quality Division
Buildings 90
Room 3074
Lawrence Berekeley Laboratory
Berekeley, California
94720 - United States of America
Tel: +1.510.486.40.22
Fax: +1.510.486.66.58
mhsherman@lbl.gov
http://www.lbl.gov

**Operating Agent**
INIVE eeig
P. Wouters & Ch. Delmotte
Lozenberg 7
1932 Sint-Stevens-Woluwe - Belgium
Tel: +32.2.655.77.11
Fax: +32.2.653.07.29
inive@bbri.be
http://www.inive.org

## How to obtain the AIVC publications?

### *The easiest way is through a subscription*

Subscribers receive:
- a personal access code to the protected part of the AIVC website and
- the quarterly newsletter of the AIVC (paper version)

Thanks to the access code, one can download all the AIVC publications:
- 12 AIVC Ventilation Information Papers
- 48 AIVC Technical notes
- 6 AIVC Guides
- 13 AIVC Annotated Bibliographies
- AIVC conference proceedings 1980 to 2005 - 1482 papers
- Air Information Review – All issues since 1979
- 9 AIVC contributed reports

The bibliographic database Airbase is also available on-line (about 17000 references from 1979 to present day). The access code gives access to 1800 full documents already linked to Airbase.

The cost of the subscription for the year 2007 is given on the order form.

Access codes for **Belgium, France, Germany, Greece, Norway and Netherlands** and for the **U.S.** engineering and research community (U.S. residents) can be delivered **free of charge** on request.

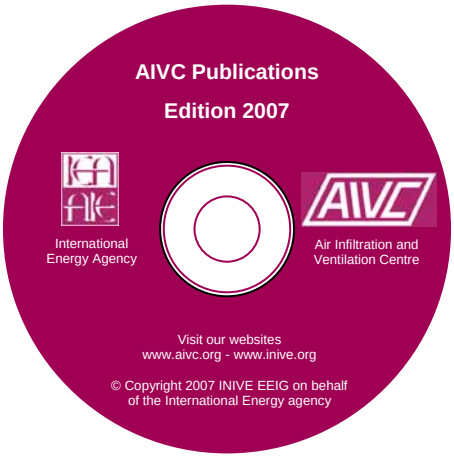
See http://www.aivc.org (How to subscribe?) for more information and on-line registration.

### *AIVC publications are also available on CD-Rom*

A CD-Rom is available with all the guides (6), annotated bibliographies (12), ventilation information papers (12), contributed reports (4) and technical notes (48 - only some old superseded ones are not included) published by the AIVC between 1979 and 2006.

A CD-Rom is also available with the proceedings of the AIVC conferences from 1998 to 2004.

There is also another CD-Rom with the proceedings of the AIVC conference 2005.



# - ORDER FORM -

v. 0703 - Replaces all previous order forms

*Please complete and return this form to INIVE EEIG – Operating Agent AIVC*
*by fax to **+32.2.653.07.29** or by mail to Lozenberg7, BE-1932 Sint-Stevens-Woluwe, Belgium*
*On receipt of your order we will forward an invoice, and the order will be dispatched on receipt of payment.*

Mr ❑ Mrs ❑ Name .....

Organisation / Firm .....

Address .....

Town ..... Postcode .....

Country ..... E-mail .....

Telephone ..... Telefax .....

VAT .....

**Selling prices for AIVC countries** (Belgium, Czech Republic, France, Greece, Japan, Norway, South Korea, The Netherlands, USA)

| **Item **** | **Qty** | **Unit Price*** | | **Total** |
|---|---|---|---|---|
| | | Excl. VAT | Incl. VAT 21 % | |
| Proceedings of AIVC conference 2005 (1 CD-Rom) | | 40,00 EUR | 48,40 EUR | |
| Proceedings of AIVC conferences 1998 - 2004 (1 CD-Rom) | | 75,00 EUR | 90,75 EUR | |
| AIVC publications CD-Rom - Edition 2007 (1 CD-Rom) | | 100,00 EUR | 121,00 EUR | |
| Air Information Review & personal access code to AIVC publications online (Subscription 2007) (Free for Belgium, France, Greece, Norway, The Netherlands, USA) Temporary special offer | | ~~100,00 EUR~~ 50,00 EUR | ~~121,00 EUR~~ 60,50 EUR | |
| | | | **Total** | |

**Selling prices for non AIVC countries**

| **Item **** | **Qty** | **Unit Price*** | | **Total** |
|---|---|---|---|---|
| | | Excl. VAT | Incl. VAT 21 % | |
| Proceedings of AIVC conference 2005 (1 CD-Rom) | | 80,00 EUR | 96,80 EUR | |
| Proceedings of AIVC conferences 1998 - 2004 (1 CD-Rom) | | 150,00 EUR | 181,50 EUR | |
| AIVC publications CD-Rom - Edition 2007 (1 CD-Rom) | | 200,00 EUR | 242,00 EUR | |
| Air Information Review & personal access code to AIVC publications online (Subscription 2007) (Free for Germany) Temporary special offer | | ~~200,00 EUR~~ 100,00 EUR | ~~242,00 EUR~~ 121,00 EUR | |
| | | | **Total** | |

* 21% VAT applies to non VAT-registered customers in the European Union (EU). VAT-registered customers in the European Union (EU) should include their VAT registration number with their order and will be invoiced without VAT. Customers outside the European Union will be invoiced without VAT.
** CD-Roms have been developed for use in a Microsoft Windows environment for PC
Conditions of sale are available at http://www.aivc.org

❑ I wish to pay by **bank transfer**. The payment will be made on receipt of the invoice
❑ I wish to pay by by **credit card**:
❑ VISA ❑ Eurocard-Mastercard ❑ American Express

I herewith authorise INIVE EEIG to use my credit card information to charge the total amount due for the order
Credit card number ..... Exp. Date .....
Surname and first name of cardholder .....

Date ..... (Cardholder's) Signature .....

Delivery address (if different)
Name ..... Country .....
Address .....
Town ..... Postcode .....

# 2nd PALENC Conference and 28th AIVC Conference

# Building Low Energy Cooling and Advanced Ventilation Technologies in the 21st Century

27-29 September 2007, Crete island, Greece

## SECOND ANNOUNCEMENT & CALL FOR PAPERS

http://palenc2007.conferences.gr

Organisers

International Energy Agency
Energy Conservation in Buildings and Community Systems Programme

air infiltration and ventilation centre

Under the auspices of

INIVE
International Network for Information on Ventilation and Energy Performances

UNION INTERNATIONALE DES ARCHITECTES
INTERNATIONAL UNION OF ARCHITECTS
ARES INTERNATIONAL WORK PROGRAMME
ARCHITECTURE AND RENEWABLE ENERGY SOURCES