AIR INFORMATION REVIEW

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Success for the AIVC silver jubilee conference

This year the 25th AIVC conference was held in the beautiful city of Prague (Czech Republic) from 15 to 17 September 2004. Over 80 participants from all over the world (21 countries) attended the conference.

The main topic of the conference was ventilation and retrofitting. In addition to this topic, 2 special sessions were organized in close collaboration with the EC RESHYVENT project dealing with hybrid ventilation in residential buildings (*http://www.reshyvent.com*)

The best paper prize was awarded to Mr. François Rémy Carrié (from CETE Lyon) for his presentation of the paper entitled: "Checking the compliance of residential ventilation systems in France". The full version of his paper is available on the AIVC-CD. (See also article on page 12).

The best poster prize was awarded to Mrs. L. Guo (from Urban Institute Ireland) for her presentation of the paper entitled: "Field investigation of indoor air quality in various Chinese residential buildings". Her paper is also available on the AIVC-CD.

The proceedings of the 25th AIVC conference are now available on CD. The price (postage and package included) is 35 Euro. The table of content of the proceedings and the order form are available on the AIVC-CD and on the AIVC website

2005 AIVC Conference Brussels - Belgium - 21-23 September 2005
"Ventilation in relation to the Energy Performance of Buildings"
Announcement and call for papers

More information on pages 8 and 9

AIR
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 and CD is to encourage and increase information exchange among ventilation researchers and practitioners worldwide.

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Certified Rating Programmes of Home Ventilating Institute

http://www.hvi.org

The Home Ventilating Institute - HVI - is a non-profit association of the manufacturers of home ventilating products. HVI represents manufacturers from the United States, Canada, Asia and Europe, producing a large parts of the residential ventilation products sold in North America.

Founded in 1955, HVI today represents a wide range of home ventilating products including bathroom fans, kitchen rangehoods, downdraft kitchen fans, inline fans, heat/energy recovery ventilators, single and multi-port exhaust fans, exterior mounted fans, balanced ventilators, whole house cooling fans, powered attic ventilators, passive fresh air inlets and static ventilation devices for attics and crawl spaces.

The Certified Rating Programs of HVI were created to provide a fair and credible method of comparing ventilation performance of similar products. Not only are products Certified, but a random verification program ensures that those products still meet their original performance. All testing for certification and verification is performed by laboratories independent of any manufacturer. The test standards utilized for testing are, in most cases, developed by HVI using national and international consensus methods. In a few cases test standards previously developed by other agencies are recognized and adopted by HVI. A complete list of Certified Products, Manufacturers and Products can be found in the Certified Product Directory on *http://www.hvi.org*.

HVI Certification has been accepted and recognized as the method of performance assurance by many agencies some of which are - the US Department of Housing and Urban Development, US Department of Energy - Bonneville Power Administration, National Building Code of Canada, R2000 Housing Program - Canada, Washington State Building Code, Minnesota State Building Code, Building Officials and Code Administrators International (BOCA), International Conference of Building Officials (ICBO) and the National Electrical Manufacturers Association.

Introduction to SCANVAC

Dr. ing. P. G. Schild,
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http://www.scanvac.net

Scandinavia has perhaps the highest density of HVAC engineers in the world. This reflects a long history of activity in the HVAC field, both in industry and universities/institutes. HVAC engineering has been on the curriculum for over a hundred years, and degree courses up to PhD level are available at many universities in the member countries.

SCANVAC (*Scandinavian Federation of HVAC and Sanitary Engineering Societies*) promotes close cooperation between the national HVAC societies in the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden). The corresponding societies in the Baltic states (Estonia, Latvia and Lithuania) are associated members of SCANVAC, represented by their federation BALTVAC. SCANVAC has now almost 20 000 individual members. SCANVAC's member societies are listed below.

Denmark	**DANVAK,** Danish Society of Heating, Ventilating & Air-Conditioning Engineers (http://www.danvak.dk/)	
Finland	**FINVAC**. Finnish Association of Heating, Piping & Air Conditioning Societies (http://www.finvac.org/)	**SulVi,** Finnish HVAC Assosiation (Finnish speaking) **VSF**, Finnish HVAC Assosiation (Swedish speaking) **LIVI,** The Finnish Society of Building Services and Energy Engineers
Iceland	**ICEVAC,** Icelandic Heating, Ventilating & Sanitary Association	
Norway	NORVAC (**Norsk VVS**), Norwegian Society of HVAC Engineers (http://www.vvs-foreningen.no/)	
Sweden	SWEDVAC (**VVS Tekniska Föreningen**), Swedish Society of Heating & Air Conditioning Engineers (http://www.siki.se/)	
Estonia	**EKVÜ**, Estonian Society of Heating and Ventilation Engineers (http://www.hot.ee/ekvy)	**BALTVAC** (Baltic Federation of HVAC Societies)
Latvia	**AHGWTEL**, Latvian Association of Heat, Gas & Water Technology Engineers	
Lithuania	**LITES**, Lithuanian Thermotechnical Engineers Society	

The main objective of SCANVAC´s member societies, and thus for SCANVAC itself, is to encourage the continuing education and professional advancement of its members (through publishing journals, guides, seminars), participating in different programmes of applied research. SCANVAC cooperates with other international organizations, e.g. REHVA (the European Federation of International Heating and Air-Conditioning Associations), and ASHRAE (the American Society of Heating, Refrigerating and Air-Conditioning Engineers), and SHASE (the Japanese Society of Heating, Air-Conditioning and Sanitary Engineers).

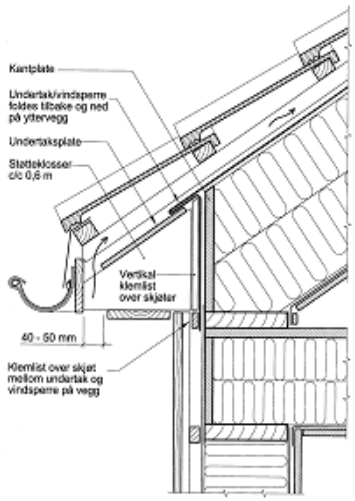
SCANVAC publishes a biannual newsletter that is distributed to members via their respective journals, and is available on their website (*http://www.scanvac.net*).

The secretariat for SCANVAC is presently held by SWEDVAC. You can find a copy of the latest newsletter on the AIVC-CD.

External windbreakers for airtight buildings

PhD L. Myhre & PhD A. Tormod , Norwegian Building Research Institute

In co-operation with the building industry, the Norwegian Building Research Institute (NBI) is developing solutions for reducing the infiltration and air-leakage in buildings. Timber-framed constructions are common in Norway. The thermal insulation (normally mineral wool) is located between the external windbreaker and the internal vapour barrier (polyethylene film). The connection between the walls and the roof has historically been a challenging detail. To improve airtightness, NBI has explored the possibility of ending rafters flush with the façade, allowing a continuous sheet of external windbreaker past the cornice, effectively wrapping the building, as shown in the figure below.



The connection between walls and ceiling: rafters end flush with the wall. Detail from Norwegian Building Detail Sheet 525.102, widely spread in the Norwegian building industry

NBI recently measured an air-leakage (n_{50}) of only 0.8 air changes per hour in a 2-storey house (Figure) with only the external windbreaker present - before the internal vapour barrier was fitted. This is the lowest air change rate NBI has measured for a timber-framed house before the vapour barrier is fitted. The walls were covered with a spunbonded polyethylene windbreaker from DuPont Tyvek. The house has a cold attic, and the roof construction is covered with a combined breathable and water-tight under-roof of spunbonded polyethylene with laminated polypropylene, also from DuPont Tyvek.

All penetrations through the external constructions were established (ventilation ducts, cables, pipes), except for the chimney, which had not been installed when the measurements were conducted. The connection between the walls and roof were similar to that shown at the first Figure. Polyurethane-foam was used around windows and doors, and the windbreaker film was clamped between the window frame and the wooden cladding. The house has a slab-on-ground foundation.

The record-breaking house is a standard production house

This example shows that very good airtightness can be achieved in timber-framed houses by using new products and new labour-saving construction solutions.

A very contented carpenter, after having received the 0.8 ach/h result, here carrying in the first roll of vapor barrier

Info from projects

IEA - ECBCS Annex 44: Integrating Environmentally Responsive Elements in Buildings

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Research into building energy efficiency over the last decade has focused on efficiency improvements of specific building elements like the building envelope, including its walls, roofs and fenestration components, and building equipment such as heating, ventilation, air handling, cooling equipment and lighting. Significant improvement have been achieved, and whilst most building elements still offer opportunities for efficiency improvements, the greatest future potential lie with technologies that promote the integration of responsive building elements and communication among building services.

In this perspective *Integrating Building Concepts* are defined as solutions where responsive building elements together with building services are integrated into one system to reach an optimal environmental performance in terms of energy performance, resource consumption, ecological loadings and indoor environmental quality. *Responsive Building Elements* are defined as building construction elements which are actively used for transfer of heat, light and air. This means that construction elements (like floors, walls, roofs, foundation etc.) are logically and rationally combined and integrated with building service functions such as heating, cooling, ventilation and energy storage.

Building integrated ventilation is an example of a technology that integrates responsive building elements with the ventilation system. The focus on the environmental impacts of energy production and consumption has provided an increased awareness of the energy used by fans, heating/cooling coils and other equipment in ventilation and air conditioning systems. An expectation of a reduction in annual energy costs has also been an important driving force for the development of natural and hybrid ventilation strategies.

Available data from case studies provided in the international project IEA ECBCS-Annex 35 show that a substantial energy saving has been achieved in a number of buildings, mainly because of a very substantial reduction in energy use for fans and a reduced energy use for cooling. This was achieved primarily by utilising the natural driving forces and the natural cooling potential of the outdoor air. Building elements like embedded ducts, multiple skin facades and exposed thermal mass was used to some extent to preheat and/or pre-cool ventilation air or to reduce the impact of high heat gains. But, due to limited knowledge on the integrated performance of these elements and the ventilation system as well as appropriate simulation methods the system designs were far from optimised. Development, application and implementation of responsive building elements in building integrated ventilation systems are a possible next step towards further energy efficiency improvements in the built environment and will provide new opportunities for further improvement of environmental performance.

The annex will address the following objectives:

- State-of-the-art review of responsive building elements, of integrated building concepts and of environmental performance assessment methods.
- Improve and optimise responsive building elements.
- Develop and optimise new building concepts with integration of responsive building elements, HVAC-systems as well as natural and renewable energy strategies.
- Develop guidelines and procedures for estimation of environmental performance of responsive building elements and integrated building concepts.

The annex will be divided into the following three subtasks to reach the objectives:

- Subtask A: Responsive Building Elements
  The subtask will focus on improvement of responsive building element concepts including assessment of the advantages, requirements and limitations. The subtask will focus on systems that have the potential to be successfully integrated with integrated building concepts.
- Subtask B: Integrated Building Concepts
  The subtask will focus on development of integrated building concepts where responsive building elements, energy systems and control systems are integrated into one system to reach an optimal environmental performance.
- Subtask C: Implementation and dissemination
  The focus of the subtask will be to guide, collect, packet, transform and disseminate the findings generated in Subtasks A and B. The main target groups are manufacturers of building elements, designers (architects and engineers), but also end-users and building owners.

An annex preparation workshop was arranged in May 2004 and another one is scheduled for September 2004. For more information about the Annex, see Annex description on CD.

For information about the workshop please contact the Operating Agent, Per Heiselberg, *ph@bt.aau.dk*, Aalborg University, Denmark.

Dampness in buildings as a risk factor for health effects, EUROEXPO

A multidisciplinary review of the literature (1998-2000) on dampness and mite exposure in buildings and health effects

http://www.blackwellpublishing.com/ina

There is general consensus that there is in most buildings a strong link between the ventilation rates and the humidity levels. Also, the ventilation rate is one of the major variables for explaining dampness problems in buildings.

In the framework of a European Project, the scientific literature on health effects from dampness in buildings, including mite exposure over the period 1998-2000 has been reviewed by a European group (EUROEXPO) of eight scientists from medicine, epidemiology, toxicology and engineering fields (C.G. Bornehag, J. Sundell, S. Bonini, A. Custovic, P. Malmberg, S. Skerfving, T. Sigsgaard and A. Verhoeff).

Forty studies deemed relevant have been the foundation for the conclusions. Based on this review, it is concluded that dampness in buildings is a risk factor for health effects both in domestic and in public environments. However, the literature is not conclusive in respect of causative agents, e.g. mites, microbiological agents and organic chemicals from degraded building materials.

There is a strong need for more multidisciplinary studies including expertise from all relevant areas. A general conclusion from the work was that there is a strong need for multidisciplinary reviews in scientific journals of articles dealing with associations between indoor environmental factors and health effects.

As far as the practical implications are concerned: there is good evidence for a true association between dampness in buildings and health. As the causative factors behind this association are not known, the main focus in practical investigations should be on finding out and remediating the reasons for the humidity problem.

The full paper was published in the August issue of 'Indoor Air', which is the official journal of the International Society of Indoor Air Quality and Climate (ISIAQ). Information regarding subscriptions can be obtained on *http://www.blackwellpublishing.com/ina*.

Using ground cooled ventilation air in housing

Demonstrations show how air-conditioning can be avoided in hot climates

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http://www.softech-team.it/Coolweb/cool-index.htm

Is it feasible to use buried plastic pipes to provide cool air in summer for housing and similar buildings in southern Europe? The COOLHOUSE project, which finished in 2004, has demonstrated that simple systems can reduce peak internal temperatures in summer in well designed new housing and give good comfort, without air conditioning.

Monitored results from a private housing development in south west Portugal and an old people's home in Frejus, in the south of France, confirm that several straightforward construction measures are important in providing summer comfort, including solar shading, thermal mass, and insulation, but that ground cooling pipes can also contribute. Ground cooling pipes work best if they are used in a simple way e.g. air is slowly pulled through and used directly as cooled ventilation air. Then the system can deliver air at 10^0C below outside air temperatures even at peak times. At night, if the air is cold, it can be drawn through to help cool the ground ready for the next day. The pipes can either be used only for peak times of the day or for longer periods, and can also provide preheated ventilation air in winter. They can make active air conditioning unnecessary but cannot supply the same blasts of cold air, they work in a slower way and will work best if there is a pre-planned strategy for their use. Ground cooling pipes supply coolting over long periods of time but at a low rate, which is almost the opposite of active chillers. This is very important in understanding and designing a good ground cooling system, and indeed for using the system effectively.

The experience in a community centre in central Italy was less successful, as the ground pipe cooled air passed through a heat exchanger before being integrated mechanically into the heating and ventilating system of the building. The benefits of ground cooling are more difficult to identify and it seems that the particular use strategy was not best suited to the pipe system installed.

The costs of ground cooling obviously varies with the size but are need not be expensive, a price per house of about 7500 euro was quoted at Alma Verde, the Portuguese site, and the estimated payback was 10 years, due to the avoided electricity running cost for chillers. From an environmental point of view the energy savings are large at around 5000 tonnes of CO_2 per year per house. This is a very significant conclusion for European energy consumption.

A study on "Regional Suitability" of thetechnologies concluded that all are widely applicable across southern Europe where domestic cooling is needed, and could become useful in more northern areas as the effects of global warming becomes more widespread.

Design of passive cooling measures including ground pipe systems is not difficult and methods are described in a report on calculation methods used in the project. Computer modelling and calculation methods are available (e.g. from the University of Athens) and these give reliable results. The integration of the passive measures into the architecture of a building are not likely to cause any major difficulties, this is the conclusion of the "Architecture and Passive Design" report, but they should be carefully considered from the start of the design process.

Overall the project concluded that occupants like the passive systems, but there remains the question as to whether individuals will actually buy in. The "Marketability of Passively Cooled Housing" report concludes that although passive cooling is low on the list of priorities of prospective purchasers, it does have some marketing benefits and has been used as such at Alma Verde (the only private development for sale in COOLHOUSE). The report also indicates that a significant number of purchasers will opt for the optional "COOLHOUSE" system, if they are offered to them at the current price.

Duct thermal performance models for large commercial buildings

C. Wray, Lawrence Berkeley National Laboratory
http://epb1.lbl.gov/EPB/Publications/lbnl-53410.pdf

California's energy standards (Title 24) are one of the most advanced energy codes in the United States, but they have no provisions to credit energy-efficient duct systems in large commercial buildings. A substantial reason is that there are no readily available simulation tools to demonstrate the energy-saving benefits associated with reducing air leakage or other thermal losses from duct systems in these buildings.

To help address this problem, LBNL has recently carried out a project to:

- Define a set of principles that can be used to guide duct thermal performance modeling for large commercial buildings.
- Identify an energy simulation approach that can be used now with little or no modification to assess the impacts of duct system improvements in California large commercial buildings.
- Develop recommendations on how to proceed with longer-term development of an improved code compliance tool for Title 24 that addresses duct thermal performance.

Short-Term Modeling Approach

We concluded that the best short-term approach is to build upon previous research that used DOE-2 and TRNSYS in a hybrid sequential simulation.

An advantage of this approach is that DOE-2 prototypical models for a large commercial California building are available, as are TRNSYS component models that we developed in the past to model duct leakage effects in VAV systems. To assist other modelers, the project's final report presents the source code for the TRNSYS component models, which was never previously published.

Long-Term Modeling Approach

Although DOE-2 is the reference simulation tool for Title 24, its duct modeling limitations, convoluted structure, and the lack of government support for future development make it unsuitable as a platform for long-term modeling of duct thermal performance in large commercial buildings.

We have suggested instead that EnergyPlus be developed to include duct component models like the TRNSYS ones identified for short-term use.

Other steps required to implement this long-term approach include:

- Developing models to account for airflows entering VAV boxes from ceiling return plenums (e.g., parallel fan-powered VAV boxes), to deal with duct surface heat transfer effects, and to deal with static pressure reset strategies.
- Developing an interface to facilitate program use in Title 24 compliance analyses. The interface might include utilities that convert DOE-2 input files for use in EnergyPlus to help current DOE-2 users migrate more quickly to EnergyPlus
- Developing reliable techniques for measuring duct air leakage that can be practically applied in large commercial buildings. Field measurements would help define a reference duct leakage for use in Title 24 compliance simulations.
- Validating EnergyPlus against measured data and certifying it as a compliance analysis tool.

The final report is available at: *http://epb1.lbl.gov/EPB/Publications/lbnl-53410.pdf* and on the AIVC-CD.

WIS 3.0: Free European Software Tool for the calculation of the thermal and solar properties of windows

ir. G. Flamant,
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Windows strongly affect building energy use. By using energy efficient windows we can greatly reduce the heating consumption of a building, while providing a healthy indoor environment, avoiding downdraught and cold surfaces. Windows with proper solar shading provisions contribute to a comfortable indoor environment in summer conditions. Windows also play a key role in providing adequate daylight, which is another important factor for comfort and energy savings in buildings.

WIS 3.0 is a uniform, multi-purpose, European-based software tool designed to assist in determining the thermal and solar characteristics of window systems (glazing, frames, solar shading devices, etc.) and window components. The tool contains databases with component properties and routines for calculation of the thermal/optical interactions of components in a window. One of the unique elements in the software tool is the combination of glazings and shading devices, with the option of free or forced air circulation between both. This makes the tool particularly suited to calculate the thermal and solar performance of complex windows and active facades.

The WIS algorithms are based on international (CEN, ISO) standards, but WIS also contains advanced calculation routines for components or conditions where current standards do not apply.

WIS 1.0 (the first version of WIS), previously developed as a licensed tool under a European Commission-funded research project, has been upgraded to WIS 3.0 during the last three years within the European WINDAT Network, which includes 40 leading research and educational organizations, industries, consulting engineers and designers, including a strong representation in relevant international standardization bodies.

This tool is collectively supported and used in research, industry, standardisation, education and design throughout Europe to compare, select and promote innovative windows and window components to maximise energy savings and improve indoor comfort.

WIS 3.0 tool is now freely available, and is designed as a user-friendly tool, prepared for a wide variety of users including:

- Consulting engineers
- Manufacturers
- Building designers
- Researchers
- Those involved in standardisation, building regulation and education.

An extended description of WIS is available on the AIVC-CD (English, French, Dutch).

For more information, support, and free download of the tool:
http://www.windat.org

WINDAT and WIS were financially supported by the European Commission Directorate General for Energy and Transport.

Standards and regulations

New standard on performance requirements for ventilation and room-conditioning systems

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In September 2004 the CEN published the standard EN 13779 entitled "Ventilation for non-residential buildings - Performance requirements for ventilation and room-conditioning systems".

The standard applies to the design of ventilation and room conditioning systems for non-residential buildings subject to human occupancy in order to achieve a comfortable and healthy indoor environment. It focuses on the definitions of the various parameters that are relevant for such systems. Naturally ventilated buildings are outside the scope of the document.

The standard focuses on the system-aspects for typical applications and covers the following:

- Relevant parameters of the indoor environment.
- Definitions of data design assumptions and performances.
- Communication between the various parties involved in the system completion.

The classification uses different categories. For some values, examples are given and, for requirements, typical ranges with default values are presented.

Three informative annexes give guidelines for good practice, information on economic aspects and checklist for the design and use of systems with low energy consumption.

Mankind's gravest IAQ problem

Dr. ing. P. G. Schild,
Norwegian Building Research Institute

A smoking World

$5.6´10^{12}$ cigarettes are smoked annually, 900 cigarettes for every human on Earth, 30 % of them in China. Though cigarette production is starting to fall, deaths are rising, especially in developing countries, where 82 % of smokers live. At current rates, the number of tobacco users may rise from 1.3 billion to 1.7 billion by 2025.

Smoking-related diseases kill 4.9 million people worldwide every year (10 % of adult fatalities), one every 6.5 seconds. Tobacco damages more than smokers' own lungs & heart - exposure to second-hand smoke also kills. Passive smokers have up to 60 % greater risk of coronary heart disease. Smoking causes annual global losses of US$ 200 billion in productivity and health-care costs.

Effective policies

Only 5 % of smokers give up by their own accord each year. We therefore need strong regulation; the best remedies are taxation, bans on smoking in public, and advertising bans. 100 countries (representing 4.5 billion people) have ratified the WHO Framework Convention on Tobacco Control. It is the first global legal instrument to reduce tobacco-related deaths. It defines international minimum standards on tobacco advertising, promotion & sponsorship, tax & price measures, packaging & labelling, illicit trade, and protection from second-hand smoke. These provisions are guiding governments, which are free to legislate at higher thresholds if desired.

California in the forefront

7 US states and some cities, have state-wide bans on smoking in workplaces including restaurants & bars (California 1998, Delaware 2002, New York 2003, Connecticut 2003, Maine 2004, Massachusetts 2004, Rhode Island). 4 more have blanket bans that exempt bars (Florida, Vermont, Utah, Idaho). These measures are a success. The number of smoke-free Californian homes rose from 38 % in 1992 to 74 % in 1999. Even half of smokers' own homes have become smoke-free. The health of Californian restaurant employees improved quickly after the ban. Despite claims to the contrary, smoke-free bars have not lost business. In New York (colder climate) turnover in restaurants & bars was up 12 % after the first year, and 14 % of smokers had quit. In Maine, 76 % support the ban, including 54 % of smokers. Most Canadian provinces & territories also have anti-smoking legislation, many including restaurants & bars.

Ireland – first country with blanket ban

Ireland was the first country to ban smoking in all enclosed workplaces, including bars and restaurants and company vehicles (29 March 2004).
It has been hailed a success. 25 % of the Irish population smoke. 82 % of those surveyed support the smoke-free workplace; 95 % agree that it is positive for health. Most feel that it has improved their experience in pubs (70 %) and restaurants (78 %). More are now inclined to eat in a pub.

Norway

Norway was the 2nd nation to implement a blanket ban in public places (1 June 2004). 26 % of adults smoke. Approx. 0.1‰ of non-smokers die annually from passive smoking. Waiters & barkeepers had a significantly higher risk of lung cancer than other employee groups. 120 000 asthmatics had been partially unable to visit restaurants where smoking was allowed. Smoking was already banned in workplaces & public transport in the mid-1990s, but restaurants were only obliged to create smoke-free zones. Simple segregation measures, to protect non-smokers from secondary-smoke in restaurants, were largely ineffective, and did not fully protect staff. Opinion polls show that the most Norwegians support the new law, which permits smoking only outside or in private homes. Most restaurants & bars have since abandoned doomsday predictions that a smoking ban would ruin their business; many acknowledge that many customers were looking forward to smoke-free restaurants. Open-air pavement-restaurants mushroomed in the summer to cater for smokers. However, the cold climate cannot permit this all year round, even though a major tobacco producer sponsored outdoor heating lamps to keep them warm£. Safety regulations (in case of explosions) are being flouted in many cases where these gas lamps are used.

Others will follow, but what of developing countries?

New Zealand (December 2004) and Sweden (July 2004) are next in line to implement blanket bans. Australia will follow suit in 2006. Several others are discussing the possibility. Developing countries are behind. In Asia, India has banned smoking in most public places but not restaurants. Similarly, Pakistan has banned smoking in most public places but it is rarely enforced. In Africa only Tanzania, Uganda and South Africa have implemented limited bans. Smoking is banned in all public places including the workplace in South Africa. Most South American states have few restrictions - less than half ban smoking in public transport. Brazil also has some restrictions in workplaces and public places.

Second announcement & call for papers

26th AIVC conference
Ventilation in relation to the Energy Performance of Buildings

Hotel President WTC
Brussels, Belgium

21-23 September 2005

Sub-theme
"Whole building heat, air and moisture transfer"

The conference is organized by the International Network for Information on Ventilation (INIVE EEIG) on behalf of the Air Infiltration and Ventilation Centre (AIVC).

Purpose
Since 1980, the AIVC conferences have been the meeting point for presenting and discussing interesting developments and results regarding ventilation in buildings. For each conference a specific theme is selected and a substantial part of the presentations relate to this theme. The theme of this 26th conference is 'Ventilation in relation to the energy performance of buildings'.

There are several reasons for selecting this theme:
- Buildings represent in many countries of the order of 30…50 % of the total energy and pollution load. The improved insulation of new and existing buildings in combination with an increased number of buildings with ventilation systems risk to lead to a higher percentage of the energy consumption due to ventilation;
- An increased number of countries are implementing so-called energy performance regulations, whereby limits are imposed on the total energy consumption of a building for clearly defined boundary conditions. For the 25 EU countries, this process is substantially accelerated due to the Energy Performance of Buildings Directive which imposes all countries to have in January 2006 an energy performance regulation in place with e.g. energy performance requirements for ALL new buildings as well as energy performance certification for all buildings when constructed, rent or sold. This conference is an excellent occasion for having a clear picture regarding the status of implementation just a few months before January 2006.
- During the last decade, a lot of attention has been given to the development of innovative ventilation systems. Energy Performance regulations can be a stimulus for the market introduction of innovative systems but also a barrier.

As during previous conferences, there is also a sub-theme of the conference. This year, the topic is 'Whole building heat, air and moisture transfer'. This topic is also the title of IEA Annex 41.

A new feature of this conference is the organisation of **2 parallel sessions**. Indeed, most of the conference will consist of 2 parallel sessions:
- One session can be considered as the 'practice track': presentations and discussions focused on information for practitioners. We expect that most of the papers regarding energy performance of buildings will be presented here;
- The other session can be considered as the 'research track': presentations which are more focused on the researcher community, specialised consultants, ….

Of course, all participants will receive all conference papers and both tracks are open for all participants.

Topics of the conference
Abstracts are invited regarding interesting work in the areas of research, development and application of ventilation in buildings. Preference will be given to abstracts focusing on one of the following topics:
- Treatment of ventilation aspects in standards and regulations
- Handling of ventilation in energy performance regulations outside Europe
- Airtigthness of buildings and ducts
- Energy for transport of air
- Innovative ventilation systems and energy performance regulations
- Impact of regulations on ventilation market
- Good indoor climate and energy performance
- Ventilation in the context of energy certification of buildings
- Commissioning and inspection of ventilation systems
- Ventilation related challenges for the existing building stock
- Ventilation in very low energy buildings
- Ventilation aspects in warm and cold climates
- Economics of indoor climate

- Coupling, in terms of heat, air and moisture flows, between building and building fabric, consequences for energy consumption and durability
- Combined effect of ventilation and hygric inertia on indoor climate and energy consumption.

Interesting papers on other ventilation related issues can also be submitted.

Programme
The programme for this conference will consist of:
- *Invited* presentations;
- *Papers*: 15 to 20 minute extended oral presentations followed by discussion;
- *Posters:* 5 minute short oral presentations followed by exhibit and discussion;
- *Summing*-up at the end of the conference.

Abstracts
Full oral presentations or short oral presentations with poster are welcome on the conference topics.

The one page abstract, which should be single spaced, with the one of the above mentioned topic(s) and in English, should include:
- Full title
- Author's full name, affiliation, address, phone, fax & e-mail
- Purpose of the work
- Method of approach
- Results and assessment of their significance
- Conclusions.

In addition, authors may include up to 2 explanatory pages which will facilitate the reviewer's assessment.
A standard form for the abstract can be found on the website
http://www.aivc.org

Interested contributors are kindly asked to submit their abstracts by 15 March 2005 by one of the following ways:
- by E-mail: Word, RTF or ASCII (text only) to: *conferences.inive@bbri.be*
- by fax to +32.2.653.07.29
- by post mail to INIVE EEIG, Lozenberg 7, BE-1932 St-Stevens-Woluwe, Belgium

All presenting authors must register with payment by 15 July 2005, for their papers to appear in the proceedings.

Deadline for abstracts and papers

- Receipt of abstracts 15 March 2005
- Notification of abstract acceptance 30 March 2005
- Submission of papers 15 July 2005

Conference proceedings
All accepted papers will be inserted in the Conference Proceedings which will be available at the start of the Conference.

Venue
AIVC Conference 2005 will be held at the Hotel President WTC
Boulevard du Roi Albert II, 44
Koning Albert II-laan, 44
BE-1000 Brussels, Belgium
Tel: +32.2.203.20.20
http://www.presidenthotels.be

Dates
The Conference will start on Wednesday 21 September 2005 (at 9.00) and will end on Friday 23 September 2005 (about 16.00).

Conference fee

	before 1st July 2005	from 1st July 2005
Conference fee	± 599 Euro	± 699 Euro
Conference fee for students (without accomodation)	± 349 Euro	± 399 Euro
Full conference package (3 nights in a single room, incl. breakfast)	± 999 Euro	Only available till 1st May

Precise information will soon be available on the AIVC website:
http://www.aivc.org.

Language
English will be the official language.

Hotel information
A contingent of rooms is being reserved for conference participants and accompanying persons at the Hotel President WTC and a special group rate will be offered (140 €/night, single room and 165 €/night, double room, breakfast and taxes included, special price 95 € for the week-end night).

To obtain the preferential price, please mention the reference code 'AIVC Conference'.
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Conference secretariat
If you would have any further questions, please contact the conference secretariat:

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Additional information
Information about the conference can also be found on the AIVC ±

website: *http://www.aivc.org*.

With support of

How to get to the hotel President WTC?
As conference location, the hotel President WTC is located within walking distance from Brussels North station and just 15 minutes away from the airport. Moreover, there are direct high speed trains from Paris Charles De Gaulle (about 1h30), Schiphol (2h30) and Frankfurt (3h30).

Local scientific committee
- D. Berckmans, University Leuven
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Bookshop

Airtightness of buildings

A new Ventilation Information Paper from the AIVC

AIVC VIP 08, 2004, 8 pp,
V. Dorer, C. Tanner, A. Weber

If the building envelope is not airtight enough, significant amounts of energy may be lost due to exfiltrating air, or damage to structural elements may occur due to condensation. Air leakage can be avoided by appropriate design and careful construction. Test methods to check the quality of airtightness and to locate the individual leakages are available and are increasingly used.

For more information on airtightness of buildings, read the new Ventilation Information Paper.

Energy Performance regulations: Which impact can be expected from the European Energy Performance Directive?

A new Ventilation Information Paper from the AIVC

AIVC VIP 09, 2004, 8 pp, P. Wouters

In the past and often still today, building regulations and standards don't reflect the state-of-the art with respect to the performance assessment of buildings in terms of energy use and indoor climate.

Because of the field of most of these regulations (transmission losses, energy demand for heating,…) and the typical used components, the assessment procedures were rather simple and not really a reflection of the physical behaviour (e.g. dynamic behaviour of buildings).

Energy Performance (EP) standardisation and regulation is considered by an increasing number of countries as an attractive approach for achieving a more energy efficient built environment. Several countries have already enacted such EP based regulation (the Netherlands, France, ASHRAE approach in North America…), or are preparing one (Germany, Greece, the Flemish Region…). Moreover, a European Directive on the energy performance of buildings (EBPD) was adopted in November 2002 with a deadline for implementation in 2006.
This VIP describes the main elements of the EPBD and specific attention is given to the ventilation related aspects.

A new guide on air quality in ventilation systems

F. Durier, CETIAT
http://www.cetiat.fr

This new guide provides practical recommendations and rules for the correct design, installation and servicing of ventilation and air conditioning systems to achieve good indoor air quality.

It was published in May 2004 by CETIAT (French Technical Centre for Heating, Ventilation and Air Conditioning Industries), in co-operation with the ventilation, filtration and air conditioning systems manufacturers (especially ALDES, ANJOS, ASTATO, ATLANTIC, CAMFIL, CARRIER, CIAT, FRANCE AIR, TITANAIR, UNELVENT), energy suppliers (EDF and Gaz de France) and ADEME (French Agency for Environment and Energy Management).

The first part of the guide presents the various ventilation and air conditioning systems (exhaust ventilation, balanced ventilation, air handling units, terminal ventilation units) and draws attention to specific points which require particular care for air quality.

The second part gives detailed recommendations for components (air inlet, air filter, heat recovery unit, heating and cooling coils, humidifier, …), in order to ensure good air quality in the ventilation/air conditioning system as well as in the rooms.

The English and French version of the guide are both available on the AIVC CD. They can also be downloaded from *http://www.cetiat.fr*.

Meetings and events

RoomVent 2004

A Selective Review

A. Rusås Kristoffersen,
Norwegian Building Research Institute
http://www.roomvent2004.com

The 9th International Conference on Air Distribution in Rooms, ROOMVENT 2004, was held at the Univeristy of Coimbra, Portugal, September 5-8. 2004. The conference had 250 participants from 30 countries. 210 papers were presented in four auditoriums with parallel technical sessions. There were three workshops: on virtual manikins, quality of CFD results and an introduction to the new REHVA handbook. A selective review of some of the different topics is given below.

Modelling of Human/Indoor Environment Interaction
This was the Special topic for the 2004 conference, with 10 presented papers.

H. Matsumoto (Toyohashi University of Technology, Japan) presented "CFD Simulation of Air Distribution in Displacement Ventilated Rooms with a Moving Object". The distribution of indoor air and ventilation effectiveness obtained by the simulation were compared with the experiments using a full-scale room model. Simulation results showed a significant difference of thermal stratification and ventilation performance among the cases with different object speeds. The ventilation effectiveness decreased as the object's moving speed increased in the occupied zone.

Individually controlled environments – 19 papers
Jianrong Yang (Tsinghua University, China) discussed the performance of personalized ventilation (PV) under realistic conditions in an office environment. His results identified that although personalized ventilation may greatly improve the air quality of the micro-environment at static workplaces. PV is suitable for call-centres etc, where people stay static most of the time, but workplaces with high mobility of occupants should not have PV. Yang's work has also showed that fluctuating PV should optimally have a frequency of about 0.2 Hz which is the typical human breathing frequency, but that this has the same acceptability as constant flow rate PV. Further it was found that it is beneficial to have relatively large PV outlets, since the lower jet velocity means that less air is induced from the polluted surroundings.

Thermal Comfort – 10 presented papers
I. Müller (Dresden University of Technology, Germany) introduced a Manual of Thermal Comfort. The manual gives recommendations for choosing an optimal building energy system as well as location and type of the flow inlet, with regards to thermal comfort. It provides answers about critical conditions regarding thermal comfort. Graphical demonstrations enable the evaluation and comparison of different heating systems.

Indoor air quality – 19 presented papers
M. Sandberg (University of Gavle, Sweden) presented the paper titled "Rapid Time Varying Ventilation Flow Rates as a mean of increasing the Ventilation Efficiency". He reported findings from a series of experiments where the supply flow rate varied periodically in time. By introducing a periodic time variation of the supply flow rate, vortices are generated at the inlet. His conclusion was that stagnant areas disappear if the rate of generation of vortices is sufficiently high. The vortices are generated at a rate equal to the frequency of the variation of the flow rate and can therefore be controlled.

Modelling techniques – 30 presented papers
J. Axley (Yale University, USA) introduced "Zone Resistance in Embedded CFD Modeling". Zone resistance is ignored in multi-zone models (e.g. COMIS, CONTAM software) yet is implicitly included in CFD and sub-zone models. Axley found that zone resistance was significant for the cases considered, so it is important to estimate and take it into consideration when embedding detailed CFD or sub-zone (zonal) models within multi-zone idealizations of building systems. He presented a simplified model for estimation of zone resistance.

Sensors and measurement techniques – 16 presented papers
P. Hansson (University of Gavle, Sweden) discussed how tracer gas absorption in – and permeation through – building materials influence tracer gas ventilation measurements. The results show that the tracer diffuses through untreated boards and that gypsum board has the largest permeability to the common tracer gas SF_6.

Natural and hybrid ventilation – 40 presented papers
J. Seifert (Dresden University, Germany) discussed the effect of wall porosity on the flow rate in a building cross-ventilated by wind. The aim was to understand how well the conventional simple macroscopic method predicts the ventilation flow rate using a CFD approach. He concluded that wind-driven ventilation in a simple cubic building with large openings is too complex to develop a simple prediction method.

Case Studies – 24 presented papers
A. Schaelin (ARC Air Flow Consulting, Switzerland) showed a successful application of CFD simulations for analyzing complex room air flow problems in real applications and for deriving optimized solutions. His recommended approach was to start from the existing flow (reproduce the observed flow) and then to introduce various solution proposals to derive the optimized solution. The final solutions should then be tested.

Other topics were Ventilation in cabins of vehicles (7 papers), Building envelope and indoor environment (12 papers), Indoor climate performance of buildings (13 papers), and Industrial and agricultural ventilation (5 papers).
The proceedings of the conference are available for sale (more information at *http://www.roomvent2004.com*).

ASHRAE to Host Satellite Broadcast on Mold

http://www.ashrae.org

Concerns about mold in the building environment are no longer limited to just humid environments or North America.

Mold is now a global concern for designers, contractors, building owners/ operators and building occupants.

Information on how to properly control moisture and humidity conditions in order to minimize mold will be presented in an April 13, 2005, satellite broadcast and Webcast, Mold in Our Building Environment, offered by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). The program is sponsored by ASHRAE's Chapter Technology Transfer Committee (CTTC).

"Moisture management and humidity control require a team effort during the design, construction, start-up and operation phases of a facility," Wilfred Laman, chair of CTTC, P.Eng. said. "If any part of the team fails to perform their tasks in proven and prescribed methods, the facility may promote mold formation and growth. This broadcast will be beneficial to all team members by describing how each should perform their tasks properly."

The level of interest in mold has also expanded to the legal profession due to the claim that "mold is gold" based upon recent jury awards in mold-related cases, according to Laman.

For situations where mold is present, various proven assessment and remediation processes will be addressed for different types of facilities.

Speakers will include biological, chemical, investigative and health experts, design architects, engineers and contractors who specialize in mitigation.

The broadcast will be similar to the 2004 ASHRAE broadcast on homeland security, which was viewed by more than 20,000 viewers at more than 1,500 locations earlier this year.

More information about ASHRAE's work on mold and moisture can be found at *http://www.ashrae.org*.

ASHRAE, founded in 1894, is an international organization of 55,000 persons. Its sole objective is to advance through research, standards writing, publishing and continuing education the arts and sciences of heating, ventilation, air conditioning and refrigeration to serve the evolving needs of the public.

Conference on passive and low energy cooling for the built environment PALENC 2005 -

Santorini, Greece, May 19-21, 2005

The scope of this Conference includes all aspects of technology dealing with the summer performance of buildings and in particular ventilation, solar control, thermal mass, thermal comfort, urban microclimate landscaping, low energy architecture, innovative components and materials legislation and regulations, advanced and alternative air conditioners, demand side management, etc. The main aim is to present and discuss the state of the art of research and applications dealing with the summer performance of buildings.

At the time of writing this article, 2 months before the deadline for submission of abstracts, about 140 abstracts from almost 30 countries all around the world were already received. Authors will be informed on the acceptance of their abstracts by the 15th of December. All abstracts will be reviewed at least by 3 reviewers. Full papers are due by the 15th of February. All papers will be fully reviewed at least by three reviewers.

After agreement with the Journal of Solar Energy and the International Journal of Ventilation, a special issue of these journals will be devoted to PALENC 2005. Best papers on passive cooling techniques will be published in Solar Energy Journal while the best papers dealing completely with ventilation will be published in the International Journal of Ventilation.

ISES, the International Society for Solar Energy has decided to join the Sponsors of the Conference. ISES members will receive a discount of 10 % in the fees of the Conference.

Policy and programmes

Regulatory compliance of residential ventilation systems in France

F. R. Carrié, CETE Lyon
http://www.qualiteconstruction.com

Regulatory compliance checks on buildings have been initiated in France in the early 70s. These inspections are meant to be both (a) an incentive for practitioners to build according to the rules set by the building code; and (b) a monitoring tool of the application of the regulation for the ministry of housing. Today, about 8 % of the new multi-family buildings are checked nationwide by 20 inspectors of the CETE network.

The inspections cover 8 fields: fire safety, balustrades, acoustics, automatic garage doors, stretcher transport, accessibility, energy performance, and ventilation. With respect to ventilation, there are both functional measures (e.g., the location and characteristics of air inlets and outlets) and given extract airflow rates that must be attained in order to comply with the regulation.

Inspections are carried out according to a protocol that lists the items to be checked, and the methods to be used. This way, non-conformities can be reported by the inspectors on standard forms for statistical processing. They are also recorded in minutes that include legal facts as well as observations. The minutes may be forwarded by state authorities to the attorney general. In addition, the inspectors file a report that is sent to the owner.

The legal procedure is such that the owner must take measures to remedy the non-conformities. He must prove to the state authority that he took adequate remedial actions. In practice, state authorities often ask CETE technicians for advice regarding the proposals and justifications given by the owner.

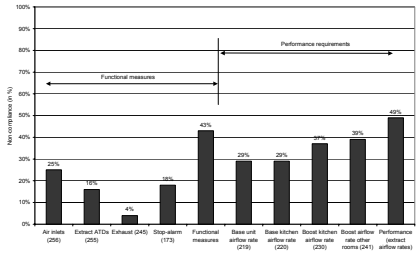
The results based on a sample of 260 building projects (multi-family buildings and grouped individual houses) were presented at the 25th AIVC conference. They show that 43 % of the buildings inspected do not comply with the required functional measures, i.e., there exists at least one non-conformity of the building code.

Nearly half of the buildings do not comply with the minimum requirements on extract airflow rates (Figure 1).

This is despite the availability of adequate industrial products. In fact, the non-compliance often results in a lack of care in the installation phase. The good news is that most defaults could be avoided should quality control be simply but efficiently implemented for all phases, including commissioning. Such approaches have been successfully experimented.

For more information, see: Carrié, F.R, and Garin, D. 2004. Checking the compliance of residential ventilation systems in France. In proceedings of the 25th AIVC conference.
Prague, 15-17 September 2004.

François Rémi Carrié and Daniel Garin, CETE de Lyon.



Percentage of non-compliant buildings (based on 260 inspections). By type of non-compliance. Sample size in parenthesis

Regulatory controls and dissemination

This binder written by D. Garin and M. Janody (CETE de Lyon), and published by Agence Qualité Construction aims at raising awareness among building professionals about the minimum quality requirements of the building code. Straightforward and easy to read, it relies on the authors' field experience and summarizes lessons learned from regulatory controls.

ECBCS Annual Report 2002-2003

M. Orme, Fabermaunsell

It is now over 27 years since the International Energy Agency (IEA) initiated a Programme of Research and Development on Energy Conservation in Buildings and Community Systems (ECBCS). After this time, the achievements and impacts of ECBCS are significant. The major successes of the Programme include the AIVC, who this year are celebrating 25 years of excellence in the dissemination of information about energy efficient ventilation and improving the understanding of air infiltration.

In joining ECBCS, national governments and programmes enable their researchers and industry to take part in a well-established international programme, which each year collaboratively carries out over 60 person-years of work. This is achieved with an average work load of only approximately 3 person-years per country, therefore offering great leverage to national R&D approved programmes.
New drivers have set new challenges for the future work. A review of these challenges has led to a new Strategic Plan for the period 2002 - 2007. ECBCS' revised mission announced in the Strategic Plan is, "*to facilitate and accelerate the introduction of energy-conservation and environmentally sustainable technologies into healthy buildings and community systems, through innovation and research in decision-making, building assemblies and systems, and commercialization*".

ECBCS initiates proposals for new research projects, as aligned with national programmes and the priorities of the Strategic Plan. Beyond the technical work of the research projects, known as 'Annexes', the transfer of results to potential beneficiaries and recipients continues.

ECBCS discusses proposals for new research projects in co-ordination with other IEA buildings-related programmes to pool expertise and to avoid duplication of research. Aside from working with other IEA programmes, ECBCS works openly with external organizations to pursue shared goals. Within ECBCS, there are currently 10 active Annexes. In addition, the successful completion of 35 Annexes demonstrates the proven capability of the Programme to deliver high quality results.

Presently, the Programme is two years into the current 2002 – 2007 Strategic Plan. An Annual Report is now available, spanning the period 2002 – 2003, and is intended to provide an update on progress in accomplishing this Plan. This has included the creation of new ECBCS Annexes, and the successful completion of one of the existing projects. Five other Annexes are still ongoing and have continued their work during the reporting period.

During the period 2002 - 2003, the ECBCS Executive Committee has approved four new research projects Annexes:

- Annex 41:
  Whole building heat, air and moisture response (MOIST-ENG),
- Annex 42:
  The Simulation of Building-Integrated Fuel Cell and Other Co-generation Systems (COGEN-SIM),
- Annex 43:
  Testing and Validation of Building Energy Simulation Tools, and
- Annex 44:
  Integrating Environmentally Responsive Elements in Buildings.

Furthermore, the following highlights of the work emerged during the period 2002-2003.

- Annex 36 '*Retrofitting of Educational Buildings*' produced, "Energy Concept Advisor for Technical Retrofit Measures - Case Studies Reports". A further Working Group is testing the Energy Concept Advisor on educational buildings.
- Annex 31 '*Energy Related Environmental Impact of Buildings*' published a Survey of LCA Tools, Assessment Frameworks, Rating Systems, Technical Guidelines, Catalogues, Checklists and Certificates, as well as LCA Methods for Buildings.
- Furthermore, Annex 37 '*Low Exergy Systems for Heating and Cooling*' have founded an international network, "LowEx.Net - Network of International Society for Low Exergy Systems for Heating and Cooling in Buildings" *http://www.lowex.net*.

The extent of partnership and collaboration in ECBCS has consistently made it possible for each national programme to witness a return on investment and added value that would not have been possible without the leverage from the other participating countries.

More information about the ECBCS Programme can be found at *http://www.ecbcs.org*.

AIVC publications – CD

A CD-Rom with all the guides (6), annotated bibliographies (12), ventilation information papers (2) and technical notes (46 – only some old superseded ones are missing) published by the AIVC between 1979 and 2003 is available.
See selling prices on the order form.

AIR + AIVC CD

The Air Information Review (AIR) is a quarterly newsletter containing topical and informative articles on air infiltration and ventilation research and application. The newsletter is distributed with the AIVC-CD.

This set contains the printed version of the Air Information Review and a CD-Rom with:

- Current Air Information Review (with annex documents)
- Related newsletters;
- Airbase (AIVC bibliographical database);
- AIVC publications;
- AIVC conference proceedings.

The set is available through subscription. Subscriptions are for 4 consecutive issues of AIR (from September issue to June issue). See selling prices on the order form.

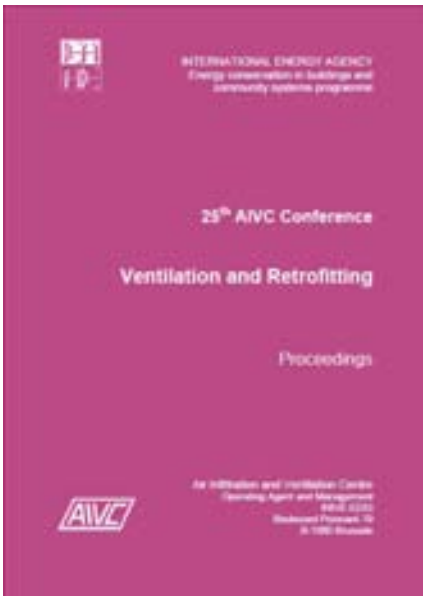
Enquirers in INIVE countries (Belgium, France, Greece, Norway) can obtain AIR and the AIVC-CD at preferential rates (even free of charge in some countries). Please contact INIVE for practical information (*inive@bbri.be*).

Conference Proceedings - CD 2004

The proceedings of the 25th AIVC conference are now available on CD.

The price (postage and package included) is 35 Euro.

The table of content of the proceedings and the order form are available on the AIVC-CD and on the AIVC website *http://www.aivc.org*.



AIRBASE

The full version of AIRBASE, the bibliographical database of AIVC, is available on the AIVC CD Rom. It contains more than 15,000 references and abstracts of articles and publications related to energy efficient ventilation.

New additions to AIRBASE include references of numerous papers from the International Journal of Ventilation and from the recent Healthy Buildings conference (National University of Singapore – December 2003).

The free publication of the month

One of the AIVC publications is available for free on the Internet (*http://www.aivc.org*).

The publication is available for 2 months and afterwards replaced by another one.

Conference proceedings - CD

A CD-Rom with the proceedings of past AIVC conferences is available. At present, the CD contains the proceedings of AIVC conferences 1998, 1999, 2000, 2001, 2002 and **2003**. See selling prices on the order form.

Printed version of old technical notes

Since June 2001, the new publications of the AIVC are no longer produced in a printed version. However remaining printed copies of previous AIVC documents are still for sale at ECBCS Bookshop (£ 15 + postage).

An overview of the remaining stock is available at *http://www.aivc.org/Publications/clearance.html*
(mainly: Technical notes 39 to 51; Guide to energy efficiency ventilation; Improving ductwork: a time for tighter air distribution systems; Annotated Bibliographies 5 to 10, Conference proceedings 1995 to 2000). A brochure presenting these publications is available on the AIVC-CD.

Send orders by e-mail at *essu@ecbcs.org* (for printed AIVC publications only), or by fax at +44(0)121.262.1994, marked for the attention of Malcolm Orme.

Mailing Address:
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