

# Air Information Review

a quarterly newsletter from the IEA Air Infiltration and Ventilation Centre

International Energy Agency - AIVC

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## AIR and the AIVC CD : Your Companions in the Ventilation World

For over 20 years, the AIVC has been a key player in developments in technical knowledge on ventilation and related issues, and has always been very active in the dissemination of information. Since its creation in 1980, there has been a substantial change in the users' expectations of how information on ventilation knowledge should be disseminated. The AIVC has always tried to adapt its strategies to these evolving needs.

As announced by Willem de Gids, AIVC Steering Group Chairman in the March issue of this newsletter, the Air Infiltration and Ventilation Centre is moving in a new direction. From 1<sup>st</sup> June onwards, a fundamental adaptation has started up.

### A New Operating Agent

On the formal level, there has been a change of Operating Agent. INIVE EEIG (International Network for Information on Ventilation) will now act as the Operating Agent for the AIVC. As reflected by the name, it is a network organisation with the legal status of a European Economic Interest Grouping. Its founding members are leading research organisations with

strong activity in the areas of ventilation, indoor air quality and energy use: BBRI (Belgium), CETIAT (France), CSTB (France), NBI (Norway) and NKUA (Greece). It is expected that over the coming months other organisations will also join as full members. Besides full members, a second level of membership will be established, so-called 'associated members'. At present, interest in this level of participation has been expressed by a range of organisations. All full and associated members will pay an annual contribution to INIVE EEIG. For more information, contact us at [inive@bbri.be](mailto:inive@bbri.be).

Through this extensive network of organisations, we expect to raise sufficient funding to manage a whole range of tasks and, perhaps even more importantly, to establish an excellent basis for achieving a wide-scale dissemination of high quality information on ventilation related issues.

### New Services

In parallel with the formal change in Operating Agent, and to a large extent due to this change, there will be a fundamental change in the services

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provided to the ventilation world.

The keywords are 'more information - more users - lower cost'.

### More Information

In the present issue of AIR, the changes are marginal: instead of 'Air Infiltration Review', it is now called 'Air Information Review'. There are also a few changes in the layout. However, from the September issue on, you will see major changes, and in particular 'more information'. On the one hand, the layout and type of articles in AIR will change, on the other hand, there will be an accompanying CD-ROM with each issue, called the 'AIVC CD'.

Instead of typically long articles, the 16-page AIR newsletter will mostly contain very short contributions. The newsletter will be organised around topics such as 'news from research, standardisation and regulation, information from practice, websites, new publications, information on research programmes', etc. For most of these contributions, there will be hyperlinks to the accompanying CD-ROM and/or to the internet. It is also the intention to feature the full content of AIVC technical reports on the CD-ROM, as well as the AIVC guides, AIRBASE and the AIVC conference proceedings. In parallel, we expect to distribute information from many ventilation related activities: final reports from international and national ventilation research projects, software tools, and more.

Whereas the AIR newsletter will provide mainly summaries and (hopefully) give you a taste for obtaining more information, the AIVC CD will con-

tain a wealth of information. In fact, with some 600 Mb of storage space available, the CD will allow us to distribute a great deal of information.

### More Users

In order to reach 'more users', we have decided to apply a fundamental change in the dissemination strategy: instead of selling the majority of the information at costs which, though not exaggerated, are also not marginal, we are aiming for a very low-cost distribution, with even the possibility of a free-of-charge distribution to several target groups. It is our ambition to reach a quarterly distribution of 10,000 issues of AIR and the AIVC CD. In order to achieve this, achieving a low unit cost for providing information to our users is crucial. We believe that the newsletter and the AIVC CD will make such a wide scale dissemination possible. Moreover, our aim is not only to print 10,000 copies, but effectively to reach 10,000 or more key actors ('decision makers') in the fields of ventilation, indoor air quality and energy use. Therefore, the content of AIR and the AIVC CD will be broadened in order to attract more interest from a wide range of people: manufacturers, consultants, designers, building owners and managers, researchers, etc. If you have information which you believe is relevant for inclusion in AIR and/or the AIVC CD, you can contact us at [inive@bbri.be](mailto:inive@bbri.be).

### Lower cost

'A lower cost' for the end-user will be achieved by combining low cost publications with network sponsorship. In fact, we believe that there is a strong interest in the ventilation

world in becoming an AIVC network sponsor. We have the impression that the package is very attractive. The income from network sponsors will to a large extent help us to finance our dissemination activities. For more information on the conditions for network sponsorship, you can contact us at [inive@bbri.be](mailto:inive@bbri.be).

Everybody within and outside the AIVC member countries will be in a position to obtain the majority of the AIVC related deliverables. Of course, persons and organisations in AIVC member countries will receive a substantial price reduction, and further price reductions will be offered to the INIVE EEIG members.

### In Conclusion...

As you can imagine, such a major transition will take time. It does seem unrealistic to expect that in September the situation will be fully clear in all countries. Therefore all persons who receive this issue of AIR will also receive AIR and the AIVC CD free of charge in September. Other interested parties will be able to receive a free copy of the September issue by contacting INIVE.

I sincerely hope that the new approach for the AIVC, of which AIR and the AIVC CD are the cornerstones, will be a major contribution to better communication within the ventilation community and, as a result, will contribute to better buildings with respect to indoor air quality, ventilation and energy efficiency.

Peter Wouters

Manager INIVE EEIG and Operating Agent AIVC

# ASHRAE Standard Debate Continues - Update

by Max Sherman, Lawrence Berkeley Laboratory, California, USA

Last fall SPC 62.2 (Standard Project Committee on residential ventilation) worked to resolve the vast majority of issues raised by the approximately 3000 commentors to the first public review of its standard.

As a result of extensive discussions with all concerned parties, the committee made some changes to the draft as a result of these discussions; the changes were of three types: 1) wording changes that clarified the standard or improved usability but did not change the intent; 2) changes which dealt with specific requirements for special cases; and 3) changes which represented a real change in requirement.

The draft standard now has the following key requirements:

- Whole-house mechanical ventilation of about 50 cfm (25 l/s) for a typical new house. (Older homes may offset this with an additional infiltration credit in some cases.)
- Local exhaust ventilation in bathrooms and rooms with unvented combustion equipment. (If the uncompensated exhaust capacity is too large, naturally aspirated combustion equipment inside the pressure boundary must be tested for backdrafting.)
- Medium efficiency particle filtration for most air handling systems. (Air handling systems must also be isolated from garage pollutants.)
- Minimum specifications for ventilation fans including delivered air flow, noise,

reentrainment and branching..

- Windows: most rooms must have operable windows (or some other means) to allow occupants to provide local ventilation to account for unusual sources.

After these changes were made the committee voted to recommend the revised draft for public review, but there were two key issues that disturbed two interested parties: the National Association of Home Builders and the Gas Appliance Manufacturers Association. Although some of NAHB's comments were resolved, their key concern of requiring mechanical ventilation was not. The committee almost unanimously believes the data that shows that acceptable indoor air quality cannot be achieved in typical new construction without the use of mechanical ventilation.

The natural gas industry submitted a lot of constructive comments to the first public review and in subsequent meetings. Most of their concerns were, in fact, resolved with the exception of one narrow one. GAMA objects to requirement that exhaust ventilation is required in any room in which an unvented combustion device is used. The committee, however, was not persuaded that the products of unvented combustion posed no appreciable health risk.

Even though the technical committee had reached consensus for a second public review, ASHRAE procedures require other levels of approval. To be approved for a second public review, the Board Policy Committee on Standards (BPCS) must approve a High Profile Standard (HPS) such as

62.2P.

In late March BPCS met to consider, among other thorny issues, how, if at all, the proposed standard could proceed in face of the controversy, generated by the two interest groups. ASHRAE is committed to gaining consensus within the Society before going out for a public review and it is up to BPCS to determine under what circumstances that criterion has been met. That discussion produced two main options for SPC 62.2P to consider: 1) to convert the standard to a guideline or 2) to make substantial progress towards resolving the two key issues relating to unvented combustion appliances and mandatory whole-house ventilation.

The committee debated the issues of converting to a guideline, but felt that the need for a true standard outweighed the convenience associated with conversion to a guideline and voted to proceed with a standard intended for use in regulation. To continue development of a standard, however, requires following the specific guidance provided by BPCS.

The controversy related to unvented gas appliances stems from requirements that the committee felt were necessary to ventilate the products of combustion, but that the manufacturers felt were unnecessary. Several attempts were made to find compromise language that would satisfy the manufacturers, but no consensus could be found that would not reintroduce other requirements the gas industry found objectionable.

To respond to the guidance from the BPCS, the committee is requesting a change to the scope of the standard that would stipulate that requirements

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of the standard are not intended to provide adequate indoor air quality in presence of certain kinds of sources. The delineation of these sources would include the appliances of concern.

To respond to all the NAHB issues, BPCS has directed us to loosen the requirements for mandatory whole-

house mechanical ventilation for appropriate climates and situations. The committee has already decided to exclude climates such as Hawaii, from this requirement and is currently considering further changes to the draft that will allow natural ventilation in other circumstances when its use can be reasonably be expected.

With the firm guidance provided by the Board Policy Committee on Standards and the operational improvements taking place in SPC 62.2P, I expect that good progress can resume towards publishing a quality, consensus standard on residential ventilation.

## BRASINDOOR 2001: A Great Success

**Prof. Francisco Radler de Aquino Neto, President of BRASINDOOR 2001, thanks AIVC for its valued contribution**

The 3<sup>rd</sup> Brazilian Congress on Indoor Air Quality and Indoor Environment and the International Meeting on the Environment, Ventilation, Health & Comfort, BRASINDOOR 2001, came to an end after the General Assembly of BRASINDOOR on the 28<sup>th</sup> of March, 2001. For three full days, 170 delegates from 12 countries listened and discussed the contents of three plenary lectures, six keynote lectures and twenty seven oral/poster contributions. Being the first International Scientific Meeting on Indoor Environment in Latin America, it is not surprising that only 40% of all contributions were from Brazilian researchers; none from other Latin American countries.

Proceedings will be published as normal issues of Revista BRASINDOOR, the Society's scientific journal, most of them in English.

Local practitioners are still to become aware of the importance of scientific and technological knowledge for their everyday life. The participation in the conference of many AIVC members (especially the lectures by Dr. Willem de Gids, Malcom Orme and Peter Wouters) helped to highlight this issue, regarding ventilation, air conditioning, health and comfort.

The possible benefits to Latin American countries of participation in AIVC activities was also highlighted.

The guidance and support from ISIAQ is acknowledged as well as the backup from PETROBRAS, the Brazilian Oil Company.

A special mention is due to the representation of the ICIEE, by its Director Prof. Ole Fanger, also representing IAIAS at the conference. The scope of the work performed by Prof. Fanger was highlighted by its plenary opening lecture and a humbled honor delivered by BRASINDOOR, in the form of a medal and certificate for his outstanding achievements in the Indoor Environment scenario.

His professional qualities, kindness and receptiveness, attracted the attention of graduate students wishing to continue their studies at the ICIEE, therefore fulfilling one of the main goals of the 1<sup>st</sup> international meeting, namely to establish transfer mechanisms for international expertise to Brazil and other Latin American countries.

The participation of ISIAQ through its former President Dr. Marco Maroni was the determinant for the success of the meeting, especially its adver-

tisement to the IAQ community. Also the medical aspects of the Indoor Environment were thoroughly covered by Dr. Maroni filling the enormous gap in the knowledge of this public health issue in Brazil.

The two lectures by Dr. Hal Levin were enlightening in regards to architectural aspects of the indoor environment quality as well as the often neglected importance of indoor chemical pollution. The overall scenario was neatly wrapped up by Dr. Max Sherman (AIVC), who reviewed ASHRAE'S effort towards the normatization and guidance concerning ventilation, air conditioning and IAQ.

The reviews of the Brazilian (chemical, Prof. Francisco Radler de Aquino Neto; microbiological, Dr. Luiz Fernando de Góes Siqueira) indoor air quality situation were timely delivered and stressed the enormous task lying before the Brazilian Indoor Environment community. All in all we must consider the conference a success and the organizing committee must thank the participants for this outcome and hope that the next BRASINDOOR Meetings would be as fruitful as this one.

## **"Energy Efficient and Healthy Buildings in Sustainable Cities"**

### **23rd Conference of the Air Infiltration and Ventilation Centre and 3rd European Conference on Energy Efficiency and Indoor Climate**

To be held in Lyon, France

October 2002

The conference will be co-organised by INIVE EEIG (as Operating Agent of AIVC), and LASH-ENTPE (Laboratoire Sciences Habitat, Ecole Nationale des Travaux Publics de l'Etat, Lyon). The three day event, from Wednesday noon to Saturday noon, will comprise parallel sessions with (either extended or short) oral presentations and twelve thematic workshops.

Topics will include:

- Energy Performance Regulations,
- Performance assessment,
- Hybrid ventilation,
- Urban climate,
- Design for IAQ,
- Environmental quality,
- Climate facades,
- Renewables,
- Sustainable design, and more...

More info via [inive@bbri.be](mailto:inive@bbri.be)



INTERNATIONAL ENERGY AGENCY  
AIR INFILTRATION AND VENTILATION CENTRE

**22nd AIVC Annual Conference  
11–14 September 2001**

**Market Opportunities for  
Advanced Ventilation  
Technology**

**Preliminary Programme**

**Hilton Bath City Hotel  
Bath  
United Kingdom**

## **"Market Opportunities for Advanced Ventilation Technology"**

Areas of interest for this conference may cover residential, commercial or industrial buildings and include: innovations in components and control; integration with the building envelope; design procedures for innovative systems; applicable measurement and simulation techniques; commissioning, operation and maintenance; overcoming perceived barriers; improving occupant understanding; the impact of codes and standards; and demonstration projects.

The following provisional programme lists the papers accepted for presentation at the conference. Details of oral/poster presentation and daily sessions will be available soon.

### **1. Energy - Air Leakage**

Air Tightness of New Houses in the U.S  
*M.H. Sherman, N.E. Matson (USA)*

Airtightness of 12 non residential large buildings Results from field measurement studies

*A. Litvak, D. Boze, M. Kilberger (France)*

Airtightness and Ventilation of a Naturally Ventilated House in Finland

*C. Simonson (Finland)*

The Use of the Blower Doors in the Characterization of Building Envelopes. Measurements of the Exfiltrations

*G. Giorgiantoni, G. Giuli (Italy)*

Barriers to the Integration of Cladding and Building Services

*Ledbetter S (UK)*

### **2. Energy Use - Standards**

The new German energy conservation regulation - Energieeinsparverordnung

*A. Maas (Germany)*

Energy Consumption in a Naturally Ventilated House in Finland

*C. Simonson (Finland)*

Dynamic Insulation - Recent Experimental And Theoretical Studies

*A. Clare, D. Etheridge (United Kingdom)*

Energy Conservation In Buildings With Integration Of Advanced Ventilated Wall Components

*A. Dimoudi, A. Androutsopoulos, S. Lykoudis (Greece)*

Ventilation in the new French thermal regulation RT

2000

*J.-R. Millet (France)*

Energy Performance Standardisation and Regulation: State-of-the-Art, challenges and ongoing actions

*P. Wouters, J. Porrez, D. Van Orshoven, L. Vandaele (Belgium)*

Overview of key aspects in the proposed Energy Performance Regulation for the Flemish Region in Belgium

*P. Wouters, D. Van Orshoven, L. Vandaele, J. Schietecat (Belgium)*

### **3. Ventilation Mechanical**

Ventilation and Air Revitalization on the International Space Station (ISS)

*W. Raatschen (Germany)*

Parametric analysis of the airflow performance of ventilators

*S. Sharples, N. Chilengwe (United Kingdom)*

Testing a method for checking the performance of ventilation systems in commercial buildings, in France

*P. Barles, M-C Lemaire, R. Larsson (France)*

HVAC air filter testing : the need of a field test method

*A. Ginetet, D. Pugnet, J.H. Salazar, P. Grange (France)*

Demand Controlled Ventilation (DCV) : case-study in meeting rooms

*P. Vialle, M. Jardinier, X. Pelleter (France)*

### **4. Ventilation Natural/Hybrid Ventilation**

Natural and Hybrid Ventilated Buildings in Sweden

*Å. Wahlström, J. Eriksson (Sweden)*

Evaluate the Performance of Windcatchers Using Wind Tunnel Testing

*A. Elmualim, H. Awbi (United Kingdom)*

Natural Ventilation Air Change Rates Considering Atmospheric Turbulence. Estimates And Measurements

*F. da Silva, J. Saraiva (Portugal)*

The Implementation of Local Controls in Naturally Ventilated Buildings through the Use of Interoperable Field Bus Systems

*M. Skelly, M. Wilkinson (United Kingdom)*

Dynamic conditions in naturally ventilated office rooms: Implications for intelligent window opening control.

*E. Bjørn, P. Heiselberg, J. Jensen (Denmark)*

Programme of Testing for a Low-Energy Whole House Ventilation System

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*M. McEvoy, R. Southall (United Kingdom)*

## 5. IAQ

Experimental study on the impact of ventilation parameters on pollutants transfer from outdoor air into a dwelling

*B. Collignan, J.-P. Flori, S. Kirchner, Y. le Moullec, J. Villenave (France)*

Indoor Air Quality Measurement

*P. Dorel (Ireland)*

Improving room thermal comfort and air quality using a low cost air chiller.

*E. Munyebvu, R. J. Saunders, S. Beck (United Kingdom)*

Pollutant Exposure Of Children In Schools

*V. Iordache, P. Blondeau, C. Ghiaus, F. Allard (France)*

## 6. Modelling and Simulation

Numerical study on enhancement of the mixing effectiveness in air handling unit mixing chamber

*H. Park, C. Macy (USA)*

Experimental and Numerical Studies of A Solar Chimney with Uniform Heat Flux

*J. Halldorsson, C. Byrjalsen, Z. D. Chen, P. Bandopadhyay, P. Heiselberg (Denmark)*

Earth-air heat exchangers in the Belgian climate: Analysis of the potential with a 3D modelling technique

*M. de Paepe (Belgium)*

Earth-air heat exchangers in the Belgian climate: first practical experience

*M. de Paepe, E. Mlecnik, G. de Bruyn, K. Govers, T. Van Dyck, A. Bossaer, K. Baert (Belgium)*

Use of multi-zone air exchange simulation to evaluate a hybrid ventilation system.

*J. Eriksson, Å. Wahlström (Sweden)*

Laboratory Test Procedures To Evaluate Thermal And Fluidodynamic Performances For Ventilated Space

*P. Principi, C. Di Perna, E. Ruffini (Italy)*

Velocity variations in ventilated rooms as a method for creating comfort

*H. Wigö, M. Sandberg (Sweden)*

Full representation of supply openings for indoor airflow simulation

*B. Zhao, X. Li, Q. Yan (China)*

SOLVENT: Development of Strategies for the Efficient Use of Solar and Passive Ventilation in Urban Buildings

*M. Kolokotroni, M. Santamouris, F. Allard, C.*

*Ghiaus, S. Alvarez, J. Palmer (United Kingdom)*

URBVENT - European Research Project on Natural Ventilation in Urban Areas

*F. Allard, C. Ghiaus (France)*

Thermal bridge analysis in practice : KOBRA software and EUROKOBRA database

*P. Wouters, J. Schietecat (Belgium)*

Monozone modelisation of natural ventilation with ducts

*A. Bernard (France)*

General Presentation and Use of a Method of Calculation of Consumption of the RAC (Room Air Conditioners)

*Riviere Ph, Adnot J, Orphelin M*

## 7. Advanced Ventilation Devices and Techniques

Evaluation and development of innovative and energy efficient ventilation strategies

*A. Afshari, N. Bergsoe (Denmark)*

Development And Test Of A Virtual Test Bench Adapted To The Study Of VAV Controllers

*P. Riederer, D. Marchio, J. Visier (France)*

Development of a new type of ventilation fan

*S. Berthin (France)*

Performance Prediction Of Roof-Integrated Photovoltaics

*G. Gan and S. Riffat (United Kingdom)*

Control Strategies For Hybrid Ventilation: Development Of An Experimental Device

*M. Elmankibi, P. Michel, G. Guarracino (France)*

Investigation of a Production Facility

*U. Groszmann (Germany)*

Night Ventilation in Urban Environment

*Geros V, Santamouris M, Guarracino G*

## GENERAL INFORMATION

**AUTHORS PLEASE NOTE:** Final papers from both oral and poster presentations should be received at the AIVC by **27th July 2001**. A completed registration form and payment are required from authors, prior to acceptance of their paper for publication in the proceedings.

**REGISTRATION DESK:** The conference registration desk will be open on Tuesday 11th September 2001 between 1300-1400 hrs for pre-conference registration. Thereafter it will be open from 08.30 hrs each day of the conference.



**22<sup>nd</sup> AIVC Annual Conference  
Hilton Bath City Hotel, Bath, UK 11-14 September 2001  
ADVANCE REGISTRATION FORM**

**Completed registration forms & full payment must be received by the extended deadline of 6<sup>th</sup> July 2001 to qualify for lower rates. All accommodation must be booked by 10 August 2001**

**Write clearly in BLOCK CAPITALS**  
 Name (with title): .....  
 Organisation: .....  
 Address: .....  
 ..... Country .....  
 Tel: +..... Fax: +..... E-mail: .....

**PLEASE COMPLETE THE APPROPRIATE SECTIONS BELOW:**

	AIVC Rate*£	Non/AIVC Rate £	Total Payable £
<b><u>FULL CONFERENCE PACKAGE</u> from Tuesday 11 to Friday 14 September 2001:</b> Includes: bed & breakfast 3 nights (11, 12, 13), 1 lunch (Thurs 13), Gala Dinner (Thurs 13), conference attendance, proceedings, coffee/tea breaks, light refreshments during evening poster sessions	699	799	[£     ]
<b><u>TWO DELEGATES SHARING ACCOMMODATION</u> (incl. of above package), cost per person:</b> (Please note this section applies to <u>2 delegates</u> sharing, & <u>not</u> an accompanying guest)	599	699	[£     ]
Please name <u>delegate</u> sharing room .....			
<b><u>CONFERENCE ATTENDANCE ONLY</u> (i.e. without accommodation):</b> Includes: conference fees for period from registration 13.00 hrs Tues 11 to 13.00 hrs Fri 14 Sept 2001, proceedings, 1 lunch (Thurs 13), all applicable coffee/tea breaks & light refreshments during evening poster sessions	450	450	[£     ]
<b>***<u>LATE PAYMENT</u>*** (forms &amp; payment received <u>after</u> 6<sup>th</sup> July 2001) <u>add</u> to above categories:</b>	+80	+80	[£     ]
<b><u>NON-CONFERENCE GUEST</u> sharing double room with delegate:</b> Includes 3 nights bed & breakfast <u>only</u> (11, 12, 13 Sept)	+80	+80	[£     ]
Please name <u>guest</u> sharing room .....			
<b><u>GALA DINNER:</u> Cost for daily attendees or non-conference guests attending Gala Dinner (Thurs 13)</b>	+40	+40	[£     ]
<b><u>Total Payable in Pounds Sterling</u></b>			£

\* i.e. Delegates from AIVC member countries, Belgium, Denmark, Finland, France, Germany, Greece, Netherlands, New Zealand, Norway, Sweden, UK, USA

**METHODS OF PAYMENT**

Payment can be made in any of the following ways:

- A cheque: in Pounds Sterling made payable to Oscar Faber Group - AIVC Conference a/c [     ]
- Credit card: [     ] VISA [     ] MASTERCARD  
 Card Number ..... / ..... / ..... / ..... Expiry ..... / .....
- Bank transfer [     ] Please contact us for our bank account details

**ADDITIONAL NIGHTS ACCOMMODATION**

Additional nights accommodation can be reserved through this form but please **do not** include payment for this extra accommodation as these costs should be settled direct with the hotel at check-out together with any other extras (i.e. newspapers, telephone calls, etc.). Cost per night for standard room accommodation with breakfast at the Hilton Bath City:     **SINGLE ROOM: £95.00**     **DOUBLE ROOM: £115.00**

Sat 8 Sept [     ]     Sun 9 Sept [     ]     Mon 10 Sept [     ]     Fri 14 Sept [     ]     Sat 15 Sept [     ]

**NB: Subject to availability**

Please return this completed registration form and remittance to: **Jo Manicom, Conference Secretariat**  
 AIVC c/o Oscar Faber Group Ltd, Beaufort House, 94/96 Newhall Street, Birmingham B3 1PB, United Kingdom  
 Tel: +44 (0)121 262 1900     Fax: +44 (0)121 262 1999     e-mail: airvent@aivc.org

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## New Publication

IEA Energy Conservation in Buildings and Community Systems Programme: Annex 27

# Evaluation and Demonstration of Domestic Ventilation Systems: Final Report

## Contents

- 1 Introduction
- 2 System Selection Procedure
- 3 Design Constraints
- 4 Thermal Comfort
- 5 Noise
- 6 Building Aspects
- 7 Indoor Air Quality
- 8 Reliability
- 9 Energy
- 10 Life Cycle Cost (LCC)
- 11 Application

The main motivation for initiating this Annex was the need to develop tools to better evaluate domestic ventilation systems in various situations. Different systems in various climates must handle situations with a large range of residential behaviour. With the use of the most complex models and development of new ones, a large number of combined situations enable us to develop simplified tools, that can be used by practitioners in specific cases.

This report presents the various simplified tools and an application of the use of the tools on a specific case. The detailed results on which the simplified tools are based can be found in more detailed background reports.

## Participation

The countries which have participated in this task are: Canada, France, Italy, Japan, The Netherlands, Sweden, UK, and the USA.

## Introduction

This report is a concluding work and a summary of all the background reports for the project.

## Background

Ventilation is of major importance for the wellbeing of people in their homes. The rate of outdoor air supply, as well as comfort aspects associated with air distribution and the ability of a system to remove pollutants, are important factors to be considered at the design stage, during the commissioning procedure and when using the building during its lifetime.

The two main purposes of ventilation are to obtain an acceptable indoor air quality and to avoid degradation of the building fabric, e.g. rot in wood, rust on steel. "Acceptable indoor air quality" is not easy to define, especially in dwellings. However, everyone should have the right to acceptable indoor air quality at home. As distinct from a workplace, residents' sensitivity can vary widely from an allergic infant to a well trained sportsman, from an active person spending most of their time outdoors to an elderly person confined

to a life indoors.

Over the lifetime of a building, its occupancy patterns will vary. This results in a varying need for outdoor air to obtain acceptable indoor air quality (IAQ) and avoid degradation of the fabric. Emissions from building materials are also time dependant. When the building is new or recently refurbished it may be necessary to dilute the emissions by increased flow rate. In standards and codes the supply air needed in a dwelling is generally based on the maximum number of persons living in the dwelling defined by the possible number of beds contained therein. Statistics from various IEA countries indicate that, in general, about 50 % (range 46 – 71 %) of dwellings have only one or two residents.

Dwellings represent about 25 – 30 % of all energy used in the OECD countries, and domestic ventilation will in the future represent up to 10 % of the total energy use. Thus even a relatively small reduction in overall ventilation levels could give significant savings in total energy use. Of course, the greatest potential for savings lies in existing buildings.

Today there is a vast range of different ventilation strategies in the different OECD countries. In some countries the only ventilation present is adventitious ventilation and window airing, while in others natural stack ventilation systems are more or less

in common use. In countries with colder climates, mechanical systems have been installed in new buildings over the last 15 – 20 years. The systems are either exhaust only or balanced, with or without heat recovery units. However, the majority of dwellings still have natural ventilation, even in countries with colder climates.

Improvement of residential ventilation is of concern in both existing and future buildings. The functioning of the ventilation systems can deteriorate at all stages of the building process and during the life-time of the building.

## Objectives

The overall objective has been to develop tools for better selection of domestic ventilation systems, that can better predict the expected indoor climate and make a choice for the most likely situations in dwellings. The work within IEA Annex 27 has been to:

- Develop tools for evaluating domestic ventilation systems
- Validate that the methods work
- Demonstrate the tools

The main aim in this report is to give guidance on how to use the tools for evaluating domestic ventilation systems in different situations.

## The Subtasks

The Annex has been divided into subtasks dealing with specific topics. The main goal, to produce tools usable for practitioners, has resulted in splitting up the work in the following way:

First the background data was collected in a State of the Art report (Månsson 1995) which included statistical data on housing, frequently used systems, standards and codes, reviews

of recent research reports on material emissions, residents' behaviour, and evaluation methods. The report was a collection of background material for the assumptions needed in the ensuing work.

Simplified tools were developed for evaluation of ventilation systems. Tools have been developed for energy, thermal comfort, noise, inside to outside pressure difference, life cycle cost, reliability, user and building aspects, indoor air quality for constant emission sources, CO<sub>2</sub>, tobacco smoke, cooking products<sup>2</sup>, water vapour in habitable rooms and the bathroom.

There was a need to validate the developed simplified tools. Hence measurements have been performed in a range of dwellings both to validate the tools and give background material.

## Target Audience

Decisions on ventilation are made in all countries by standards bodies, policy makers, companies involved in the housing industry, and others. But these decisions have often been made without a comprehensive evaluation method. Research in recent years described in the IEA Annexes, for instance, has now made it possible to formulate such methods to evaluate domestic ventilation systems. The tools developed can be used both for new and for existing dwellings undergoing renovation, and for detecting, analysing and solving problems.

## Handbook Use

In general the handbook can be used for new dwellings, the renovation of existing buildings and to find explanations for certain situations for existing systems. A flow chart provides a very easy way to handle the tools, and for

each of the tools, there are tables which provide results mostly in a qualitative way. The selection of one parameter may give an excellent quality for one tool whilst giving an adverse effect on another one. This might result in an iterative procedure, necessitating going through the flow chart more than once, to come to a final satisfactory result.

The easiest way is to look at the 'Application' chapter first, and then go back to each of the tool chapters to find the result of your own chosen example.

For those who are interested in detailed analysis, where the number of residents varies over the life time of the dwelling, and different sizes of dwellings, we recommend you read the more detailed background reports. This is also the case if you want to use your own experienced values for e.g. reliability of system performance and life cycle cost calculations.

The handbook will be published soon. To order a copy, contact

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The following prices are for printed documents.

### Air Information Review and the AIVC CD

The AIVC CD (from September 2001) will be available at very low cost, and will feature electronic versions of the latest AIVC technical publications, (including technical notes 52-54) as well as a wealth of other ventilation-related information.

### QUARTERLY JOURNALS

*Available in print, online and on CD from September 2001*

**Air Information Review.** Quarterly newsletter containing topical and informative articles on air infiltration and ventilation research and application, with accompanying CD. Web: [www.aivc.org/air.html](http://www.aivc.org/air.html). September 2001 edition free of charge.

#### Recent Additions to AIRBASE.

Quarterly listing of the latest 200 or so items added to AIRBASE, AIVC's bibliographic database, and the AIVC Library. Web: [www.aivc.org/publications\\_password.html](http://www.aivc.org/publications_password.html). From September 2001 the abstracts will be available on the AIVC CD.

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The AIVC's home page is at [www.aivc.org](http://www.aivc.org).

### GUIDES AND HANDBOOKS

- Improving ductwork: a time for tighter air distribution systems, Carrie F R, Andersson J, Wouters P (eds.) (TP 1999:4) £45.00
- Guide to Energy Efficient Ventilation, Liddament M W, 1996 (GV) £60.00
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- The Role of Ventilation in Cooling Non-Domestic Buildings, Irving S J, 1997 (TN 48) £30.00
- Energy Impact of Ventilation: Estimates for the Service and Residential Sectors, Orme M S,

1998 (TN 49) (£30.00)  
Introduction to Ventilation Technology in Large Non-Domestic Buildings, Dickson D, 1998 (TN 50) (£30.00)  
Applicable Models for Air Infiltration and Ventilation Calculations, Orme M S, 1999 (TN 51) (£30.00)

#### ANNOTATED BIBLIOGRAPHIES

Ventilation and infiltration characteristics of lift shafts and stair wells, 1993 (BIB 1) £22.50  
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Air intake positioning to avoid contamination of ventilation air, 1995 (BIB 4) £22.50  
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'Ventilation and Indoor Air Quality in Buildings', Edinburgh, Scotland, 1999 CD ROM with printed abstracts and indexes. (CP 20) £65.00 + VAT  
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*These are literature searches performed on the AIVC's bibliographic database, Airbase, and can be viewed on the Web. Suggestions for new literature lists are welcome.*

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1. Models (LL01)  
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# URBVENT - European Research Project on Natural Ventilation in Urban Areas

by F. Allard, C. Ghiaus

LEPTAB (Laboratoire d'Etudes des Phénomènes de Transfert Appliqués au Bâtiments),  
Université de La Rochelle, France,

Financed within the 5th framework program of the European Community, the URBVENT project aims to provide a methodology, imbedded in software, to assess potential and feasibility, and to design optimal façades for natural ventilation in the urban environment, which will be accessible to architects, designers and decision makers. The methodologies and tools are to be tested in three stages by the developers, end-users and project integrator. The philosophy of URBVENT is to use distributed skills and knowledge in order to obtain low cost and energy efficient solutions as an alternative to relatively unskilled installation of expensive, energy consuming manufactured systems.

Fundamental to the URBVENT work-plan is the cooperation between university research laboratories and industrial end-users in producing knowledge accessible to European specialists.

The project is divided into five work packages (WP):

- 1) Soft Computing of Natural Ventilation Potential;
- 2) Optimal Openings Design;
- 3) Engineering Validation;
- 4) Synthesis.

The first two WPs provide the input to the third. They will be developed by university research laboratories taking into account the feedback coming from industry. Then, in WP3 the software and the methodologies will be tested only by industries that did not participate in their development. Finally, the consistency of the project will be checked in the final work package.

WP1 will fill the gap between oversimplified and hyper-exact models used for assessing pressure and temperature distribution around buildings. It is based on computational systems that learn and adapt themselves, and explain their results (along with the degree of confidence). The combination of numerical and qualitative information is done in a meaningful way.

WP2 will develop design guidelines by using measurements of meteorological data, pollutants and noise in canyon streets. WP4 and WP5 are essential for the success of the project. They will ensure that the software tools and methodologies are coherent, self-contained and user friendly. About half of the effort in this project is destined to make an orderly, logical, and aesthetically consistent relation of parts for the end-user.

The participants in the project are the Université de La Rochelle (France), the project coordinator, and National and Kapodistrian University of Athens (Greece), Ecole Polytechnique Fédérale de Lausanne (Switzerland), Sulzer Infra Lab AG (Switzerland), Wetenschappelijk en Technisch Centrum voor het Bouwbedrijf (Belgium), University of North London (United Kingdom), Instituto de Engenharia Mecânica (Portugal), Centre National de la Recherche Scientifique (France), and Building Research Establishment Limited (United Kingdom). The project is financed for three years, starting from 2001.