

AIR

AIR INFORMATION REVIEW

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A quarterly newsletter from the IEA Air Infiltration and Ventilation Centre

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ASHRAE - SPC 62.2P Approves Third Public Review

After meeting in both December and January, SPC 62.2P (Standard Project Committee 62.2P) processed all of the 414 comments generated by the second public review, *Ventilation and Acceptable Indoor Air Quality in Low-rise Residential Buildings*, and recommended that Independent Substantive Changes (ISCs) be made; the public review was approved by ASHRAE in March.

There were seven high-volume comment areas in the second public review, which were responded to as follows:

- *Whole-house Mechanical Ventilation:* Some disagreed with the committee's position that there are some climates and some houses where infiltration and natural ventilation are insufficient to provide minimum ventilation requirements, but brought little new information. The SPC did not make any substantive changes.
- *Kitchen & Bath Exhaust Ventilation:* Some generally disagreed with the committee's position that fans were necessary in bathrooms and kitchens to remove contaminants, but brought little new information. The SPC did not make any substantive changes.
- *Sound Ratings:* Some generally disagreed that intermittent (e.g. kitchen and bath) fans needed to meet noise limitations. As a compromise, the committee agreed to remove the requirement for bathrooms, as that was the stated concern of most of the commentators, but kept the kitchen requirement.
- *Air Distribution Systems in Garages:* Some claimed, without substantial justification, that having an air tightness performance requirement was unnecessarily costly and that a prescriptive requirement to use sealant materials would be sufficient. The committee made editorial changes to address concerns about the form of the requirement.
- *Carbon Monoxide Alarms:* Some requested that the CO alarms be required, citing health impacts of carbon monoxide and refuting some of the reasons that the committee took out of the requirement after the first public review draft. The SPC asked for input from both sides on the issue and was persuaded that the technology currently on the market does not meet a standard that results in sufficient reliability to include as a requirement. The SPC would reconsider the issue, if products meeting higher standards were on the market.
- *Backdraft testing:* There were a variety of concerns related to backdrafting. The SPC clarified several of the sections concerning the details of the test, but was not persuaded to make substantive changes to the requirement itself.



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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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Contributions to AIR: Suggestions for contributions are welcomed.

Subscriptions

(See also the subscription form on page 15 or on the CD )

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- **Pollution Sources, Exposures And Control:** There were many comments questioning the right of the standard to address issues relating in any way to source control or mitigation. This overarching issue was responded to in a variety of ways. The SPC was not persuaded by philosophical issues that would exempt gas appliances from consideration, but did forward these comments to ASHRAE's Standards Committee for their consideration. A few minor changes were made by the committee to respond to specific gas industry concerns. Finally, the committee was persuaded that the details in the appendix (C) on sources were out-of-date, incomplete, or inappropriate for this type of standard, and decided to delete the entire appendix.

The committee has approved a third draft of the standard for public review, but the draft contains only Independent Substantive Changes from the second public review draft. Thus as public review happens this spring, only the few sections changed from the second public review will be available for comment. During the public review period, 5 April to 20 May, the standard is available at www.aivc.org. Comments to the ISCs will be considered by the committee starting at the summer meeting in June.

In parallel with the ISCs the committee is working with all of the commentors to get as much resolution as possible. The committee has sent out an explanation of what was done in response to each comment and the justification for it. Each commentor has an

opportunity to reply. The SPC will make all reasonable efforts to get every commentor to reply whether they accept the committee's response or not.



One interesting issue that came out of public review relates to garage ventilation as a method of keeping contaminants (e.g. carbon monoxide) from migrating to habitable spaces. Garage ventilation has been a part of ASHRAE Standard 62 for many years and is still part of 62-2001, but SPC 62.2P left it out of the current draft because no consensus could be reached on how to do it appropriately. One commentor raised the issue during the 2nd public review and the SPC agreed to initiate the development of an addendum on the subject and invited the commentor to participate. The SPC is beginning that work at its spring meeting.

Also at the spring meeting, the SPC is beginning consideration of a companion guideline to 62.2, as authorized by ASHRAE procedures. In the course of trying to reach an acceptable consensus, much useful information and many valuable requirements have been dropped from the standard (e.g. Appendix C on sources). The SPC believes that creating such a companion guideline with state-of-the-art information would be valuable to the membership and to the general public.

Significant progress has been made this past winter and we anticipate continued progress towards a quality standard on residential ventilation.

Max Sherman, Chair of SSPC 62.2P

GUIDE TO THE NEWSLETTER

Throughout the newsletter you will see [websites](#) and [email contacts](#). A jump to the AIVC CD is shown with . Simply click to jump to the CD, to your chosen website, or to send an email. For an overview of the contents of the CD click here .

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WEBSITE INFORMATION

Free Online US Reports on Ventilation and IAQ Issues

National Academy Press (NAP) publishes the reports issued by the US National Academy of Sciences, National Academy of Engineering, Institute of Medicine and National Research Council.

On the NAP website (www.nap.edu), a very powerful research engine gives free access to the published books.

They can be read free of charge online in their integral text, section by section, with a searching function which applies either to

the entire book or to a given chapter. Books can also be bought online.

Among recent titles related to ventilation and indoor air quality are the following:

- Clearing the smoke : assessing the science base for tobacco harm reduction (2001)
- The airliner cabin environment and the health of passengers and crew (2002)
- Research priorities for airborne particulate matters (2001)
- Clean the air : asthma and indoor air exposures (2000).

Less recent books concern for example : Indoor pollutants (1981), Indoor allergens (1993) or Health effects of exposure to radon (1999).

Online Publications from Canada

The Canadian Institute for Research in Construction (IRC) offers a database on the web which includes references to all its publications since 1947 (_____). Many of the references include a link to the full documents, which can be downloaded free of charge.

Recent reports concern topics such as indoor climate and environmental satisfaction of occupants in open-plan offices (thermal comfort, noise, lighting), material emissions, VOCs and IAQ, moisture, ...

The newsletter of IRC also contains interesting information about recent results of research projects. It can be downloaded at the following address : _____.

240 of the 250 Canadian Building Digests published between 1960 and 1990 by NRC's Institute for Research in Construction and its predecessor, the Division of Building Research are also available on the Web (_____). Among the different titles, we can point out:

- CBD-247. Control of Radon in Houses (R.S. Dumont, D.A. Figley);
- CBD-245. Mechanical Ventilation and Air Pressure in Houses (C.Y. Shaw);
- CBD-222. Airtight Houses and Carbon Monoxide Poisoning (F. Steel);

- CBD-110. Ventilation and Air Quality (A.G. Wilson);

Patents : An Excellent Information Source

A patent is one of the best means to protect an invention.

A patent can cover a product, a method or an application, representing a technical added value.

In this way, for example, an acoustical ventilation grille, as well as the equipment to manufacture them could be patented, if three conditions are fulfilled: the invention must be new, it must be susceptible to an industrial application and it must involve an inventive activity.

The foremost objective of this method of protection is to assign an exclusive right on the exploitation of an invention in order for the inventor to profit from the development work that he has invested in.

An enterprise can utilise patents as a marketing tool, by giving licenses for their use by other companies (financial gain) or as a negotiation means with competitors in order to obtain, or communicate technological knowledge.

Patents are an excellent information source, in technological, but also in judicial and economical domains.

How was an invention realised? Who is the inventor? Who holds the patents, where does he come from? What is the technological development in a given country in a given technological domain? Is an invention still protected by a patent or has the protection elapsed, so that everyone can exploit it?

An informative search on existing patents might provide answers to all those questions and can be done by everyone – for free - via the website of esp@cenet (_____), via a mandated patent officer or via the Industrial Property Offices in your country.

NEWS FROM PRACTICE

The French Permanent Survey on Indoor Air Quality: First Results of the Pilot Study

Created by the French government in September 1999; the French Permanent

Survey on Indoor Air Quality (in French : "Observatoire de la qualité de l'air intérieur"), aims to provide the necessary data for risk assessment and risk management related to indoor pollution by a better understanding of environmental and behavioural determinant of indoor exposure and exposure levels to the populations concerned.

The general description of the methodology was presented in the December 2001 issue of the Air Information Review. A pilot phase on 90 dwellings and 9 schools was started in March 2001. The first results were presented on the 10th April 2002. More detail is available on the AIVC-CD through the report of the president Ms Buchmann [1], and the executive report [2].

Air Purification by Photocatalysis: a New System of VOC Degradation and Odour Removal

Nowadays, quality of life is becoming a growing concern. Therefore, indoor air quality (IAQ) has become a new branch of chemical and medical science. IAQ is directly linked to the presence of pollutants (volatile organic compounds, VOC) in confined atmosphere. The odour problems encountered in such environments are connected with the presence of these VOCs.



Photocatalysis-based techniques seem to be a promising approach for remediating VOC and odour problems. Indeed, this approach degrades pollutants although other technologies (filter, active coal) simply transfer these VOC onto substrates. In this context, CERTECH (a Belgian centre of chemical expertise and applied research) (_____) used its expertise and know-how in air quality and catalysis to develop a new system of air purification by photocatalysis. A patent application has been submitted.

A full paper describing the technique is available on the AIVC-CD. In this paper, after a short introduction to IAQ and photocatalysis, the performances and advantages of this new technology are described. With regard to performances, results from degradation tests are presented for both model pollutants and a real atmosphere. Among the numerous

advantages of this new technology, one can note its small size, discrete design, low cost and modular character. According to the authors the new technology presented in this paper is very suitable for low pollutant concentration environments.

The full article is available on the CD .

Natural Ventilation Tools

Transfer of air between the building and the surrounding environment as well as between the various zones of the buildings plays a very important role in the overall thermal balance of buildings while regulating to a certain degree the levels of thermal comfort and of indoor air quality.

The exchange of air can be achieved either by mechanical means, (mechanical ventilation) or through the large openings of the building's envelope, (natural ventilation). Air is also exchanged through cracks and other small size openings, (infiltration).

Knowledge of the exact air supply to a building is necessary to determine its thermal performance and the indoor pollutant concentration. Calculation of air flow through large openings, natural ventilation, is a complicated task. The random nature of the wind makes the estimation of air flow characteristics much more complicated than in the case of mechanical ventilation.

Classical fluid dynamics provides a stable scientific background to calculate the air flow of ventilation systems. This can be achieved either by using computerized fluid dynamic techniques, CFD, or more simplified network models.

Computerized fluid dynamics tools are based on the solution of the Navier Stokes equations combined with turbulence models. These tools determine the field of air velocity in a zone, the flow rate through various components, and the concentration of indoor pollutants in zones. Also, they combine efficient heat transfer models to calculate the thermal balance of various building elements. Although these tools are very powerful, only experts are able to use them while their cost is high. Another problem is related to the knowledge of the climatic boundary conditions that are rarely known. Recent research has shown that CFD solutions are of high variability inside the limits of fuzziness of the input data. Therefore, the use of complicated CFD techniques is now the most suitable solution

specially for small and medium projects. Some very well known CFD tools are PHOENICS (_____), FLOWVENT, etc.

Network calculation models are based just on the equation of mass conservation combined with some empirical knowledge. These tools can efficiently simulate the air flow rate in a building, when mechanical ventilation techniques are used, as well as the concentration of indoor pollutants, but do not provide any information on the velocity field in a space. Well known network models for mechanical ventilation systems are AIOLOS, COMIS (_____ or _____), AIRNET, and BREEZE. Network models are easy in their use while their cost is minimal. Some of the models like AIOLOS are free to the public. AIOLOS, is developed in the framework of the ALTENER program of the European Commission (F. Allard (Ed) : Natural Ventilation of Buildings, James and James Science Publishers, London, UK, 1999). AIOLOS is based on the algorithms of the PASSPORT-AIR, air flow tool, developed in the framework of the PASCOOL research program and provides the user with specialized powerful algorithms calculating the air flow rate through large openings as well as design assistance (M. Santamouris and E. Dascalaki : 'Description of Passport AIR Tool' Final Report of the PASCOOL Program, 1995). The model is also coupled with a thermal model to quantify the impact of natural ventilation techniques to the thermal balance of the buildings.

Some empirical manual methods have also been proposed to calculate air flow through large openings, natural ventilation. Some of them are the British Standard Method, and the manual algorithms of NORMA. These tools provide an estimate of the air flow but should always be used in the limits of their validity.

INFO FROM PROJECTS

IEA CADDET

Working on an international scale, CADDET and GREENTIE disseminate information on clean energy technologies and suppliers. The fields of technologies that the programmes cover are extensive – ventilation is among them.

CADDET and GREENTIE operate as separate, but complementary elements,

under the IEA's Energy and Environmental Technologies Information Centres (EETIC). Their aim is to make available to the world, the latest information on demonstrated renewable and energy efficient projects and greenhouse gas mitigating technology suppliers. This is achieved via the input of an extensive network of clean energy experts in member countries.

The information CADDET provides is taken directly from proven demonstrated projects that are submitted to the CADDET Centre. The projects are monitored for their eligibility pertaining to their credibility, innovative nature, economic feasibility, replication viability and environmental impact. Examples of two such projects about ventilation have recently been released on the CADDET EE Web site.

'Innovative call centre design with geothermal air conditioning' (Further details can be found on the CADDET EE Website in the Brochure _____ and InfoStore entry _____.) from Australia, details the efficiency of the newly installed geothermal air conditioning system in a purpose-built call centre. The call centre is a leading example of environmental design and displays cost and energy saving effectiveness in its running and maintenance.

A key design issue at early stages was to create high-level air-conditioned comfort for the tenants, which is necessary in a region that experiences extremes in temperature. A displacement ventilation system was chosen for the call centre in order to provide a particularly high level of indoor air quality. The nature of the work carried out in the building and the open plan layout also demanded the system be inaudible.

Energy efficient ventilation is further demonstrated in the project 'Large temperature difference HVAC system using gas-fired absorption chiller-heaters' from Japan (Further details can be found on the CADDET EE Website in the Brochure _____)

Reducing the power used for delivery of hot and cold water and conditioned air within an exhibition hall reduces primary energy consumption and operating costs by up to 15 per cent. Creating an increase in the supply and return temperatures of the circulating air and water decreases their flow rates and results in a reduction in power

consumption by the pumps and fans. The award for 'Excellent energy-saving product of the year 2000' was given to this design reflecting its significance in the marketplace.

The EETIC programmes understand the importance of economic and business issues relating to the introduction and replication of energy-saving technologies. With this in mind, projects chosen have to demonstrate commercial viability in running and operating and payback figures. GREENTIE provides a database of clean-energy suppliers and supports the work of CADDET by providing all the information needed to research a replica or new energy-saving project. It provides a platform by which to contact suppliers internationally in order to obtain all the equipment needed to implement a project.

Climate-friendly technologies are what CADDET and GREENTIE focus on, and, combined with the commercial knowledge and practical information they supply, are able to provide a complete information service that helps the clean energy technology industry to develop and grow.

For further information please E-mail the Centres at _____ or _____ or visit our Web sites at _____ or _____

The Inventory of European Research on the Indoor Environment (IERIE)

Under the Long Range Research Initiative of the European Chemical Industry Council (CEFIC), the MRC Institute for Environment and Health is compiling a comprehensive database of indoor environment research being conducted in Europe. The purpose of this database is to provide an up-to-date source of information that may be used to:

- Provide information on current topics relating to the indoor environment
- Identify gaps in research in the indoor air environment
- Identify new advances in the indoor air field
- Assist in the prioritisation of future research in the indoor air environment
- Identify individuals and groups with expertise in particular aspects in the indoor air environment

Studies of indoor air environment monitoring, ventilation, exposure assessment, building characteristics, health effects, epidemiology and toxicology are all to be included.


In order to facilitate dissemination and easy access by all interested parties, the database is available via an Internet web site:

A short questionnaire  is available for download on the CD and the website for researchers to complete.

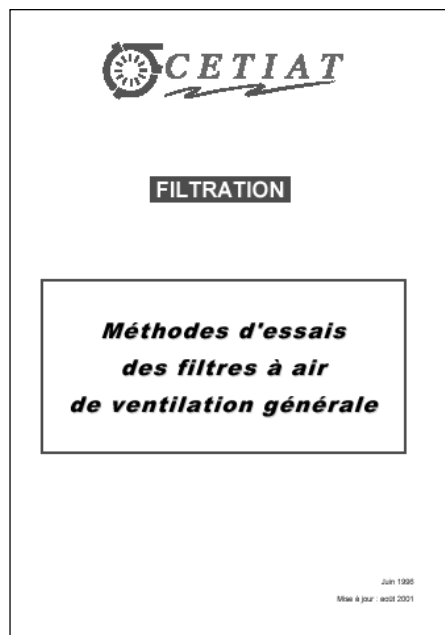
STANDARDS AND REGULATIONS

Testing Methods for Air Filters

CETIAT recently updated a document showing the different testing methods used for the characterization of air filters for general ventilation in Europe. These methods are defined in the European Standard EN 779 and by the recommendation EUROVENT 4/9.

The document (in French)  shows the three main testing methods (gravimetric, opacimetric, particle counting) which are used to determine parameters such as : filter pressure loss, filtration efficiency and filter dust holding capacity.

It also indicates the filter classification according to the European Standard EN 779 (classes G1 to G4 for medium efficiency filters and classes F5 to F9 for high efficiency filters).



Training Available in the New French Thermal Regulations


The new French thermal regulations (RT 2000) are applicable to new residential and non residential buildings.

They are mainly based on the calculation of energy consumption (C value) compared to a C_{ref} one and on the summer temperature (T_{ic} compared to $T_{ic,ref}$) for non air conditioned buildings.

In order to help final users to understand and apply it, a training CD Rom has been produced by AICVF (The French HVAC engineering association) and the CSTB, with the financial help of Ademe (The French Agency for Environment and Energy Management) and the French Ministry for Housing.

It includes

- the official texts of the regulation
- a PowerPoint presentation of about 300 slides
- tools enabling the user to make sensitivity analysis both for the C or the T_{ic} calculation

More details on the CD .

Hygienic Standards for Ventilation and Air-Conditioning Systems - Guideline VDI 6022

Part 1 of Guideline VDI 6022 contains hygienic standards for ventilation and air-conditioning systems in offices and assembly rooms. Specifications for production areas are dealt with in Part 3. Part 2 of the guideline applies to hygiene training. It contains minimum requirements on the training content and the qualification of the training personnel.

The requirements for the planning, design, operation and maintenance of air-conditioning systems and their components are dealt with to ensure a hygienic condition according to the state of the art. The Guideline also contains a checklist to control the hygienic standards in praxis.

The Guideline was sponsored by the German Ministry for Health. The working group was composed of air-conditioning-experts as well as hygienics and medics.

The Guideline VDI 6022 is addressed particularly to contractors, architects, consulting engineers, plant installers,

equipment manufacturers, approval bodies, inspectors, operators, those involved in maintenance, and users and those who represent their interests, such as personnel/works councils and company and official doctors.

The requirements for the planning, design, operating and maintenance of ventilation and air-conditioning systems and their components are dealt with to ensure a hygienic condition according to the state of the art.

Air-conditioning systems should create physiologically satisfactory room climate and hygienic indoor air. Air-conditioning systems are to be planned, designed, operated and maintained according to the state of the art so that they present no danger to health or disturbance to the ambience, and produce no thermal discomfort or odours.

Great importance is attached to regular servicing, functional testing and monitoring of the hygiene condition.

The regulations applicable to planning, design, operation and maintenance of air-conditioning systems (e.g. DIN 1946-2) are supplemented from the aspect of hygiene by this Guideline.

Editor: The Association of Engineers, (Verein Deutscher Ingenieure VDI), VDI Society for Building Services (TGA).

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Status of prEN 13465 "Calculation Methods for the Determination of Air Flow Rates in Dwellings"

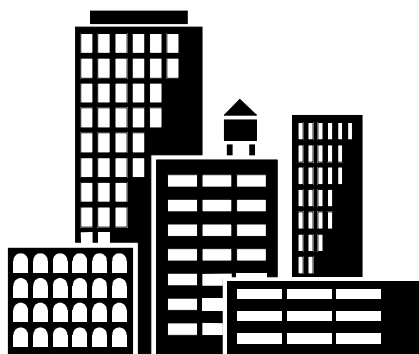
In the public inquiry version of the standard, two methods for the calculation of flows are presented: 1) an explicit method, which makes assumptions about the interaction of wind and stack forces, and 2) an implicit method, which is based on a single zone model, and which requires an iterative solution process.

From the public inquiry, many comments were received in relation to the explicit method and to the fact, that for a given case, the two methods do not give coherent results. It was also stated that, today, building energy analysis is performed on a computer, thus easily allowing the use of the

implicit method. However, some countries still see some practical use of an explicit method, although it is already quite complex, and much dependent on many input parameters, which are in many cases not available.

Therefore, member countries have now been asked to state their position in regard to a possible deletion of the explicit method. Conclusions from the inquiry and steps to be taken to produce the standard for formal vote are on the agenda of the next CEN TC 156/WG 2 meeting, June 2002 in Paris.

Meanwhile, a new sub-group of CEN 156 WG7 on "ventilation calculation for non residential buildings" has started its work and a close collaboration of the two sub-groups of WG2 and WG7 on air flow calculation methods has been envisaged. However, the non-residential group concentrates its work solely on an implicit method.



The New Radiation Performance Standard (RPS) in the Netherlands

In January 2003 the Dutch Building Decree will have requirements on radiation.

Therefore a Radiation Performance Standard NEN 7181 (abbreviation in English RPS in Dutch SPN) has been developed. As you may know radiation in buildings is mainly due to radon which is a gas. Ventilation plays an important role in diluting the radon concentration level in buildings. Since typical radiation levels in buildings do not have an immediate effect but a very long term effect, the average ventilation rate of the building plays a relatively important role. The yearly average ventilation level of a building is therefore an important factor in the calculation method for the radiation performance.

The Radiation Performance is determined according to NEN 7181 with :

$$SP = C \cdot c_{dc} + E_{ext}$$

In which

SP = radiation performance in Sv per annum

C = average radon concentration difference between inside and outside in Bq/ m³

c_{dc} = dose conversion coefficient for radon in Sv/a per Bq/ m³

E_{ext} = effective dosistempo due to external radiation in Sv per annum

The average radon concentration difference between inside and outside is calculated with:

$$C = S_i / Q_v$$

In which

S_i = radon emission in the zone in Bq/s

Q_v = the average ventilation m³/s

A discussion is still going on on how to determine the yearly average ventilation of a building.

At this moment the standard NEN 7181 stated for the determination of the average ventilation:

$$Q_v = Q_{v,ref} \cdot v_b$$

In which

Q_{v,ref} = average real ventilation over the year in m³/s

v_b = correction factor for inhabitants' behaviour with regard to ventilation

v_b is assumed 0.5 . One may use a higher v_b, between 0.5 and 0.8, in case the extracted flow rate from the building is ensured at the required level and an indication is given in case the flow rate is below that required level. As a result ventilation industries nowadays are adapting their systems because of this rule in the RPS. This has caused some discussion on the average yearly ventilation calculated according to the new standard NEN 7181.

Research is on its way to determine a more realistic value based on extensive studies:

The idea is to calculate the yearly average flow rate by:

$$q_{v,year} = q_{v,system} + q_{v,aring} + q_{v,inhabitants} + q_{v,inf}$$

in which:

q_{v,year} = yearly average ventilation

$q_{v, \text{system}}$ = yearly average ventilation through the exhaust system

$q_{v, \text{airing}}$ = yearly average ventilation due to airing

$q_{v, \text{inhabitants}}$ = yearly average ventilation due to use of the ventilation provisions

$q_{v, \text{inf}}$ = yearly average infiltration

For each of the components above a seasonal flow rate will be determined, resulting in an realistic average. The average ventilation due to the use of the ventilation system by the inhabitants will be an estimate based on a 95% exceeding level. The infiltration is based on the air leakage of the building, although the above mentioned approach looks much more promising. The study still is underway and should result in a revision of the RPS.

The Equivalence Principle Applied for Ventilation in Extra Large Houses

In accordance with the Dutch Building Decree a dwelling must be ventilated based on a specific airflow rate of 0,9 dm³/s per m² floor area. Besides this level, exhaust rates are required for toilet (7 dm³/s), bathroom (14 dm³/s) and kitchen (21 dm³/s). Officially there is no distinction between bedrooms and living room. All spaces are mentioned as living areas. So a kitchen as such does not exist, it is called a living space with a possibility for cooking.

A trend nowadays is to construct relatively large individual apartments (about 200 m² floor area) in which in most cases just two or three people live. A standard Dutch dwelling typically has a floor area of about 100 m². The rooms normally used as bedrooms have in total about 50 m² floor area, while the area normally used as living is about 150 m². This leads to rather high required flow rates in relation to the needs. Moreover almost all of the mechanical balanced ventilation units with heat recovery available on the market cannot cope with this high requirement. That means that according to the ventilation requirements in the Building Decree two units should be applied. Some people consider this as inefficient, expensive, difficult to control by the inhabitants, energy wastage and finally not very sustainable.

The Dutch Organisation for High Efficiency Ventilation (see also AIR vol. 22 September 2001) have asked TNO Building and

Construction Research to study the possibility of applying the principle of equivalence for this type of dwellings with their balanced ventilation units and limited occupation. The equivalence principle is a possibility given in the Building Decree. There are two possibilities defined;

- the test or determination method cannot be used
- system does not fulfil the requirements but has the same performance

So if one can justify that the same level of air quality can be achieved with lower flow rates than normally required, the equivalence principle applies.

With an extensive multi zone model study and input data from an important reference study in relation to the Dutch Building Decree, the yearly exposure of 6 persons in a dwelling of 200 m² was studied. Due to a special ventilation strategy, assuming enough flow rate to the so called bedrooms and an additional flow rate to the living room, TNO has proven that at substantially lower flow rates, the 6 persons in this house were exposed to lower concentrations than in the case of a reference dwelling with a ventilation system that fulfils the requirements. As a result of the study carried out by TNO only one single balanced unit should be installed.

Five manufacturers of balanced ventilation units now have a declaration of equivalence for these relatively large dwellings. The municipality who has according to the Dutch Dwelling Act to give a building permit, should give a permit with a maximum occupation limit of 6 persons. Not all municipalities like this, but a number do. Unnecessary inconvenience and energy use is the result of the application of the equivalence principle.

Ventilation Requirements in the National Building Code of Canada

Ventilation requirements for buildings are stated in Part 6 the National Building Code (NBC) of Canada, which is a model code issued by the National Research Council of Canada (NRCC). The NBC is used by the provinces and territories as a basis for their building codes. Constitutionally, the provinces and territories are responsible for building regulation.

Part 6 of the NBC deals with heating, ventilating and air-conditioning systems and

equipment. This part tends to be very general and has requirements that deal with safety rather than the performance of HVAC systems, which is determined by "good engineering practice."

Subsection 6.2.2. of Part 6 deals with ventilation and performance of the ventilation system by reference to ASHRAE 62, "Ventilation for Acceptable Indoor Air Quality." By this reference the expectation is that an appropriate level of ventilation will be provided mechanically to the spaces mentioned in the NBC.

For the next edition of the NBC, expected in 2004, it has been proposed to allow for the design of buildings that are naturally ventilated in lieu of mechanical ventilation, provided that performance calculations are presented to the authority having jurisdiction. It is acknowledged that such systems will only be acceptable and viable in certain parts of Canada.

As far as hybrid ventilation systems are concerned, the primary objective of the NBC is to provide for occupant health and safety in fires. To achieve this goal, the tendency is to use fire separations to create compartments, or fire sprinklers. The use of fire separations presents challenges to hybrid ventilation systems whereas sprinklered buildings may be less of a challenge because the NBC waives fire separations in many situations.

The Canadian Codes Centre of NRC's Institute for Research in Construction provides technical and administrative support to the standing committees responsible for the content of the NBC. The standing committee system ensures that all segments of the construction industry are represented.

The standing committee is responsible for the technical content of the NBC. It reviews proposals for code changes and makes decision on the proposals.

Proposed changes that are accepted by the standing committee are then made available for public review.

To ensure that code writers make provisions for hybrid ventilation systems in the model codes, it is necessary for designers and researchers to communicate and participate in the code writing process. Website: _____



EPIC 2002 AIVC

"ENERGY EFFICIENT AND HEALTHY BUILDINGS IN SUSTAINABLE CITIES"

HILTON LYON, Lyon, France, 23 -26 October 2002

the joint conference of the

3rd EUROPEAN CONFERENCE ON ENERGY PERFORMANCE AND INDOOR CLIMATE IN BUILDINGS

and the 23RD CONFERENCE OF THE AIR INFILTRATION AND VENTILATION CENTRE

Purpose

Assessing and improving environmental performance of buildings is a real challenge for the future. A better integration of buildings in their urban context, a real improvement of sustainability of buildings taking into account a rational use of the environment (rational use of energy sources and materials, energy efficiency of installations and building components, adaptation to local micro climate, minimization of environmental impact) and achieving a healthy and comfortable indoor climate are the main objectives.

Research and demonstration projects and initiatives have been developed in many countries during the last decade. A new generation of integrated simulation tools and simplified design guidelines is being developed for the evaluation/assessment of the indoor climate and environmental impact of building components and/or whole buildings. These experimental examples and tools are important aids for evaluating new products as well as full building and urban designs.

The EPIC Conference builds further on the experiences of the former events organized in 1994 and 1998, and bundles the efforts with the annual conference of the AIVC on ventilation and indoor air quality research.

Aims of the Conference

- to create a discussion forum where most recent results of research and development in the fields of rational use of local or global environment of buildings are confronted with the views and the needs of industry and practice oriented professionals;
- to inform the European building community on the latest developments in the research as well as in the practical application of new building products and evaluation tools;
- to discuss the possibilities for guidelines and standardization of assessment methods and global environmental quality requirements on a European-wide level.

To achieve this, a combination of full and short oral sessions is foreseen as well as 12 workshops focusing on specific discussion items.

Programme

The four day programme for this conference will consist in:

- Full plenary sessions for the opening and closing sessions
- Parallel sessions for:
 - extended oral presentations (EOP), 12 min per paper
 - short oral presentations (SOP), 3 min introduction to poster.

Scientific posters will be on display for the duration of the session.

- Workshops on selected topics, where the views of research and industry will be confronted.

More than 200 papers have been submitted to date.

Keynote Lectures

The oral sessions will start with an invited lecture by a representative of the leading organisations of the building sector. To date:

- The IEA approach to energy performance and indoor climate : objectives, achievements, and challenges (M. Atif, J. Brunsell)
- The European Construction Forum's views on energy performance and indoor climate in buildings (J. Goodall, FIEC)
- ASHRAE's approach to energy performance and indoor climate : objectives, achievements, and challenges
- Indoor air quality, health and costs of building services (REHVA , AICVF)
- The impact of energy performance and indoor climate on architecture : in 1980, 2000 and 2020
- Performance prediction and simulations on energy performance and indoor climate: in 1990, 2000, 2010 (J. Clarke, US, IBPSA)

Workshops

A series of dedicated workshops will gather a number of specialists on the specific topic with various viewpoints from either science or industry in a confronting debate.

Workshop Topics

Hybrid Ventilation

New strategies are under development to combine the advantages of both natural and mechanical ventilation for energy conservation and optimal air quality

Opportunities and Barriers for the Integration of Renewables in the Built Environment

Solar technologies: not just as add-ons to the building but an integral part of the building design

Sustainable Urban Planning

Energy conscious design and sustainable building starts with the urban planning phase.

Air Distribution Systems, Health and Energy

Ventilation channels should transport clean air in an efficient way.

Environmental Performance Assessment of Building Components

What is the real value of a new glazing system or other façade or roof component in terms of energy performance, heat loss, solar gain, etc? PASLINK is a network of test centres specialised in this type of assessment under real climate conditions.

Natural Ventilation in Urban Settlements

How do we make use of the special climatic conditions in urban environments to provide good air quality and thermal comfort?

Glazing and Active Facades

New developments in glazing systems, active or climate facades, shading systems, allow an optimal control of the indoor environment. Reliable product data are needed for a correct design and integration.

IAQ Criteria for Sustainable Buildings

Better indoor air with less energy use: what are the targets?

Contributions and Challenges of the 'Information Society' to Environmental Quality

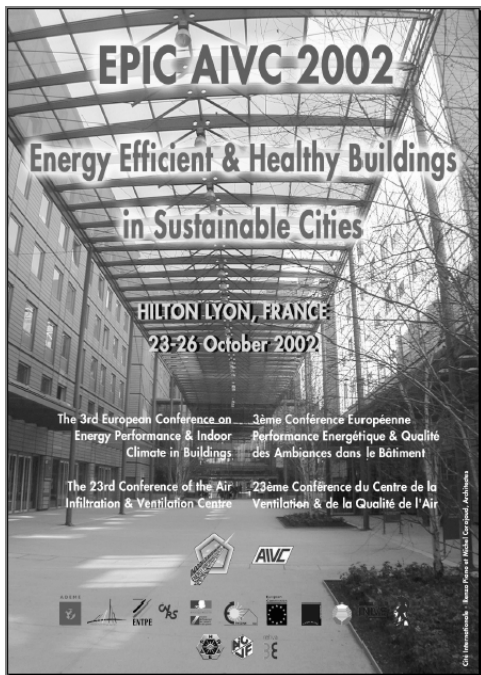
Informatics technologies for sustainable building

Indoor Climate and Economy

Poor indoor climate conditions can have major economic consequences.

Energy Performance Regulations

How do European countries assess the energy performance of new or existing buildings? The new European directive urges the member states to set minimum standards to this integral energy performance.



Design of Large Buildings of High Environmental Quality

This is a real challenge for architects and engineers!

EnerBuild at EPIC 2002 AIVC

Energy in the Built Environment - EnerBuild Thematic Network.

Enerbuild clusters ongoing and finalised EU energy RTD projects in six thematic groups: Solar technologies, Lighting, Mechanical heating and cooling, PV in buildings, Building components, Building and urban design. Enerbuild stimulates co-operation and co-ordinates dissemination of the results.

A project meeting of the Thematic Network will be held in Lyon, prior to the conference. At the conference, an Overview of the Network and representative projects will be presented to the EPIC2002AIVC audience in a dedicated workshop session on Thursday 24th October.

<http://www.enerbuild.net>

Exhibition

There is limited space available for commercial exhibitors to demonstrate products, software, measurement equipment, publications related to the themes of the conference. Ask the conference secretariat for conditions.

Venue

The EPIC 2002 AIVC Conference will be held at the Hilton Lyon hotel, situated in the heart of the Cité Internationale.

Languages

English will be the official language. Simultaneous translation in English and French will be provided for the opening and closing sessions.

Conference Proceedings

All accepted papers will be published in the Conference Proceedings which will be distributed at the Conference. Best papers will be published in a special issue of a scientific journal.

After the Conference, a CD-Rom including all papers, summaries of workshops and selected presentations, will be sent to all participants.

The next announcement and preliminary programme will be available in July 2002.

Click here for a list of the accepted abstracts - **200 abstracts accepted so far**.

Special Event

FP6 Brokerage Party

On the eve of the launch of the European 6th Framework Programme, this conference is the ideal opportunity to prepare proposals and to lay contacts with potential partners.

To foster such contacts, EPIC2002AIVC is organising on the first evening of the conference a 'FP6 Brokerage Party'. If you have ideas, intentions, which you might wish to share with others, or questions on the new FP6 instruments (Networks of Excellence, Integrated Projects) you will have the opportunity to present them either orally or on poster or just by informal discussion, glass of wine in hand, with representatives of the Commission and colleagues.

Registration Fees

- Contributing authors 700 EUR
- Full participants 700 EUR
- Students 350 EUR

One full registration fee per participant is required. Papers submitted without payment of the registration fee will not be printed in the Conference Proceedings nor included in the programme.

The fees cover :

- attendance at all oral sessions, poster sessions and workshops
- coffee and lunches during the Conference
- the book of Proceedings and CD-Rom

Conference Secretariat

Laboratoire des Sciences de l'Habitat, Département Génie Civil et Bâtiment, CNRS URA 1652, Ecole Nationale des Travaux Publics de l'Etat, Rue Maurice Audin, F -69518 Vaulx-en-Velin FRANCE
Tel : +33 (0)4 72 04 70 27
Fax : +33 (0)4 72 04 70 41

E-mail : epic2002aivc@entpe.fr
Website: <http://epic.entpe.fr>

Scientific Committee

The list of the members of the scientific committee is given on the conference flyer (available on the AIVC CD)

Schedule

Wednesday 23 rd October 2002				
	1	2	3	4
Morning	Technical visit to CETIAT (optional)			
12:00 - 14:00	Registration			
14:00 - 15:30	Opening session			
	Coffee break			
16:00-17:30	EOP 1	Workshop 1	Workshop 2	
19:00	City hall reception			
Thursday 24 th October 2002				
9:00-11:00	EOP 2	SOP 1	Workshop 3	Workshop 4
	Coffee break			
11:30-13:00	EOP 3	EOP 4	SOP 2	SOP 3
	Lunch			
14:30-15:30	EOP 5	EOP 6	SOP 4	SOP 5
	Coffee break			
16:00-18:00	SOP 6	EOP 7	Workshop 5	Workshop 6
Evening	Technical visit to CETIAT (optional)			
Friday 25 th October 2002				
9:00-11:00	EOP 8	SOP 7	Workshop 7	Workshop 8
	Coffee break			
11:30-13:00	EOP 9	EOP 10	SOP 8	SOP 9
	Lunch			
14:30-15:30	EOP 11	EOP 12	SOP 10	SOP 11
	Coffee break			
16:00-18:00	SOP 12	EOP 13	Workshop 9	Workshop 10
20:00	Conference dinner at Château Saint Priest			
Saturday 26 th October 2002				
9:00-11:00	EOP 14	EOP 15	Workshop 11	Workshop 12
	Coffee break			
11:30-13:00	Closing session			
	Buffet Lunch			

EOP - Extended Oral Presentation
SOP - Short Oral Presentation

BOOKSHOP

A Review of International Literature Related to Ductwork for Ventilation Systems

Tor G. Malmstrom

AIVC Technical Note 56, 2002, 62 pp,

Code TN 56 

Ductwork is used for transport of air used for ventilation or air conditioning in buildings. The supply air is typically conditioned (filtered, warmed or cooled, sometimes humidified or dehumidified). It is important that the air is distributed properly in the building. Thus the duct system must be well balanced regarding airflow rates, or have provisions controlling the air distribution. The ducts should have a low leak rate. A primary function is also thermal insulation to protect the heat content of the air.

Another primary function of ductwork can be to transport smoke out of the building in case of fire, or assist in pressurisation of escape routes.

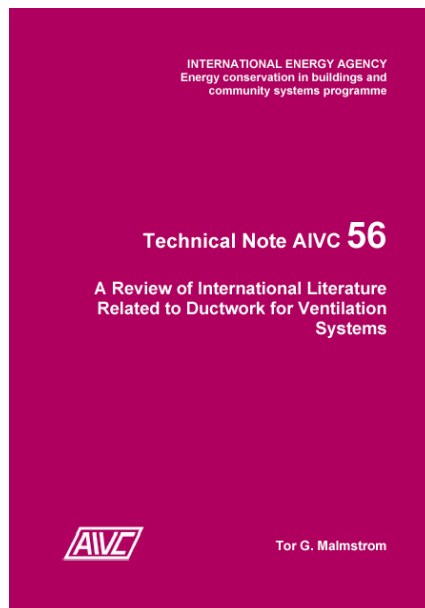
There are many boundary conditions regarding air ducts:

- **Energy use.** It is important to choose a technical solution that uses a small amount of energy (and exergy) for the air transportation in the duct. Low energy use also means that tight and (where appropriate) well insulated ducts should be used.
- **Minimisation of cost.** Between different layouts of a duct system, all of which are able to fulfil the primary functions causing the system to be built, the one using least resources, based on the lifetime performance, should be chosen. Provided that the price of different resources as energy, material, building space and flexibility is adequate, this choice can be based on cost minimisation. In practice it is difficult to state that two different layouts of a duct system have the same quality regarding function. Whenever in doubt, proper function and low energy use should be given priority to cost minimisation.
- **Fire.** The duct system should not spread fire or smoke in the building. This gives restraints regarding e.g. duct system layout, duct material, and fire insulation of the ducts.


- **Acoustics.** Noise, or private conversations in rooms, should not be transmitted through the ductwork. Nor should noise be generated in the ducts so it is transmitted to the rooms. Noise generation is often governing the choice of air velocity in the ducts, resulting in velocities lower than economically optimal.

The present review attempts to summarise the information on all these aspects available in international literature.

See also www.aivc.org for a list of all technical notes.



Use of Ventilation Zonal Models for HVAC Sensor Assessment

A thesis  done at CSTB by Peter Riederer aimed to improve the assessment of HVAC sensors on the following basis :

Room models, currently used for controller tests, assume the room air to be perfectly mixed. A new room model is developed, assuming non-homogeneous room conditions and distinguishing between different sensor positions.

From measurements in real test rooms and detailed CFD simulations, a list of convective phenomena is obtained that has to be considered in the development

of a model for a room equipped with different HVAC systems.

The zonal modelling approach that divides the room air into several sub-volumes is chosen, since it is able to represent the important convective phenomena imposed on the HVAC system. The convective room model is divided into two parts: a zonal model, representing the air at the occupant zone and a second model, providing the conditions at typical sensor positions. Using this approach, the comfort conditions at the occupant zone can be evaluated as well as the impact of different sensor positions.

The model is validated for a test room equipped with different HVAC systems. Sensitivity analysis is carried out on the main parameters of the model.

Performance assessment and energy consumption are then compared for different sensor positions in a room equipped with different HVAC systems. The results are also compared with those obtained when a well-mixed model is used.

A main conclusion of these tests is, that the differences obtained, when changing the position of the controller's sensor, is a function of the HVAC system and controller type. The differences are generally small in terms of thermal comfort but significant in terms of overall energy consumption. For different HVAC systems the cases are listed, in which the use of a simplified model is not recommended.

OPEN Energy Technology Bulletin

OPEN Energy Technology Bulletin is the new on-line news bulletin of the International Energy Agency's (IEA – _____) and the Agency's Committee on Energy Research and Technology's (CERT - _____).

The bulletin contains news about IEA programmes, developments and initiatives. It also provides a list of relevant upcoming events and of recent IEA publications.

Three issues are already available on the Internet :

Issue n°1, March 2002 : _____

Special issue, April 2002 : _____

Issue n°2; May 2002 : _____

You can subscribe (free of charge) to the OPEN Bulletin : _____

Uncertainty in Predictions of Thermal Comfort in Buildings

A PhD thesis  from Sten de Wit

TNO Building and Construction Research, Delft, The Netherlands, June , 2001, ISBN 90-9014884-1



Condensed summary

A crucial element in building design and construction is decision making. Building performances play an important role in choices between alternative designs. Predictions of building performances in the design stage imply uncertainty. Quantitative appraisal of this uncertainty can contribute to more rational design decisions. In current practice though, the uncertainties in the majority of the performance predictions are not explicitly quantified. A number of questions are still left open. Many of the uncertainties cannot be estimated by a straightforward statistical analysis of available data. Intuitive arguments have been put forward to emphasize the relevance of quantitative uncertainty information for design decisions, no attempts have been made to show how a decision maker could use this information for improvement of his decisions.

The research in this thesis aims to provide an answer on the two questions. The questions are addressed in the context of a specific case, which concerns the performance of a four story, naturally ventilated office building with respect to the thermal performance of its occupants. To quantify this performance aspect the temperature excess above a certain level is used as an indicator for thermal comfort.


Prediction of this indicator involves computer simulation on the basis of a thermal building model. A crude assessment at hand is made of the uncertainty that should be attributed to the predictions of the comfort indicators. Uncertainties in all of the building model parameters are estimated on the basis of literature. A sensitivity analysis is carried out to identify the most important parameters to the prediction of uncertainty.

Structured expert judgement is used to assess the most important parameters. The experts are asked to state their uncertainties. Their assessments are combined by weighted averaging. The experts' weights are derived from a statistical comparison of their assessment with measured data. For some parameters an extra step was involved. For these more abstract and highly model-specific parameters, the experts' assessments are elicited over a set of related variables, which are physically observable. The uncertainties in the parameters of interest are obtained by probabilistic inversion of the model relating the parameters to the elicitation variables. In the analysis the performance of the applied method and its practical applicability are evaluated. Finally the uncertainty in the prediction of the performance indicators is assessed. A demonstration is given how this uncertainty can constructively be used in the design decision through a Bayesian decision analysis.

Contents

Introduction; Performance Assessment; Crude Uncertainty Analysis; Uncertainty in Wind Pressure Coefficients; Uncertainty in the Indoor Temperature Distribution; Propagation and Implications of Uncertainty; Closure

A Thesis on Ventilation Efficiency and Thermal Comfort of Ventilation Systems with Disturbing Elements


This Doctoral Thesis , which was defended in december 2000, was prepared by Stéphanie Laporte in the Centre de Thermique de Lyon - France (_____).

It was based on numerous experiments operated in a full-size cell called MiniBat, composed of two identical rooms (3,1 x 3,1 x 2,5 m³), in order to study ventilation efficiency and thermal comfort associated with several positions of air inlet and outlet,

taking also account of different sources of disturbance (heating systems, occupants, etc.).


Air temperatures, air velocities and tracer gas concentration fields were measured, from which ventilation efficiency and PMV-PPD indices were calculated. Experimental results were also compared with the results from a CFD code.

This large experimental study contributes to the elaboration of a database for the validation of numerical models. Besides, the influence of different parameters (ventilation rate, rate of pollutants' injection, position of the injection in pollutants, ...) on ventilation efficiency and thermal comfort was investigated in various configurations of room heating system close to real conditions.

The full text of the thesis is available on the AIVC CD  (in French).

MEETINGS AND EVENTS

Forthcoming Conferences

Click here  for a list of forthcoming conferences on ventilation, energy efficiency, and other topics

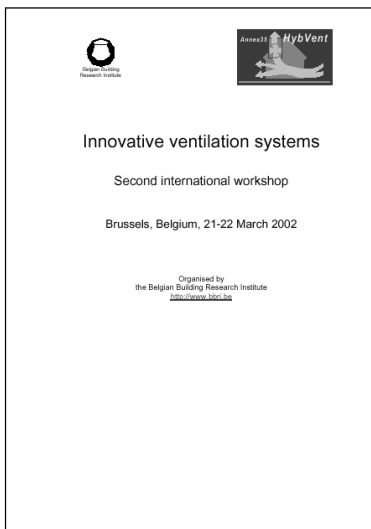
AIVC Conference 2003
'Ventilation, Moisture and Energy'
Will be held in Washington DC (USA)
October 12-14 2003

Innovative Ventilation Systems: Second International Workshop

On March 21-22, 2002, an international workshop on **innovative ventilation systems** was organised by the Belgian Building Research Institute (BBRI).

The aims of this workshop were:

- to identify recent developments in ventilation systems/strategies,
- to analyse how such innovative systems are at present treated in regulations and how they could be better treated in the



framework of standardisation and regulations on Energy Performance in Buildings.

The first workshop was held in May 1999. This second workshop was held in the framework of the IEA HybVent project. 13 speakers have shared their views to 31 participants, from 8 countries.

Firstly, a general overview on recent developments and trends in ventilation systems was presented by Willem De Gids (TNO, Netherlands) and the expected major results of the HybVent project were reported by Per Heiselberg, Operating Agent of the HYBVENT project.

Afterwards, the trends of the regulations on energy performance were presented by Luk Vandaele (BBRI). The new European Directive on Energy Performance in Buildings and the ENPER project were discussed.

A case study was described. It appeared that if in the past, natural and mechanical ventilation have been developed independently, they now merge together in a two modes system called **hybrid ventilation**.

Then, 6 ventilation companies (Aereco, Alusta, Renson, Stork, Thermopanel, Windowmaster) have shown their own developments.

The 6 companies have also shared their view on such regulations. It is clear that these regulations, which can be a real stimulus for innovative systems, become barriers if nothing is foreseen to assess correctly their performance. This can be done through the "Principle of Equivalence". However, an application of this principle on a

Dutch school has clearly shown that, according to the assumptions chosen, the performance that can be assessed to an innovative system will vary widely. Therefore, it is of first importance to complete the Principle of Equivalence with a clear procedure with recommended starting points.

Finally, the draft proposal for a Source Book on "Performance assessment of advanced ventilation systems in the framework of



energy and IAQ regulations" was discussed. This sourcebook is an output of the project HybVent.

Most of the workshop's presentations are available on the AIVC-CD. Click here... 

For more information on **IEA ECBCS Annex 35 HYBVENT: Hybrid ventilation in new and retrofitted office buildings and schools**, see [_____](#)

More information about ENPER can be found on [_____](#).

EU Sixth Framework Programme Conference

From 11 to 13 November 2002 the European Commission will hold a major conference to mark the launch of the EU's Sixth Framework Programme for research, which will cover the period from 2002 to 2006.

Based on the experience of a similar event in February 1999 which attracted over 5000 participants the conference will be a major forum to present the objectives and priorities of the Framework Programme and to explain rules for participation. At the same time the conference is meant to create opportunities for scientific debate and exchange of best practice beyond those subjects addressed in the Framework Programme.

The major features of this three-day event are as follows.

- **Sessions** addressing all the main **thematic priorities** of the Framework Programme as well as the **cross-cutting issues** of the European Research Area such as human resources and mobility, patenting and intellectual property, etc.
- **Sessions** providing guidance on **How to participate in the Framework Programme**.
- **In a major innovation compared with the 1999 conference, symposia, workshops and poster sessions will be** designed and organised using a bottom-up approach. This **participants' forum** will be organised by scientists, industrial researchers, research users, organisations and associations, and others working in or affected by research and technology on topical subjects relevant for research and society - though not necessarily related to the Framework Programme. The European Commission will supply the platform and create an appropriate environment. See the [call for proposals](#) for background information, the practical conditions and the form to be used for the submission of a proposal.
- **Project presentations** for the media and a wider audience, presenting the aims and results of research projects carried out under past EU research programmes or other programmes involving international co-operation .
- **Exhibition:** in parallel with the conference, there will be a major exhibition, providing space for some 150 stands, where interesting EU-sponsored research projects will be on display; this will complement the verbal project presentations mentioned before and promote the networking and integration of research activities in Europe. Space will also be available to accommodate corporate stands from European research organisations and national organisations having developed genuine European programmes for researchers. See the [call for proposals](#) for background information, the practical conditions and the form to be used to request space in the exhibition.



Registration to the conference is now possible. Please go on [_____](#)

POLICY AND PROGRAMMES

Update on EU Sixth Framework Programme

The European Commission is preparing the implementation of the so-called 6th framework programme (_____) which will run from 2002 till 2006. In order to increase the efficiency of the European research efforts, 2 new instruments are planned : networks of excellence and integrated projects. For more info, see also _____


As part of the call for research proposals (expected at the end of the year), a call for expressions of interest was launched with closing date June 7. It is expected that these expressions of interest may help the EC in identifying the most relevant research topics.

As indicated in previous issues of AIR, the EC is preparing a Directive on Energy Performance and it is expected to have a major influence on the European building stock. (Click here for the June 2002 draft ) Therefore, two expression of interest have been prepared entitled 'Kyoto Buildings'. Ventilation and indoor air quality play an important role in this directive and this as well from the point of view of energy use as in relation to the attention for appropriate indoor climate conditions. Therefore, INIVE EEIG is a potential project partner. See Expression of Interest on AIVC-CD .


In order to inform interested organisations and individuals, information will be made available on the e-core website (_____). On this website, you can make suggestions for research topics in the framework of such proposal.

LATEST NEWS

New Regulations Come into Force in Ireland

New regulations concerning the energy efficiency of buildings and ventilation requirements have been adopted for Ireland. On the CD  there is a description of the measures envisaged and the timescale. For more information: _____

CONFERENCE CALENDAR

Further details for these conferences are available on the CD .

SISO 2002 European Simulation Interoperability Workshop

24-26 June 2002

University of Westminster, Harrow Campus, Harrow, UK

Website: _____

World Renewable Energy Congress VII: Renewables Europe Best Energy Option WREC - 2002

29th June - 5th July 2002

Cologne, Germany

Prof. Ali Sayigh (Director General of WREN), 147 Hilmanton, Lower Earley, Reading RG6 4HN, UK, Tel: +44 (0)118 961 1364, Fax: +44 (0)118 961 1365, Email: _____
Homepage: _____

Indoor Air 2002 The 9th International Conference on Indoor Air Quality and Climate

30th June - 5th July 2002

Monterey, California, USA

Hal Levin (President Indoor Air 2002), 323 Soquel Avenue, PMB 312, Santa Cruz, California 95062 USA, Tel: +1 831 425 3946, Fax: +1 831 426 6522, Email: _____

Homepage: _____

PLEA 2002 International Conference on Passive and Low Energy Architecture

22nd - 24th July, 2002

Toulouse, France

PLEA 2002, Ecole d'Architecture de Toulouse,

83, rue Aristide Maillol, BP 1329,

F-31106 Toulouse cedex 1, France,

Tel: +33 (0)5 62 11 50 48,

Fax: +33 (0)5 62 11 50 49 (Attn. PLEA 2002 - M Gerber),

Email _____

World Congress of Architecture

22-26 July 2002

Berlin, Germany

Congress Management, DER-CONGRESS, Bundesallee 56, D-10715 Berlin, Germany

Tel: +49 30 857 9030, Fax: +49 30 857 90326

Website: _____

Teaming for Efficiency. 2002 ACEEE Summer Study on Energy Efficiency in Buildings

18-23 August 2002

Asilomar Conference Centre, Pacific Grove, California, USA

ACEEE Summer Study Office, Attn: Rebecca Lunetta, PO Box 7588, Newark, DE 19714-7588, USA, Fax: +1 302 292 3965, email _____

Roomvent 2002 Air Distribution in Rooms Eighth International Conference

8-11 September 2002

Copenhagen, Denmark

Scientific Secretariat

Roomvent 2002, DANVAK, Danish Society of Heating, Ventilating and Air Conditioning Engineers, Oerholmvej 40 B, DK 2800 Lyngby, Denmark, Tel +45 45 87 76 11, Fax +45 45 87 76 77, _____

Conference Secretariat

Roomvent 2002, DIS Congress Service Copenhagen A/S, Herlev Ringvej 2c, DK-2730 Herlev, Denmark, Tel: +45 44 92 44 92, Fax: +45 44 92 50 50, _____

ECO-Build Conference

21-28 September 2002

Oslo, Norway

Synnove Brekke

Tel: +47 23 24 17 08

Fax: +47 22 68 87 53

Email: _____

Sustainable Building 2002

23-25 September 2002

Oslo, Norway

Tel: +971 2 4446900, Fax: +971 2 4446135,

Healthy Buildings 2003 – Energy Efficient Healthy Buildings

13-17 July 2003

Singapore

Conference Secretariat, Healthy Buildings 2003, Department of Building, National University of Singapore, 4, Architecture Drive, Singapore 117566, _____

Building Simulation 2003 8th International Building Performance Simulation Association International Conference and Exhibition

11-14 August 2003

Technische Universiteit Eindhoven (The Netherlands)

For more information and pre-registration:

Research in Building Physics

14-18 September 2003

Leuven, Belgium

Rita Peys, Technologisch Instituut, C/o Ingenieurshuis-K VIV, Desguinlei 214, BE-2018 Antwerpen, Belgium

Ph: +32 3 216 09 96, Fax: +32 3 216 06 89

E-mail: _____

Ventilation, Moisture and Energy AIVC Conference 2003

12-14 October 2003

Washington DC, USA

Information: aivc@bbri.be

AIVC SPONSORS' CORNER

The new operating agent of the AIVC is offering the opportunity to sponsor the activities of the AIVC. This will be of direct benefit both for readers of AIR and for the sponsors themselves:


Sponsors will be able to reach **thousands of potential clients** directly interested in ventilation related products;

The sponsorship is one of the means that will enable the AIVC to provide more information at lower cost.

Three levels of sponsorship are possible (Gold, Silver and Bronze), corresponding to different contribution rates and advantages.

The main advantages for the sponsors are :

- Commercial advertisement in this newsletter
- Commercial information on the AIVC CD
- Sponsor's banner on the AIVC website
- Commercial leaflet distributed with this newsletter
- Free copies of this newsletter and the AIVC CD
- Free participation for sponsor's delegates at the annual AIVC conference
- Free exhibition stand at the annual AIVC conference

Detailed information concerning sponsorship is available on the AIVC-CD  or on the AIVC website (www.aivc.org). A request for further information may also be sent to inive@bbri.be.

The First AIVC Sponsor



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I.Z. Flanders Field
8790 Waregem
Belgium

tel: +32 (0)56 62 71 11
fax: +32 (0)56 60 28 51
Web www.renson.be
EMAIL info@renson.be

Energy Efficient and Healthy Buildings in Sustainable Cities EPIC and AIVC 2002 Conference

23-26 October 2002

Lyon, France

Detailed Information – <http://epic.entpe.fr> and <http://www.aivc.org/>.

ABT 2002 International Conference on Advances in Building Technology

4-6 December 2002

Hong Kong

Conference Secretariat, The Hong Kong Polytechnic University, Faculty of Construction and Land Use, Hung Hom, Hong Kong SAR, China,

Tel: (852) 2766 5033, Fax: (852) 2362 2574, email: _____

SSB 2002: 6th International Conference on System Simulation in Buildings

16-18 December 2002

Liège, Belgium

Monique Drienne, Laboratory of Thermodynamics, University of Liège, Campus du Sart-Tilman, Bâtiment B49, B-4000 LIEGE, Belgium,

Phone: +32 4 366 48 00,

Fax: +32 4 366 48 12,

Environment & Energy 2003

Exhibition and Conference

2-5 February 2003

Abu Dhabi International Conference Centre

Environment & Energy 2003

PO Box 5546, Abu Dhabi, United Arab Emirates

Air Information Review & AIVC-CD (4 issues per year)

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Subscriptions are for one year

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Date _____ Cardholder's signature _____

Belgium

AIVC Contact & INIVE Member

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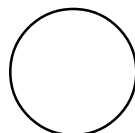
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