

ASHRAE Papers CD:



2014 ASHRAE Annual Conference

Seattle, Washington

© 2014 ASHRAE

Contents

Conference Papers

SE-14-C001

Ground Source Heat Pump Efficiency in Cold Climates

Robbin Garber-Slaght, PE, Associate Member ASHRAE; Ronald Daanen, PhD; Andy Roe

SE-14-C002

Development of a Renewable Ground-Loop (ReGL) System

Toshiyuki Hino, PhD; Ryoza Ooka, PhD, Member ASHRAE

SE-14-C003

Economic Applicability Evaluation of Heat Pump Systems in Buildings with Different Insulation Levels

Lars Junghans, PhD, Associate Member ASHRAE

SE-14-C004

Economic Analysis of Ground Source Heat Pumps in North Carolina

Hamed Honari, Student Member ASHRAE; Miriam Makhyoun; Vikram Sridhar; Kacey Hoover

SE-14-C005

Effect of Residential Ground Source Heat Pump System Design on CO₂ Emissions in Sweden

Jeffrey D. Spitler, PhD, PE, Fellow ASHRAE; Mei Yung Wong, Student Member ASHRAE;

Signhild E.A. Gehlin, PhD, Member ASHRAE

SE-14-C006

Integral Design: A New Necessary Professional Skill for Architects and HVAC Engineers to Cope with Their New Roles for Sustainable Development

Wim Zeiler

SE-14-C007

Analysis of Air Change Rates and System Configuration on the Performance of a Mini-Environment Cleanroom

Kishor Khankari, PhD, Member ASHRAE; Wei Sun, PE, Member ASHRAE

SE-14-C008

A Simultaneous Consideration of Energy and Ventilation in Health Care

Travis R. English, Member ASHRAE

SE-14-C009

Feasibility Study of a Compact Residential HRV/ERV/Economizer Based Ventilation System

Agustin Olt, Student Member ASHRAE; Jun Zhang; Alan S. Fung, PhD, PEng, Member ASHRAE

SE-14-C010

Experimental Study of the Cross-Infection Risk Due to the Cross-Flow of Exhaled Airflows and a Plane Jet with the Protected Occupied Zone Ventilation

Guangyu Cao, PhD, Member ASHRAE; Peter V. Nielsen, PhD, Fellow ASHRAE; Chunwen Xu; Rasmus Lund Jensen, PhD

SE-14-C011

Assessment of the Indoor Environmental Quality in a Dutch Daycare Center

Mark de Waard; Wim Zeiler

SE-14-C012

A Tool for Evaluating Fault Detection and Diagnostic Methods for Fan Coil Units

Shokouh Pourarian, Student Member ASHRAE; Jin Wen, PhD, Member ASHRAE;

Daniel Veronica, PhD, PE, Member ASHRAE; Xiaohui Zhou, PhD, Member ASHRAE;

Ran Liu, PhD, Associate Member ASHRAE

SE-14-C013

Net-Zero Energy Impact Building Clusters Emulator for Operation Strategy Development

Xiwang Li, Student Member ASHRAE; Jin Wen, Member ASHRAE; Teresa Wu

SE-14-C014

Development of a Probabilistic Graphical Energy Performance Model for an Office Building

Zheng O'Neill, PhD, PE, Member ASHRAE

SE-14-C015

Refrigeration Systems Failures Due to Sudden Evaporation and Condensation Phenomena

Amir Jokar, PhD, PE, Member ASHRAE; Erik W. Christiansen, PhD, PE; Ali Reza, PE

SE-14-C016

Life Cycle Climate Performance Model for Transport Refrigeration/Air Conditioning Systems

Dennis Nasuta, Associate Member ASHRAE; Robert Srichai, Member ASHRAE; Ming Zhang, PhD, Member ASHRAE; Cara Martin, Associate Member ASHRAE; Jan Muehlbauer, Member ASHRAE

SE-14-C017

Stability of Candidate Lubricants for CO₂ Refrigeration

Ngoc Dung (Rosine) Rohatgi, PhD, Member ASHRAE

SE-14-C018

Concentration Measurement Technique of Binary Liquids Containing Colloidal Suspension of Nanoparticles

Fahar Maryam, Student Member ASHRAE; Otanicar Todd, PhD, Member ASHRAE

SE-14-C019

The Influence of Climate Conditions on Life Cycle Climate Performance of Low GWP Refrigerant Based Heat Pumps

Pavel Makhnatch; Rahmatollah Khodabandeh

SE-14-C020

Effect of the Setpoint Temperature on Indoor Thermal Comfort and Energy Demand in Office Building

Taeju Park; Doosam Song, PhD, Member ASHRAE; Kinam Kang, PhD, Student Member ASHRAE; Gyumin Kang, MD; Brain S. Kim, Member ASHRAE; Hyejung Cho, PhD; Sunggeun Song

SE-14-C021

The Impact of an ECM Blower on the System Performance of a Five-Ton Air Conditioner

Peng Yin, Student Member ASHRAE; James F. Sweeney, Associate Member ASHRAE;
Michael B. Pate, PhD, Member ASHRAE

SE-14-C022

Field Study of Performance, Comfort, and Sizing of Two Variable-Speed Heat Pumps Installed in a Single Two-Story Residence

Jeffrey D. Munk, Member ASHRAE; Adewale O. Odukamaiya; Anthony C. Gehl;
Roderick K. Jackson, PhD, Member ASHRAE

SE-14-C023

Optimal Model-Based Control of Chiller Tower Fan and Cooling Water Pump

O.A. Qureshi, Student Member ASHRAE; H. Javed, Affiliate Member ASHRAE; A. Afshari, PhD;
P.R. Armstrong, PhD, Member ASHRAE

SE-14-C024

Self-Configuration of Building Control System Using Knowledgebase

Yan Chen, Student Member ASHRAE; Stephen Treado, PhD, PE, Member ASHRAE

SE-14-C025

Principal Component Analysis for Building Combined Cooling, Heating, and Power Application Potential

Bo Lin, Student Member ASHRAE; James Freihaut, PhD, Member ASHRAE; Zhao Chen, PhD

SE-14-C026

Impacts of Climate Variability on Energy at a NASA Space Center

Lee DeBaillie, PE, Member ASHRAE; Scott Schuetter, PE, Member ASHRAE; Doug Ahl, PhD

SE-14-C027

Multizone Air Change and Airflow in Two Houses Under Operation of Different Whole-Building Ventilation Systems

Armin Rudd, Member ASHRAE

SE-14-C028

Multizone Particulate, Formaldehyde, and VOC Measurements in Two Lab Houses Under Operation of Different Whole-Building Ventilation Systems

Armin Rudd, Member ASHRAE

SE-14-C029

Eight Years of Operation of 615 Ton Geothermal Nursing Home in Northern Tier

Carl D. Orio, Member ASHRAE; Zach J. Patnaude, Student Member ASHRAE

SE-14-C030

Optimum Geothermal Performance via Predictive Modeling and Adaptive Control

Stephen Hamstra, PE, HBDD, Member ASHRAE

SE-14-C031

Case Study of a Heating Only Central GSHP System Using a Shallow Aquifer for a Warehouse

Xiaobing Liu, PhD, Member ASHRAE; Mini Malhotra, PhD, Associate Member ASHRAE;

Adam Walburger, PE, Associate Member ASHRAE; Bahman Habibzadeh, PhD

SE-14-C032

Commissioning, Monitoring, and Operator Training to Optimize Ground Heat Exchanger Performance

Ed Lohrenz, Member ASHRAE

SE-14-C033

Revisit of Energy Use and Technologies of High-Performance Buildings

Cheng Li, PhD; Tianzhen Hong, PhD, PE, Member ASHRAE

SE-14-C034

Energy Performance of Building Facades in the Hot Summer and Cold Winter Zone of China

Yun Zheng; Guoqing He, PhD; Sanming Zhang

SE-14-C035

Performance-Based Building System Evaluation for DOE Energy Asset Score

Supriya Goel, Associate Member ASHRAE; Na Wang, PhD; Michael Rosenberg, Member ASHRAE;

Vrushali Mendon, Associate Member ASHRAE

SE-14-C036

Advanced Lighting Controls: A New Frontier in Building Management Systems

Edwin (Chip) Poland

SE-14-C037

Building Enclosure Airtightness Testing in Washington State—

Lessons Learned about Air Barrier Systems and Large Building Testing Procedures

Denali Jones; Bailey Brown; Tony Thompson; Graham Finch, PEng, Member ASHRAE

SE-14-C038

Targeted Calibration of Energy Models for Existing Building

Ery Djunaedy, PhD, Member ASHRAE; Kevin Van Den Wymelenberg, PhD

SE-14-C039

Use Calibrated Whole Building Energy Model to Disaggregate Retrofit Savings for Two Medium Sized Office Buildings

Ke Xu, PhD, Member ASHRAE; James Freihaut, PhD, Member ASHRAE; Payam Delgoshaei, PhD, Member ASHRAE; Scott Wagner; Mark Stutman, Member ASHRAE

SE-14-C040

Case Study: Optimization of an Industrial Steam Boiler System Operation

Bei Zhang, PhD, Student Member ASHRAE; Yunhua Li, PhD, Student Member ASHRAE; Mingsheng Liu, PhD, PE, Member ASHRAE

SE-14-C041

Annual Daylight Glare Evaluation for Typical Perimeter Offices: Simulation Models versus Full-Scale Experiments Including Shading Controls

Ying-Chieh Chan, Student Member ASHRAE; Iason Konstantzos, Student Member ASHRAE; Athanasios Tzempelikos, PhD, Member ASHRAE

SE-14-C042

Transport of Respiratory Aerosols in Patient Corridors Subject to Directional and Nondirectional Airflow—A Case Study

Ehsan S. Mousavi, Student Member ASHRAE; Kevin R. Grosskopf, PhD, Member ASHRAE

SE-14-C043

Determining Annoyance Thresholds of Tones in Noise

Jennifer M. Francis, Student Member ASHRAE; Joonhee Lee, Student Member ASHRAE; Lily M. Wang, PhD, PE, Member ASHRAE

SE-14-C044

Field Study on Effectiveness of Periodic Reversible Supply Exhaust Ventilation Strategy

A. Osama; E.E. Khalil, PhD, Fellow ASHRAE; A. Medhat, PhD, Member ASHRAE; E. El Bialy, PhD

SE-14-C045

Effect of Wall Exhaust and Spill Locations on Indoor Air Quality in a Chemical Laboratory

Ayman A. Shaaban; Samy M. Morcos, PhD; Essam E. Khalil, PhD, Fellow ASHRAE; Mahmoud A. Fouad, PhD, Fellow ASHRAE

SE-14-C046

A New Hybrid Model for Borefield Heat Exchangers Performance Evaluation

Damien Picard; Lieve Helsen, PhD

SE-14-C047

The Effect of Natural Convection on Thermal Response Test

Wonjun Choi, Student Member ASHRAE; Ryoza Ooka, PhD, Member ASHRAE

SE-14-C048

Experimental Validation of a Numerical Model for the Thermal Response of a Borehole Field

Patricia Monzó, PE, Student Member ASHRAE; Félix Ruiz-Calvo, PE; Palne Mogensen; José Acuña, PhD; Carla Montagud, PhD

SE-14-C049

An Alternative to ASHRAE's Design Length Equation for Sizing Borehole Heat Exchangers

Mohammadamin Ahmadfard; Michel Bernier, PhD, PE, Member ASHRAE

SE-14-C050

Design Fires for Smoke Control Systems

John H. Klote, PE, DSc, Fellow ASHRAE

SE-14-C051

Results of Fire Experiments to Quantify Residential Design Fires

Alex C. Bwalya, PhD; Ahmed Kashef, PhD, PEng, Member ASHRAE; Gary Loughheed, PhD, Fellow ASHRAE

SE-14-C052

A Hand Calculation Method of Smoke Movement through a High-Rise Airtight Single Shaft

Dahai (Darren) Qi, Student Member ASHRAE; Liangzhu (Leon) Wang, PhD, Member ASHRAE; Radu Zmeureanu, PhD, Member ASHRAE

SE-14-C053

Development of Empirical Office Occupancy Profiles

Based on Information Technology Sensor Systems

Huafen Hu, PhD, Associate Member ASHRAE; Chad Miller

SE-14-C054

Wind-Driven Airflow through Building Openings:

Preliminary Experimental Results Using Particle Image Velocimetry

L. James Lo, PhD, Member ASHRAE

SE-I4-C055

Automatic Generation of 3D Thermal Maps of Building Interiors

Omar Oreifej, PhD; Jason Cramer; Avidah Zakhor, PhD

SE-I4-C056

Performance Study of an Underfloor Air Distribution System in an Education Building to Identify Building Energy Efficiency Improvement Opportunities

Juan Zhao, PhD, PE, Member ASHRAE; Vasilij Khmelenko, Student Member ASHRAE; David Claridge, PhD, PE, Member ASHRAE

SE-I4-C057

Improving EER with Off-Peak Radiant Cooling

David A. Springer, Member ASHRAE; Alea German, PE

SE-I4-C058

Investigating the Potential of Residential District Energy

Nelson Fumo, Member ASHRAE; Vicente Bortone, Member ASHRAE; Juan Zambrano, Member ASHRAE; Aleyani Zambrano

SE-I4-C059

Polymeric Hollow Fiber Heat Exchangers: Liquid-to-Gas Application

Ilya Astrouski, MD; Miroslav Raudensky

SE-I4-C060

A Comparison of Approaches to Stepwise Regression for the Indication of Variables Sensitivities Used with a Multiobjective Optimization Problem

Mengchao Wang, Student Member ASHRAE; Jonathan Wright, PhD, CEng, Member ASHRAE; Alexander Brownlee, PhD; Richard Buswell, PhD

SE-I4-C061

Residential HVAC Commissioning through Energy Consumption Data Analysis

Kristen Cetin, Student Member ASHRAE; Atila Novoselac, PhD, Member ASHRAE

SE-I4-C062

Corridor Pressurization System Performance in Multiunit Residential Buildings

Lorne Ricketts, Student Member ASHRAE; John Straube, PhD, PEng, Associate Member ASHRAE

SE-I4-C063

The Potential Energy Efficiency of a Hybrid Designed House: A Postoccupancy Case Study on the Heating and Cooling System

Shan He; Ulrike Passe, Associate Member ASHRAE

SE-14-C064

An Investigation into Retrocommissioning Effectiveness in Tropical Climates

Challa Venu Kumar, Member ASHRAE; Ljiljana Marjanovic-Halburd, PhD

SE-14-C065

**Using Thermal Mass and PCM to Shift Demand Off-Peak:
A Paradigm Shift in Cold Storage Design**

R. Gary Black, PE; Raymond D. Cole, PE, Member ASHRAE

SE-14-C066

Ambient Airborne Particle Concentrations in Hospital Inpatient Rooms

Larry Dlugosz, PhD, Member ASHRAE

SE-14-C067

**Advanced Nonintrusive Duct Lining Technology for Rehabilitation of Deteriorated Ducts
in Residential Buildings**

Ashis Kumar Roy; Chris Bartlette; Shaurav Alam; Erez Allouche; Ravi Gorthala

SE-14-C068

Airflow Perception and Draught Rating for Varying Thermal Conditions

Ahmet Ugursal, PhD; Louis G. Tassinary, PhD; Charles H. Culp, PhD, Fellow ASHRAE

SE-14-C069

Residential Split-System Performance in Utility Voltage Reduction Operation

Anish Gaikwad; John Bush, Associate Member ASHRAE; Tom Short; Ron Domitrovic, PhD, Member ASHRAE

SE-14-C070

Analysis of Flow and Sound Propagation in HVAC Ducts Using Two-Port Network Theory

Mina Wagih; Tamer Elnady, PhD; Mats Åbom, PhD

SE-14-C071

Smoke Management Systems Upgrades for I-90 Tunnels in Seattle

Igor Maevski, PhD, PE, Member ASHRAE; Robert Josephson, PE; Raymond Klein, PE, Member ASHRAE; Yuan Li, PE, Member ASHRAE; Jarrod Alston, PE, Member ASHRAE; Doug Haight, PE; Zak Griffith, PE

SE-14-C072

The Effects of Ventilation Systems on Fixed Fire Suppression Systems in Tunnels

David Hahm, Member ASHRAE; Yuan Li, PE, Member ASHRAE; Igor Maevski, PhD, PE, Fellow ASHRAE

SE-14-C073

**CFD Modeling of Moisture Transfer in Porus Material
Subject to Dynamic Change of Boundary Temperature**

Lei Chen; Chao-Hsin Lin, PhD, PE, Fellow ASHRAE; Jiusheng Yin; Shugang Wang, PhD;
Tengfei Zhang, PhD, Member ASHRAE

SE-14-C074

**An Evaluation of ASHRAE's Climatic Design Conditions
against Actual Long-Term Recorded Weather Data**

Yu Joe Huang, Member ASHRAE

SE-14-C075

Error Propagation in Commercial Building Load Calculation

Sergio Escobar-Vargas, PhD, Member ASHRAE; Amip Shah, PhD; Cullen Bash, Member ASHRAE;
Niru Kumari, PhD, Member ASHRAE

SE-14-C076

**Field Comparison Study of Indoor Environment Quality in Office Buildings
with Underfloor and Overhead Ventilation Systems**

Boualem Ouazia, PhD; Michel Tardif, PEng, Member ASHRAE; Alexandra Thompson, PhD; Daniel Booth, PEng

SE-14-C077

**Energetic, Environmental, and Economic Modeling
of a Solar-Assisted Residential Microtrigeneration System in a Mediterranean Climate**

Simon P. Borg, PhD, Member ASHRAE; Nicolas J. Kelly, PhD; Vincent Buhagiar, PhD

SE-14-C078

**A New Method of Near Real-Time Monitoring
of Residential Hot Water Distribution System Performance**

J.D. Lutz, PE, Member ASHRAE

SE-14-C079

A New Model to Simulate Energy Performance of VRF Systems

Tianzhen Hong, PhD, PE, Member ASHRAE; Xiufeng Pang, PhD, PE; Oren Schetrit; Liping Wang, PhD, PE;
Shinichi Kasahara; Yoshinori Yura; Ryohei Hinokuma

SE-14-C080

**Interpreting and Applying Cooling Tower Water Efficiency Design Recommendations
in Sustainable Building Codes**

Daryn S. Cline, Member ASHRAE

SE-14-C081

Ethical Practice for Consulting Engineers

Stephen W. Duda, PE, HFDP, HBDD, BEAP, Fellow ASHRAE

SE-14-C082

Verification of Energy Savings from the Implementation of the Residential Building Codes in Texas

Juan-Carlos Baltazar, PhD, PE, Member ASHRAE; Chunliu Mao, Student Member ASHRAE;

Jeff Haberl, PhD, PE, Fellow ASHRAE

Technical Papers

SE-14-001

Methods for Calculation of Evaporation from Swimming Pools and Other Water Surfaces

Mirza Mohammed Shah, PE, PhD, Fellow/Life Member ASHRAE

SE-14-002

Phase-Splitting Algorithm for Ice Slurry Heterogeneous-Flow Pressure Drop in Straight Pipe Flow

Shugang Wang, PhD; Yanjie Lv; Jihong Wang, PhD; Tengfei Zhang, PhD, Member ASHRAE

SE-14-003

Determination of the Effect of Humidity on the Probability of ESD Failure or Upset in Data Centers

Mahdi Moradian; Abhishek Patnaik; Yunan Han; Fayu Wan; David Pommerenke; David E. Swenson

SE-14-004

Staging Packaged Air-Conditioning Units to Improve Energy Efficiency and Humidity Control by Reducing Cycling Losses

Dustin Pohlman, PE, Associate Member ASHRAE; Abdul Qayyum Mohammed, Associate Member ASHRAE;

Seth Parker, Student Member ASHRAE; Kelly Kissock, PhD, PE, Member ASHRAE

SE-14-005

Engineering and Economic Analysis of Air Conditioners in the Kingdom of Saudi Arabia—Upgrading the Minimum Energy Performance Standards

John Proctor, PE, Member ASHRAE; Abram Conant, Associate Member ASHRAE

SE-14-006

Generalized Performance Maps for Single- and Dual-Speed Residential Heat Pumps

Simbarashe Nyika; Seth O. Holloway, Associate Member ASHRAE; W. Travis Horton, PhD, Member ASHRAE; James E. Braun, PhD, PE, Fellow ASHRAE

SE-14-007

Generalized Performance Maps for Variable-Speed, Ducted, Residential Heat Pumps

Simbarashe Nyika; Seth O. Holloway, Associate Member ASHRAE; W. Travis Horton, PhD, Member ASHRAE; James E. Braun, PhD, PE, Fellow ASHRAE

SE-14-008

Thermal Design of Window-Wall Interface in Wall Energy Retrofits Using High-Performance Vacuum Insulation

Jan Kosny, PhD, Member ASHRAE; Cezary Misiwopecki; Ali Fallahi, PhD, Associate Member ASHRAE; Nitin Shukla, PhD; William C. duPont, Member ASHRAE; Lawrence D. Carbary

SE-14-009

Experimental and Numerical Investigation of Surface Convection Enhancement by a V-Formation Delta-Winglet Array in a Developing Channel Flow

Jing He, PhD, Associate Member ASHRAE; Liping Liu, PhD, Associate Member ASHRAE; Anthony M. Jacobi, PhD, Fellow ASHRAE

SE-14-010

Energy Codes and the Evolution of Fenestration: 20 Years of NFRC Ratings in Seattle

John Hogan, PE, Member ASHRAE

SE-14-011

Temperature Trends for Locations Listed in the Tables of Climatic Design Conditions in the 2013 *ASHRAE Handbook—Fundamentals*

Didier Thevenard, PhD, PEng, Member ASHRAE; Mark W. Shephard

SE-14-012

Evaluation of the Thermal Performance of Two Nonstandard Borehole Configurations

Parham Eslami-nejad, PhD; Michel Bernier, PhD, PE, Member ASHRAE; Odile Cauret, PhD

SE-14-013

Effects of Unequal Borehole Spacing on the Required Borehole Length

Massimo Cimmino, Student Member ASHRAE; Michel Bernier, PhD, PEng, Member ASHRAE

SE-14-014

Quality Control Assessment of Vertical Ground Heat Exchangers

Jasmin Raymond, PGeo, PhD, Associate Member ASHRAE; Louis Lamarche, PE, PhD; Marc-André Blais, PE

SE-14-015

Effects of Weather Parameters on Vertical Ground Heat Exchanger Design

Farzin M. Rad, PEng, Member ASHRAE; Alan S. Fung, PhD, PEng, Member ASHRAE;

Wey H. Leong, PhD, PEng, Member ASHRAE

SE-14-016

Installation and Results of Variable-Frequency Drives at a Mid-Sized Power Generation Facility

Scott A. Achelpohl, PE; Jeffrey A. Green, Student Member ASHRAE; James A. Mathias, PhD, PE, Associate Member ASHRAE

SE-14-017

Virtual Flow Meter to Estimate the Water Flow Rates in Chillers

Eric McDonald, Student Member ASHRAE; Radu Zmeureanu, PEng, PhD, Member ASHRAE

SE-14-018

Analytical Expression for Transient Heat Transfer in Concrete Core Activation

Maarten Sourbron, PhD; Lieve Helsen, PhD; Martine Baelmans, PhD

SE-14-019

**An Absorption Chiller System Using Lithium Bromide and Water as Working Fluids:
Exergy Analysis**

S. Anand; A. Gupta; S.K. Tyagi; Y. Anand

SE-14-020

Deluge Evaporative Cooling Performance of Wavy Fin and Tube-Inclined Heat Exchangers

Sahil Popli, Student Member ASHRAE; Yunho Hwang, PhD, Member ASHRAE; Reinhard Radermacher, PhD, Fellow ASHRAE

SE-14-021

Condensing Boiler and Vapor Vacuum-Heating System Combo

Igor Zhadanovsky, PhD

SE-14-022

**Cost Efficiency Comparison for Hot-Water Condensing Boiler (HWCB)
and Vapor Vacuum Heating and Condensing Boiler (VVHCB) Combo**

Igor Zhadanovsky, PhD

SE-14-023

Numerical Study of a Ventilation System Based on Wall Confluent Jets

Setareh Janbakhsh, Student Member ASHRAE; Bahram Moshfegh

SE-14-024

Preliminary Test and Analysis of a Stirling-Engine-Based Residential Trigeneration System at TRCA Archetype Sustainable House

Navid Ekrami, Student Member ASHRAE; Zannatul Moiet Hasib; Seth B. Dworkin, PhD, PEng; Alan Fung, PhD, PEng, Member ASHRAE; David Naylor, PhD, PEng

SE-14-025

Characterizing Airflow and Power of VAV Series Fan-Powered Terminal Units from Component Data—Part I

Peng Yin, Student Member ASHRAE; Dennis L. O'Neal, PhD, PE, Fellow ASHRAE

SE-14-026

Characterizing Airflow and Power of VAV Series Fan-Powered Terminal Units from Component Data—Part II

Peng Yin, Student Member ASHRAE; Dennis L. O'Neal, PhD, PE, Fellow ASHRAE

SE-14-027

Improvement of Computational Relations for Fan Pressures in HVAC Systems

Mikhail Nudelman, Member ASHRAE; Ed Kernerman, PhD, PE

SE-14-028

**Analyzing the Effects of Airflow Disturbances on Measurement and Control Equipment Positioned Downstream and Close to an Air Duct Elbow—
For the Purpose of Optimizing System Performance Using a CFD Technique**

Ali M. Hasan, CEng, Member ASHRAE

SE-14-029

One- and Two-Time-Constant Models to Predict the Capacity of Geothermal Heat Pumps in Cycling Conditions

Demba Ndiaye, PhD, PE, Member ASHRAE; Michel Bernier, PhD, PE, Member ASHRAE

SE-14-030

Analysis of the Energy Performance and Control Optimization of a GSHP Installation

J. Cervera-Vázquez; C. Montagud, PhD; J.M. Corberán

SE-14-031

**Should the Optimization Horizon in Optimal Control
of Ground-Coupled Heat-Pump Systems Cover the Interseasonal Time Scale?**

Stefan Antonov; Clara Verhelst, PhD; Lieve Helsen, PhD

SE-14-032

**Experimental Validation of Ground Heat Exchanger Design Methodologies
Using Real, Monitored Data**

J.R. Cullin, Student Member ASHRAE; C. Montagud, PhD; F. Ruiz-Calvo; J.D. Spitler, PhD, PE, Fellow ASHRAE

SE-14-033

Reducing Energy in HVAC Engineering

K.H. Chan, PhD

SE-14-034

Sensor Data Management, Validation, Correction, and Provenance for Building Technologies

Charles C. Castello, PhD, Affiliate Member ASHRAE; Jibonananda Sanyal, PhD, Associate Member ASHRAE;
Jeffrey Rossiter; Zachary Hensley; Joshua R. New, PhD, Member ASHRAE

SE-14-035

**Energy Analysis, Optimal High-Limit Control and Engineering Approach
of Air-Side Economizers**

Gang Wang, PhD, PE, Member ASHRAE; Li Song, PhD, PE; Member ASHRAE

SE-14-036

**Matching Building Energy Simulation Results against Measured Data
with Weather File Compensation Factors**

L. Carl Fiocchi; Benjamin S. Weil, PhD, Member ASHRAE; Simi Hoque, PhD

SE-14-037

Business Value as the Driver for Management of Building Energy Assets

Niloofer Salahi; Khashayar Mahani; Jianmin Zhu; Mohsen A. Jafari, PhD; Yan Lu, PhD, Member ASHRAE;
Kaveh Gharieh; P.J. Winslow

SE-14-038

**Optimizing Building Energy Footprint Using Integrated Reliability
and EnergyPlus Simulation Approach**

Khashayar Mahani; Niloofer Salahi; Jianmin Zhu; Mohsen A. Jafari, PhD; Yan Lu, PhD, Member ASHRAE