35th Air Infiltration and Ventilation Centre Conference (AIVC 2014), 4th TightVent Conference and 2nd Venticool Conference 2014

Ventilation and Airtightness in Transforming the Building Stock to High Performance

Poznan, Poland 24 – 25 September 2014

ISBN: 978-1-5108-3763-8

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2014) by International Network for Information on Ventilation and Energy Performance (INIVE) All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact International Network for Information on Ventilation and Energy Performance (INIVE) at the address below.

International Network for Information on Ventilation and Energy Performance (INIVE) Lozenberg 7
B-1932 Sint-Stevens-Woluwe
Belgium

Fax: +32 (0)2 529 81 10

info@inive.org

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: 845-758-0400 Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com

Table of Contents

PROPOSED CHANGE IN SPANISH REGULATIONS RELATING TO INDOOR AIR QUALITY WITH THE AIM OF REDUCING ENERGY CONSUMPTION OF VENTILATION SYSTEMS
DURABLE AIRTIGHTNESS IN SINGLE-FAMILY DWELLINGS: FIELD MEASUREMENTS AND ANALYSIS
IMPACT OF A PHOTOCATALYTIC OXIDATION LAYER COVERING THE INTERIOR SURFACES OF A REAL TEST ROOM: VOLATILE ORGANIC COMPOUND MINERALISATION, RISK ASSESSMENT OF BY-PRODUCT AND NANOPARTICLE EMISSIONS
THE ENERGY IMPACT OF ENVELOPE LEAKAGE. THE CHILEAN CASE
AIRTIGHTNESS IMPROVEMENT OF STRUCTURES TO IMPROVE INDOOR AIR QUALITY 36
DEMAND CONTROLLED VENTILATION IN RENOVATED BUILDINGS WITH REUSE OF EXISTING DUCTWORK46
REQUIREMENTS AND HAND-OVER DOCUMENTATION FOR ENERGY-OPTIMAL DEMAND-CONTROLLED VENTILATION
MONITORING RESULTS AND OPTIMIZATION OF A FAÇADE INTEGRATED VENTILATION CONCEPT FOR BUILDING RETROFIT
USE OF DCV FOR HEATING AND THE INFLUENCE ON IAQ IN PASSIVE HOUSE BUILDINGS . 71
THE EFFECT OF ENTHALPY RECOVERY VENTILATION ON THE RESIDENTIAL INDOOR CLIMATE
AIR RENEWAL EFFECTIVENESS OF DECENTRALIZED VENTILATION DEVICES WITH HEAT RECOVERY
PERCEPTION OF A COOLING JET FROM CEILING - A LABORATORY STUDY94
PROMEVENT: IMPROVEMENT OF PROTOCOLS MEASUREMENTS USED TO CHARACTERIZE VENTILATION SYSTEMS PERFORMANCE100
IMPACT OF A POOR QUALITY OF VENTILATION SYSTEMS ON THE ENERGY EFFICIENCY FOR ENERGY-EFFICIENT HOUSES
DEMAND-CONTROLLED VENTILATION 20 YEARS OF IN-SITU MONITORING IN THE RESIDENTIAL FIELD119
SUMMER PERFORMANCE OF RESIDENTIAL HEAT RECOVERY VENTILATION WITH AN AIR-TO-AIR HEAT PUMP COOLING SYSTEM130
HEATING "PASSIVE HOUSE" OFFICES IN COLD CLIMATE USING ONLY THE VENTILATION SYSTEM – COMPARISON OF TWO VENTILATION STRATEGIES
MONITORING OF AN INNOVATIVE ROOM-BY-ROOM DEMAND CONTROLLED HEAT RECOVERY SYSTEM ON FOUR LOCATIONS142
CLEANLINESS OF AIR FILTERS IN THE EXPERIMENTAL PASSIVE HOUSE154
COMPARISON OF TWO VENTILATION CONTROL STRATEGIES IN THE FIRST NORWEGIAN SCHOOL WITH PASSIVE HOUSE STANDARD 163

SELF-EVALUATED THERMAL COMFORT COMPARED TO MEASURED TEMPERATURES DURING SUMMER IN THREE ACTIVE HOUSES WHERE VENTILATIVE COOLING IS APPLIED
EXPERIENCES WITH VENTILATIVE COOLING IN PRACTICAL APPLICATION BASED ON EXPERIENCES WITH COMPLETED ACTIVE HOUSES
INDOOR CLIMATE IN A DANISH KINDERGARTEN BUILT ACCORDING TO ACTIVE HOUSE PRINCIPLES: MEASURED THERMAL COMFORT AND USE OF ELECTRICAL LIGHT
AIR HEATING OF PASSIVE HOUSE OFFICE BUILDINGS IN COLD CLIMATES – HOW HIGH SUPPLY TEMPERATURE IS ACCEPTABLE?
ENERGY-OPTIMAL VENTILATION STRATEGY OUTSIDE OF THE OPERATING TIME FOR PASSIVE HOUSE OFFICE BUILDINGS IN COLD CLIMATES
CAN AIR HEATING ALONE BE USED IN PASSIVE HOUSE OFFICE BUILDING IN COLD CLIMATES? REVIEW OF THE OBTAINED RESULTS
IMPACT OF THE USE OF A FRONT DOOR ON THERMAL COMFORT IN A CLASSROOM IN A PASSIVE SCHOOL
A NOZZLE PULSE PRESSURISATION TECHNIQUE FOR MEASUREMENT OF BUILDING LEAKAGE AT LOW PRESSURE 236
EXERGY EVALUATION OF MECHANICAL VENTILATION SYSTEMS245
STRATEGIES FOR EXPLOITING CLIMATE POTENTIAL THROUGH VENTILATIVE COOLING IN A RENOVATED HISTORIC MARKET
DURABILITY OF AIR TIGHTNESS SOLUTIONS FOR BUILDINGS268
MULTI-PIPE EARTH-TO-AIR HEAT EXCHANGER (EAHE) GEOMETRY INFLUENCE ON THE SPECIFIC FAN POWER (SFP) AND FAN ENERGY DEMAND IN MECHANICAL VENTILATION SYSTEMS
AIRFLOW MODELLING SOFTWARE DEVELOPMENT FOR NATURAL VENTILATION DESIGN287
REDUCING COOLING ENERGY NEEDS THROUGH AN INNOVATIVE DAILY STORAGE BASED FACADE SOLUTION
SIMULATION OF STATIC PRESSURE RESET CONTROL IN COMFORT VENTILATION305
A PROTOCOL FOR ASSESSING INDOOR AIR QUALITY IN RETROFITTED ENERGY EFFICIENT HOMES IN IRELAND
TESTING FOR BUILDING COMPONENTS CONTRIBUTION TO AIRTIGHTNESS ASSESSMENT
IMPLEMENTATION AND PERFORMANCE OF VENTILATION SYSTEMS: FIRST REVIEW OF VOLUNTARY CERTIFICATION CONTROLS IN FRANCE
AIR LEAKAGES IN A RETROFITTED BUILDING FROM 1930: MEASUREMENTS AND NUMERICAL SIMULATIONS
INDOOR ENVIRONMENTAL QUALITY-GLOBAL ALLIANCE: THE VALUE CHAIN OF IEQ 350 DO EXISTING INTERNATIONAL STANDARDS SUPPORT VENTILATIVE COOLING?
THE INFLUENCE OF TRAFFIC EMISSION ON IAQ ESPECIALLY IN STREET CANYONS

SIMULATION OF NIGHT VENTILATION PERFORMANCE AS A SUPPORT FOR AN INTEGRATED DESIGN OF BUILDINGS	61
ESTIMATING THE IMPACT OF INCOMPLETE TRACER GAS MIXING ON INFILTRATION RATI MEASUREMENTS	
VENTILATIVE COOLING IN NATIONAL ENERGY PERFORMANCE REGULATIONS: REQUIREMENTS AND SENSITIVITY ANALYSIS	78
THE 10 STEPS TO CONCEIVE AND BUILD AIRTIGHT BUILDINGS3	98
BELGIAN FRAMEWORK FOR RELIABLE FAN PRESSURIZATION TESTS FOR BUILDINGS4	106
CO-HEATING TEST AND COMFORT ASSESSMENT OF A COUPLED SYSTEM MADE BY A VENTILATED WINDOW AND A HEAT RECOVERY UNIT4	.17
DERIVATION OF EQUATION FOR PERSONAL CARBON DIOXIDE IN EXHALED BREATH INTENDED TO ESTIMATION OF BUILDING VENTILATION4	-27
PASSIVE COOLING THROUGH VENTILATION SHAFTS IN HIGH-DENSITY ZERO ENERGY BUILDINGS: A DESIGN STRATEGY TO INTEGRATE NATURAL AND MECHANICAL VENTILATION IN TEMPERATE CLIMATES4	36
ENERGY SAVING AND THERMAL COMFORT IN RESIDENTIAL BUILDINGS WITH DYNAMIC INSULATION WINDOWS4	
EXPERIENCES IN THE AIRTIGHTNESS OF RENOVATED TERTIARY EXEMPLARY BUILDINGS IN THE BRUSSELS CAPITAL REGION4	
MONITORING THE ENERGY- & IAQ PERFORMANCE OF VENTILATION SYSTEMS IN DUTCH RESIDENTIAL DWELLINGS4	
DUCTWORK AIRTIGHTNESS: RELIABILITY OF MEASUREMENTS AND IMPACT ON VENTILATION FLOWRATE AND FAN ENERGY CONSUMPTION4	178
AIRTIGHTNESS OF BUILDING PENETRATIONS: AIR SEALING SOLUTIONS, DURABILITY EFFECTS AND MEASUREMENT UNCERTAINTY4	88
COMPARISON OF BUILDING PREPARATION RULES FOR AIRTIGHTNESS TESTING IN 11 EUROPEAN COUNTRIES	01
THE IMPACT OF AIR-TIGHTNESS IN THE RETROFITTING PRACTICE OF LOW TEMPERATUR HEATING5	
THE USE OF A ZONAL MODEL TO CALCULATE THE STRATIFICATION IN A LARGE BUILDING5	22
RECENT ADVANCES ON FACTORS INFLUENCING HUMAN RESPONSES AND PERFORMANCIN BUILDINGS AND POTENTIAL IMPACTS ON VENTILATION REQUIREMENTS5	
STRATEGIES FOR EFFICIENT KITCHEN VENTILATION5	34
COUPLING HYGROTHERMAL WHOLE BUILDING SIMULATION AND AIR-FLOW MODELLING TO DETERMINE STRATEGIES FOR OPTIMIZED NATURAL VENTILATION5	
EXPERIMENTAL CHARACTERISATION OF DOMINANT DRIVING FORCES AND FLUCTUATING VENTILATION RATES FOR A SINGLE SIDED SLOT LOUVER VENTILATION SYSTEM	47
A STUDY OF CARBON DIOXIDE CONCENTRATIONS IN ELEMENTARY SCHOOLS5	557

MEASUREMENT OF INFILTRATION RATES FROM DAILY CYCLE OF AMBIENT CO ₂	. 568
PREDICTING THE OPTIMUM AIR PERMABILIY OF A STOCK OF DETACHED ENGLISH DWELLINGS	575
DEVELOPMENT OF AN EVALUATION METHODOLOGY TO QUANTIFY THE ENERGY POTENTIAL OF DEMAND CONTROLLED VENTILATION STRATEGIES	. 587
SYSTEM FOR CONTROLLING VARIABLE AMOUNT OF AIR ENSURING APPROPRIATE INDOOR AIR QUALITY IN LOW-ENERGY AND PASSIVE BUILDINGS	. 597
MULTI-ZONE DEMAND-CONTROLLED VENTILATION IN RESIDENTIAL BUILDINGS: AN EXPERIMENTAL CASE STUDY	614
SEASONAL VARIATION IN AIRTIGHTNESS	621
OPTIMIZATION OF DATA CENTER CHILLED WATER COOLING SYSTEM ACCORDING TO ANNUAL POWER CONSUMPTION CRITERION	. 629
NUMERICAL SIMULATION OF INDOOR AIR QUALITY - MECHANICAL VENTILATION SYSTEM SUPPLIED PERIODICALLY VS. NATURAL VENTILATION	. 638
DEVELOPMENT OF A DECENTRALIZED AND COMPACT COMFORT VENTILATION SYSTEM WITH HIGHLY EFFICIENT HEAT RECOVERY FOR THE MINIMAL INVASIVE REFURBISHMENT OF BUILDINGS	
CFD SIMULATION OF AN OFFICE HEATED BY A CEILING MOUNTED DIFFUSER	. 655
OPTIMAL POSITIONING OF AIR-EXHAUST OPENINGS IN AN OPERATING ROOM BASED OF RECOVERY TEST: A NUMERICAL STUDY	
STRATEGIES FOR THE PLANNING AND IMPLEMENTATION OF AIRTIGHTNESS ON EXISTI SLOPED ROOFS	
ACH AND AIR TIGHTNESS TEST RESULTS IN THE CROATIAN AND HUNGARIAN BORDER REGION	
MEASURED MOISTURE BUFFERING AND LATENT HEAT CAPACITIES IN CLT TEST HOUSE	
BREATHING FEATURES ASSESSMENT OF POROUS WALL UNUITS IN RELATION TO INDOO AIR QUALITY	OR
LARGE BUILDINGS AIRTIGHTNESS MEASUREMENTS USING VENTILATION SYSTEMS	.712
SIMULATION ANALYSIS FOR INDOOR TEMPERATURE INCREASE AND REDUCTION OF HEATING LOAD IN THE DETACHED HOUSE WITH BUOYANCY VENTILATED WALL IN WINTER	721
DEVELOPMENT OF A UNIQUE THERMAL AND INDOOR AIR QUALITY PROBABILISTIC MODELLING TOOL FOR ASSESSING THE IMPACT OF LOWERING BUILDING VENTILATION	N
RATES. ASSESSMENT OF THE DURABILITY OF THE AIRTIGHTNESS OF BUILDING ELEMENTS VIA LABORATORY TESTS.	738
CONTROL OF INDOOR CLIMATE SYSTEMS IN ACTIVE HOUSES TIPS FOR IMPROVING REPEATABILITY OF AIR LEAKAGE TESTS TO EN AND ISO STANDARDS	
THE INDOOR AIR QUALITY OBSERVATORY - OUTCOMES OF A DECADE OF RESEARCH AIR PERSPECTIVES	ND

MODEL ERROR DUE TO STEADY WIND IN BUILDING PRESSURIZATION TESTS	770
TEMPERATURE AND PRESSURE CORRECTIONS FOR POWER-LAW COEFFICIENTS OF	
AIRFLOW THROUGH VENTILATION SYSTEM COMPONENTS AND LEAKS	778
TOPICAL SESSION: STATUS OF THE REVISION OF EN VENTILATION STANDARDS	
SUPPORTING THE EPBD RECAST.	786
INTEGRATED APPROACH AS A PREREQUISITE FOR NEARLY ZERO ENERGY SCHOOLS I	N
MEDITERRANEAN REGION-ZEMEDS PROJECT.	788