Developments in Canada on portable air cleaners, duct cleaning and heat recovery

Sultan, Zuraimi; Magee, Robert; Schleibinger, Hans

Publisher's version / Version de l'éditeur:

Air Infiltration and Ventilation Centre Newsletter, Feb. 2013 3, pp. 2-3, 2013-02-01

Newsletter
Air Infiltration and Ventilation Centre

Foreword

Over 160 participants attended the October 2012 AIVC conference in Copenhagen; over 100 presentations were given on topics ranging from health and indoor air quality to ventilative cooling, including airtightness issues.

It has been a major discussion place for on-going projects and initiatives (e.g., a new IEA annex 62 on ventilative cooling, the venticool platform, TightVent, HealthVent, etc.), allowing to present results and making progress thanks to the interactions with the audience.

Please note already the following events!

- AIVC workshop on the **quality of residential ventilation systems** in Brussels on March 18 and 19
- AIVC-Annex 62 workshop on **ventilative cooling** in Brussels on March 19-20
- AIVC-TightVent **airtightness** workshop in Washington DC on April 18-19
- **34th AIVC conference** in Athens on September 25-26

Peter Wouters, Operating Agent AIVC

no 3
February 2013

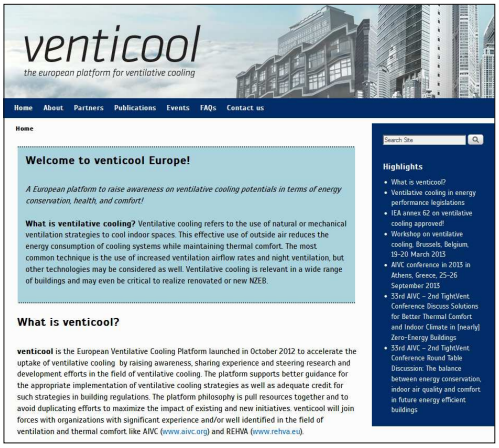
IEA annex 62 on ventilative cooling approved!

During its November 2012 meeting, the Executive Committee of IEA ECBCS (Energy Conservation in Buildings and Community Systems – www.ecbcs.org) has approved to start a new multi-annual collaboration on the topic of ventilative cooling, which is application of ventilation flow rates to reduce the cooling loads in buildings. Ventilative Cooling utilizes the cooling and thermal perception potential of outdoor air. The air driving force can be natural, mechanical or a combination.

The operating agent is Prof. Per Heiselberg (ph@civil.aau.dk) from Aalborg University. As of today, 12 countries participate to this annex.

One important first step of this annex will be a workshop in Brussels 19-20 March 2013 on ventilative cooling followed by a project planning meeting also in Brussels but on 21-22 March 2013. Mark your calendars. More information will be soon available on the AIVC website (www.aivc.org) and on the venticool website (venticool.org).

Launch of the venticool platform



The Ventilative Cooling Platform venticool was officially launched during the AIVC-TightVent conference in Copenhagen, Oct. 10-11 2012. Venticool aims to bring resources together to accelerate the learning process in particular by raising awareness, sharing experience and by steering research and development efforts in this field. Expected results include in particular better guidance for appropriate implementation of ventilative cooling strategies as well as adequate credit for such strategies in building regulations. For more information on the platform, please visit: www.venticool.eu

In this issue

Air Infiltration and Ventilation Centre

New AIVC Publication

Contributed Report 15 Development and evaluation of a new test method for portable air cleaners

By Alain Ginestet, CETIAT, France

A new test method for the measurement of the intrinsic performances of portable air cleaners, whatever the filtration techniques they use, has been developed and validated. The experimental French standard AFNOR XP B44-200 has been published in May 2011. Once the tests have been carried out, the clean air delivery rate (CADR) can be announced and the intermediate byproducts, when they exist, are identified. The availability of this standard will allow to assess and to compare the air cleaners available on the market. Also, this new method solves the problems met with the use of the existing standardised test methods. The experimental French standard XP B44-200 could be used as a basis for the development of an international standard.

Download the report at http://goo.gl/XEGht

Towards new standards for portable air cleaners

There is a growing interest to characterize the performance of portable air cleaners given their success on the market. Today, consumers can rely on little information to select a product among the systems that are commercially-available. For this, ISO has launched a work item under technical committee 142 (working group 11) to develop standardized test methods for portable air cleaners.

The methods will build on existing work undertaken in various countries. During the last meeting in Zurich (Switzerland) last September, the approaches developed in Canada, France and Switzerland were presented. The Canadian approach is briefly presented in the article of this newsletter; contributed report 15 available on the AIVC website gives details about the French approach.

Developments in Canada on portable air cleaners, duct cleaning and heat recovery

By Zuraimi Sultan, Robert Magee, Hans Schleibinger

Under the Clean Air Agenda, the Government of Canada committed to reduce the emissions of greenhouse gases and the concentrations of key contaminants in ambient air, and to contribute to better occupant health by improving indoor air quality. To deliver on its commitment, the National Research Council, Canada's premier research organization, is establishing means to control emissions of harmful contaminants at the source, improve ventilation for more effective and energy-efficient contaminant removal, and evaluate technologies and solutions aimed at purifying indoor and supply air. Regarding the air purification project a multi-stakeholder technical advisory committee was created representing federal and provincial agencies, industry associations, non-governmental organizations, municipal governments and standards associations from Canada. Under this committee's guidance, evaluation protocols and guides for existing air purification solutions were established, and the validity and usefulness of the protocols tested against existing solutions for portable air cleaners, air duct cleaning provided by commercial services, and heat recovery and energy/enthalpy recovery ventilators.

Evaluation of Portable Air Cleaners

Although portable air cleaners (PACs) are prevalent in the market place, detailed guidance for manufacturers and consumers does not exist to help them design and chose the right system for their needs. Existing PACs evaluation protocols are based only on particle removal (Arizona road dust, environmental tobacco smoke and mulberry pollen), sound output (not based on ISO standards) and energy efficiency. NRC's protocol is more comprehensive and encompasses the following five categories:

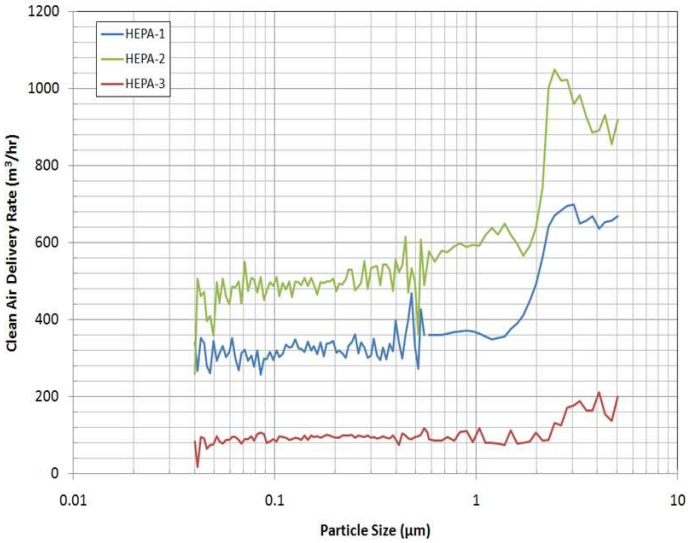
1) evaluation of the generation of potential by-products (ozone, formaldehyde and ultrafine particles) and VOCs (toluene and formaldehyde)
2) determination of the reductions of nano and micro particles in the range 50 nm – 5 µm
3) analysis of VOC reductions using limonene, toluene and formaldehyde as target compounds
4) characterization of the sound power using ISO standards 3741 and 374
5) calculating the energy index which is normalised by the removal performance

Twelve PACs of various technologies have been tested against the new NRC protocol. As an example, the relative performance of three HEPA-style PACs in removing 50 nm to 5.0 µm particulates is given in Fig. 1.
Fig 2 shows elevated VOC emissions (formaldehyde and toluene) and ultrafine particle (<0.1 µm) generated by the HEPA-based PAC operation.

Figure 1 (lright): Removal of particles given as Clean Air Delivery Rates for PAC's using different HEPA filters

Figure 2 (next page, bottom): VOC and particulate by-product formation resulting from "HEPA-1" PAC operation.

Figure 3 (next page, top): Test rig for the evaluation of Heat and Energy/Enthalpy Recovery Ventilators established within NRC's Indoor Air Research Laboratory



The evaluation protocol has been accepted as a base document by the International Organization for Standardization (ISO) and the development into an ISO standard method is in progress. Currently, NRC is developing an extension to this protocol, which includes the long term performance of PACs.

Guide for the Evaluation of Air Duct Cleaning by Commercial Services

NRC's team developed a guide to evaluate air-duct cleaning (DC) provided by commercial services for larger HVAC systems. This guide will assist building operators to obtain effective and cost-efficient air duct cleaning results from commercial service providers. Specifically, the new guide will enable them to:

1) interact in an informed way with DC companies
2) focus scope of proposed work to address both adequate cleaning and cost-effectiveness
3) minimize and assess, if applicable, potentially harmful effects on occupants resulting from improper cleaning procedures
4) assess the potential adverse impacts of the use of chemical cleaning agents or biocides
5) work with the DC company on a level playing field to resolve problems

The guide was validated in several office buildings in which commercial DC was performed.

Evaluation of Heat Recovery and Enthalpy/Energy Recovery Ventilators

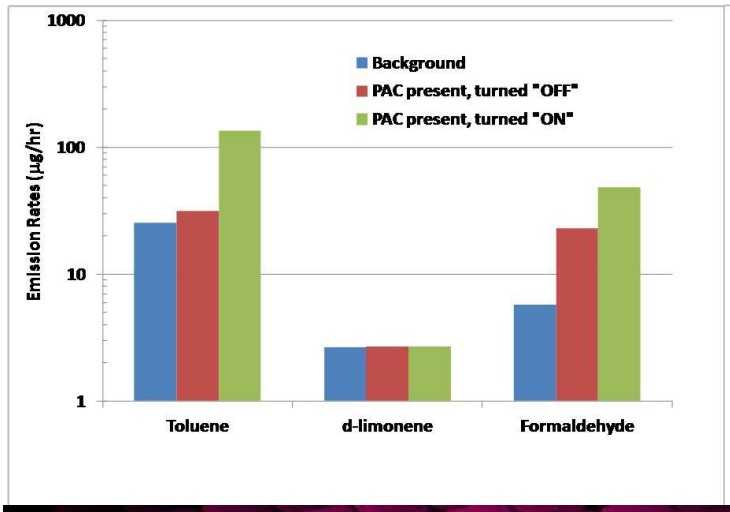
A protocol was developed to assess the IAQ impact of heat recovery ventilator (HRV) and energy recovery ventilator (ERV) systems used to provide residential ventilation. The new protocol, after confirming the specified ventilation flow rates of the systems, extends current standards that characterize ventilation performance and energy efficiency, by describing a suite of additional tests:

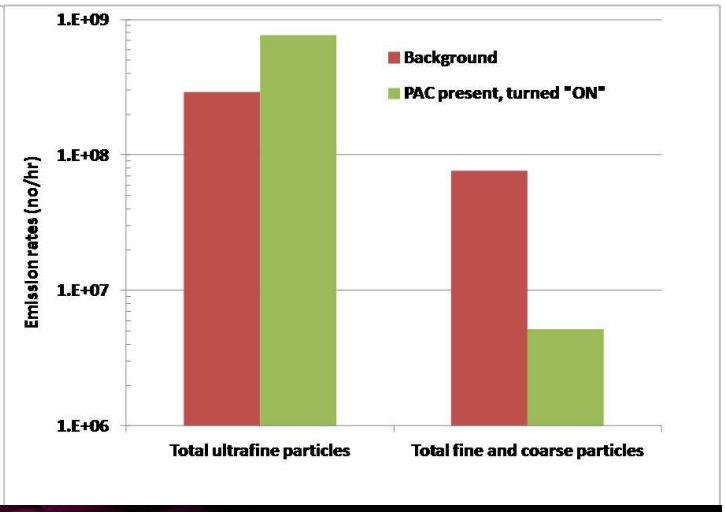
1) effectiveness of particulate removal (both PM10 and PM2.5) from outdoor air and also from return air if a recirculation option exists for the unit
2) potential formation of the by-product ozone which can be generated by blower motors or supplemental filtration systems incorporated into the system
3) emissions of VOCs and aldehydes from the complete system, and if they are conspicuous, the emissions from system components, which may include filter assemblies, casing materials, and flex duct used during system installation.

The described tests in the new evaluation protocol will provide HRV/ERV manufacturers and their supply chain with a useful tool to assess and refine their products, thereby opening market niches while achieving better indoor air quality for residential occupants.

Over the next three years, NRC's team is engaging in research and further protocol development targeted towards the removal of VOCs by passive panels, as well as particle removal and by-product emissions by in-duct solutions (systems included into larger HVAC units). Overall, efforts are aimed at providing better information for end-users as well as building designers and operators to enable them to make more informed, cost and energy-efficient decisions.

More information at http://goo.gl/Omzrv or contact Zuraimi.Sultan@nrc-cnrc.gc.ca and Robert.Magee@nrc-cnrc.gc.ca





Air Infiltration and Ventilation Centre

Workshop on "Securing the quality of ventilation systems in residential buildings: status and perspectives" in Brussels, Belgium, 18-19 March 2013

The objective of this workshop is to discuss pros and cons of existing approaches as well as ways to explore to improve the situation with key experts from various countries. The focus of the presentations will be on the schemes developed to secure the quality of the ventilation systems in residential buildings. This entails in particular the development of quality labels and performance display for products, qualification schemes for installers, design and installation guidelines, and training for designers and craftsmen, as well as the implementation of commissioning protocols, maintenance protocols, regular inspections and real performance measurements. Registration information soon available on the AIVC (www.aivc.org) and TightVent (www.tightvent.eu) websites.

Airtightness workshop in Washington DC, 18-19 April 2013

AIVC is pleased to announce that it prepares the organization of an airtightness workshop with the support of TightVent and the National Institute of Building Sciences, and in cooperation with NIST, LBNL, BETEC and ASHRAE on 18-19 April 2013 in Washington DC. More information at: www.aivc.org

AIVC conference in 2013 in Athens, Greece, 25-26 September 2013

The 34th AIVC conference will be held in Greece in conjunction with the 1st venticool conference and the 3rd TightVent conference. More information will be soon available on our website: www. aivc.org

Events calendar

18-19 March 2013: Brussels, Belgium. Workshop "Securing the quality of ventilation systems in residential buildings: status and perspective".

19-20 March 2013: Brussels, Belgium. Workshop on ventilative cooling followed by IAE annex 62 project planning meeting.

19-20 April 2013: Washington DC, USA. Workshop on building and ductwork airtightness.

25-26 September 2013: Athens, Greece. 2013 AIVC conference.

AIVC • List of board members