

Dr. Iain Stuart Walker

Building Scientist

January, 2006

Education

- 1993 : Ph.D. in Mechanical Engineering, University of Alberta, Edmonton, Alberta, Canada.
- 1989 : M.Sc. in Mechanical Engineering, University of Alberta.
- 1986 : B.Sc. in Mechanical Engineering, University of Alberta.

EXPERIENCE

March 1995 to Present.

Staff Scientist, Energy Performance of Buildings Group, Indoor Environment Department, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720. (510) 486 4692.

My focus as a researcher is on projects related to energy use, moisture issues, comfort and health in buildings. I directly supervise a staff of four other researchers and several students, and direct the activities of several other EPB group members. I am active in education/mentoring of post-docs, graduate students, and undergraduates principally from the U.S., France and Germany.

Key research activities

Air, heat and moisture transport in residential buildings with a focus on ventilation and HVAC system performance. This includes: retrofits, diagnostics (duct leakage, air handlers, heating and cooling equipment, building envelope), performance of air handlers, longevity of duct sealants., thermal and moisture performance of attics, air flow resistance of ducts, air flow around buildings, residential infiltration, infiltration heat recovery and residential HVAC simulation. As a leading building science researcher I am active in changing building practice through work on:

- HVAC performance standards for EPA, ASHRAE and the state of California (Title 24).
- Technical support to code authorities and standards bodies for building energy codes, including development of ASHRAE and ASTM standards, technical support to the California Energy Commission for changes to the California Energy Code (Title 24).
- Authored Standards for ASTM and ASHRAE.
- Presentation of technical papers, seminars and technical sessions at ASHRAE, ACEEE, Affordable Comfort, Energy Efficient Builders Association and Building America meetings and other national and international conferences.

Other Experience

Buildings Energy Consultant: I have provided consulting services to many organizations including: ConSol., Building Science Corporation, IBACOS, Natural Resources Canada/SCANADA Consultants, Inc., XENERGY Inc., SYMBIOS Ecodesign and Construction, Steven Winter Associates, Inc., Sheltair Scientific, University of Waterloo.

Research Associate (1993-1995). Building Performance Laboratory, Institute for Research in Construction, National Research Council Canada, Ottawa, Ontario, Canada.

Visiting Scientist. Air Infiltration and Ventilation Centre, Coventry, England.

Research Assistant. Department of Mechanical Engineering, University of Alberta, Edmonton, Alberta, Canada.

Academic Awards

University of Alberta Alumni Association Horizon Award, 2003

LBNL Outstanding Performance Award, 2000

LBNL Environmental Energy Technologies Certificate of Merit, 1999

LBNL SPOT award, 1997

Best Paper at 15th AIVC conference, 1994

R.R. Gilpin Memorial Award for Excellence in Research, University of Alberta, 1992

ASHRAE graduate student grant in aid

NSERC summer research Scholarship

2 Dean of Engineering Undergraduate Research Awards (University of Alberta)

PROFESSIONAL ACTIVITIES

Executive Editor of Home Energy Magazine

I am responsible for technical content of Home Energy magazine (www.homeenergy.org), direction of other editorial staff, and oversight of administrative activities.

Member of ASHRAE:

Editor of Chapter 26 “Ventilation and Infiltration” of the ASHRAE Fundamentals Handbook

Committee member of ASHRAE TC 4.3 – Ventilation Requirements and Infiltration

TC 4.3 Handbook Sub-Committee Chair.

Committee member of ASHRAE TC 6.3 – Central Forced Air Heating and Cooling Systems

Committee member of ASHRAE 62.2, ASHRAE SSPC 169P – Weather data for Building Design Calculations, ASHRAE SPC 160P - Design Criteria for Moisture Control, ASHRAE SPC 90.2 Energy Efficient Design of New Low Rise Residential Buildings. Main contributor to ASHRAE Standard 152P “Method of Test For Determining the Design and Seasonal Efficiencies of Residential Thermal Distribution Systems”

Member of ASTM:

Task Group Chair and Editor of ASTM Standard E779 – “Determining Air Leakage Rate by Fan Pressurization”

Task Group Chair and Editor of ASTM Standard E1554 – “Determining External Air Leakage of Air Distribution Systems by Fan Pressurization”

Task Group Chair and Editor of ASTM E2342 - “Longevity Testing of Forced Air Duct System Sealants”

Service to educational/governmental agencies

I have provided technical advice on a wide range of building related issues (focusing on energy use and moisture problems) and provided guidance on research planning and program funding for the following agencies: U.S. Department of Energy, U.S. Environmental Protection Agency, California Energy Commission, California Institute for Energy Efficiency, Building America Teams, Ohio Office of Energy Efficiency, and the North West Energy Alliance.

Services as a Reviewer (Partial List)

Archival Journals and Books:

Energy and Buildings, ASHRAE HCAC&R Research Journal, ASHRAE Transactions, ASHRAE Journal, Indoor Air, ASTM Moisture Analysis For Buildings Handbook, ASME Publications

Other:

DOE STTR and SBIR research awards, American Council for an Energy Efficient Economy Summer Studies, ASHRAE/DOE/BTECC Thermal Performance of the Exterior Envelopes of Buildings Conferences, ASHRAE Standards, ASTM Standards, California Energy Commission Energy Innovations Small Grant Program, ASHRAE Sponsored Research

SELECTED PUBLICATIONS

- Walker, I.S. and Sherman, M.H. 2006. Evaluation of Existing Technologies for Meeting Residential Ventilation Requirements. LBNL 59998.
- Walker, I.S. and Sherman, M.H. 2006. Ventilation Requirements in Hot Humid Climates. Proc. 15th Symposium on Improving Building Systems in Hot Humid Climates. Florida Solar Energy Center and Texas A&M University. LBNL 59889.
- Walker, I.S. and Lutz, J.D. (2005). Laboratory Evaluation Of Residential Furnace Blower Performance. LBNL 58742. <http://epb1.lbl.gov/Publications/lbnl-58742.pdf>
- Walker, I.S. (2005). The State of the Art in Residential Air Handler Performance. LBNL 57330. <http://epb1.lbl.gov/Publications/lbnl-57330.pdf>
- Walker, I.S. and Sherman, M.H. (2005). "Duct Tape and Sealant Performance". ASHRAE Journal, February 2005, ASHRAE, Atlanta, GA. LBNL 57225.
- McWilliams, J.A. and Walker, I.S. 2005. Renovating Residential HVAC Systems. Home Energy Volume 22.1, January/February 2005. HomeEnergy, Berkeley, CA.
- Walker, I.S., Forest, T.W. and Wilson, D.J. (2005), "An Attic-Interior Infiltration and Interzone Transport Model of a House", Building and Environment, Vol. 40, Issue 5, pp. 701-718, Elsevier Science Ltd., Pergamon Press, U.K.
- Abushakra, B., Walker, I.S. and Sherman, M.H. (2004), "Compression Effects on Pressure Loss in Flexible HVAC Ducts", International Journal Of HVAC&R Research, July, 2004, ASHRAE, Atlanta, GA. LBNL 49012.
- Dickerhoff, D.J., Walker, I.S. and Sherman, M.H. (2004), "Validating and Improving the DeltaQ Duct Leakage Test", ASHRAE Transactions Vol. 110, Pt. 2., pp.741-751, ASHRAE, Atlanta, GA. LBNL 53959.
- Walker, I.S. (2004), "Improving Air Handler Efficiency in Houses", Proc. ACEEE Summer Study 2004, ACEEE, Washington, DC, LBNL 54760.
- Mc Williams, J.A. and Walker, I.S. (2004), "A System Approach to Retrofitting HVAC Systems", Proc ACEEE Summer Study 2004, ACEEE, Washington, D.C., LBNL 54696
- Walker, I.S., Sherman, M.H. and Dickerhoff, D.J. (2004), "Reducing uncertainty for the DeltaQ duct leakage test", Proc. ASHRAE/DOE/BTECC Thermal Performance of the Exterior Envelopes of Buildings IX, ASHRAE, Atlanta, GA. LBNL 53549.
- Siegel, J.A., McWilliams, J.A., and Walker, I.S. (2003). "Comparison Between Predicted Duct Effectiveness from Proposed ASHRAE Standard 152P and Measured Field Data for Residential Forced Air Cooling Systems". ASHRAE Trans., Vol. 109., Pt.1, pp. 503-512, ASHRAE, Atlanta, GA. LBNL 50008.
- Walker, I.S. and Sherman, M.H., (2003), Sealant Longevity for Residential Ducts, *Durability of Building and Construction Sealants and Adhesives, ASTM STP 1453*, A. Wolf Ed., American Society for Testing and Materials, West Conshohocken, Pa. LBNL 50189.
- Walker, I.S. and Wray, C.P. (2003). "Evaluation of Flow Capture techniques for Measuring HVAC Grille Airflows". ASHRAE Transactions, , Vol. 109, Pt. 2, pp. 380-392, ASHRAE, Atlanta, GA. LBNL 51550.
- Walker, I.S. and Sherman, M.H. (2003). Heat Recovery in Building Envelopes. Proc. AIVC BETEC Conference, Washington, DC, October 2003. INIVE eeg, Brussels, Belgium. LBNL 53484.
- Walker, I.S. and Sherman, M.H., (2003), Sealant Longevity for Residential Ducts, *Durability of Building and Construction Sealants and Adhesives, ASTM STP 1453*, A. Wolf Ed., American Society for Testing and Materials, West Conshohocken, Pa. LBNL 50189.
- Walker, I.S. and M.D. Mingee. (2003). "Reducing Air Handler Electricity Use: More Than Just a Better Motor". Home Energy Magazine. , Vol. 20 No.6, November/December 2003. Energy Auditor and Retrofitter, Berkeley, CA.
- Walker, I.S. (2003). "Garbage Bags and Laundry Baskets". Home Energy Magazine, Vol. 20 No.6, November/December 2003. Energy Auditor and Retrofitter, Berkeley, CA.

Walker, I.S. and Sherman, M.H. (2003). "Ventilation Technologies Scoping Study". LBNL 53811.

Siegel, J. and Walker, I.S. (2003). "Integrating Ducts into the Conditioned Space: Successes and Challenges". Proc. Architectural Engineering Institute Conference, Austin TX., September 2003.

Walker, I.S. and Sherman, M.H. (2002) "An Easier Way to Measure Duct Leaks", Home Energy Magazine, Vol. 19, No. 5, September/October 2002

Walker, I.S., Dickerhoff, D.J. and Sherman, M.H. (2002). "The DeltaQ Method of Testing the Air Leakage of Ducts". Proc. ACEEE Summer Study 2002, American Council for an Energy Efficient Economy, Washington, D.C. LBNL 49749.

Wray, C.P., Walker, I.S. and Sherman, M.H., (2002). "Accuracy of Flowhoods in Residential Applications". Proc. ACEEE Summer Study 2002, American Council for an Energy Efficient Economy, Washington, D.C. LBNL 49697.

Abushakra, B., Walker, I. and Sherman, M. (2002). "A Study of Pressure Losses in residential Air Distribution Systems". Proc. ACEEE Summer Study 2002, American Council for an Energy Efficient Economy, Washington, D.C. LBNL 49700.

Siegel, J.A., Walker, I.S. and Sherman, M.H. (2002). "Dirty Air Conditioners: Energy Implications of Coil Fouling". Proc. ACEEE Summer Study 2002, American Council for an Energy Efficient Economy, Washington, D.C. LBNL 49757.

Siegel, J.A. and Walker, I.S. (2001). "Deposition of Biological Aerosols on HVAC Heat Exchangers". Proc. IAQ 2001 Moisture, Microbes and Health Effects: Indoor Air Quality and Moisture in Buildings. ASHRAE, Atlanta, GA. LBNL 47669.

Sherman, M.H. and Walker, I.S. (2001). "Heat Recovery in Building Envelopes". Proc. Thermal Performance of Exterior Envelopes of Buildings VIII. ASHRAE, Atlanta, GA. LBNL 47329.

Tenwolde, A. and Walker, I.S. (2001). "Interior Moisture Design Loads for Residences ". Proc. Thermal Performance of Exterior Envelopes of Buildings VIII. ASHRAE, Atlanta, GA.

Walker, I.S., Siegel, J.A., Degenetais, G. (2001). "Simulation of Residential HVAC System Performance". Proc. ESIM2001 Conference, pp. 43-50. CANMET Energy Technology Centre/Natural Resources Canada, Ottawa, Ontario, Canada. LBNL 47622.

Walker, I.S. (2001). Sensitivity of Forced Air Distribution System Efficiency to Climate, Duct Location, Air Leakage and Insulation. LBNL-43371.

Siegel, J., Walker, I. and Sherman, M. (2000). "Delivering Tons to the Register: Energy Efficient Design and Operation of Residential Cooling Systems". Proc. ACEEE Summer Study 2000. American Council for an Energy Efficient Economy. (LBNL 45315)

Walker, I.S., and Sherman, M.H., (2000), "Assessing the Longevity of residential Duct Sealants", RILEM 3rd International Symposium: Durability of Building and Construction Sealants, February 2000 (LBNL 43381).

Walker, I.S. and Wilson, D.J., (1998), "Field Validation of Equations for Stack and Wind Driven Air Infiltration calculations", ASHRAE HVAC&R Research Journal, Vol. 4, No. 2, April 1998, ASHRAE, Atlanta, GA.

Walker, I.S., Brown, K., Siegel, J. and Sherman, M.H., (1998), "Saving Tons at the Register", Proc. ACEEE 1998 Summer Study. Vol. 1, pp. 367-384. American Council for an Energy Efficient Economy, Washington, D.C. LBNL 41957.

Walker, I.S., Wilson, D.J., and Sherman, M.H., (1997), "Does the Power Law Rule for Low Pressure Building Envelope Leakage". Proc. 17th AIVC Conference, Gothenburg, Sweden. Air Infiltration and Ventilation Centre, Coventry, UK.

Jump, D.A., Walker, I.S. and Modera, M.P., (1996), "Field Measurements of Efficiency and Duct Retrofit Effectiveness in Residential Forced Air Distribution Systems.", Proc. ACEEE 1996 Summer Study, Vol. 1 pp. 147-156. American Council for an Energy Efficient Economy, Washington, D.C. LBNL 38537.

Walker, I.S., Modera, M.P., Tuluca, A. and Graham, I., (1996), "Energy Effectiveness of Duct Sealing and Insulation in Two Multifamily Buildings", Proc. ACEEE 1996 Summer Study, Vol. 1., pp.247-254. American Council for an Energy Efficient Economy, Washington, D.C. LBNL 38538.

- Walker, I.S., Forest, T.W. and Wilson, D.J., (1995), "A Simple Calculation Method for Attic Ventilation Rates", Proc. 16th AIVC Conference, Vol. 1, pp. 221-232, Air Infiltration and Ventilation Centre, Coventry, UK.
- Walker, I.S., and Wilson, D.J., (1994), "Practical Methods for Improving Estimates of Natural Ventilation Rates", Proc. 15th AIVC Conference : The Role of Ventilation, Buxton, U.K., September 1994. (Presented by ISW, Best Paper Award).
- Forest, T.W., and Walker, I.S., (1993), "Moisture Dynamics in Residential Attics", Proc. CANCAM '93, Queens University, Kingston, Ontario, Canada, June 1993.
- Forest, T.W., and Walker, I.S., (1993), "Attic Ventilation and Moisture", Canada Mortgage and Housing Corporation report.
- Walker, I.S., (1993), "Attic Ventilation, Heat and Moisture Transfer", Ph.D. Thesis, University of Alberta Dept. Mech. Eng., Edmonton, Alberta, Canada.
- Forest, T.W., and Walker, I.S., (1992), "Attic Ventilation Model", Proc. ASHRAE/DOE/BTECC 5th Conf. on Thermal Performance of Exterior Envelopes of Buildings, pp. 399-408. ASHRAE, Atlanta, GA.
- Wilson, D.J., and Walker, I.S., (1992), "Feasibility of Passive Ventilation by Constant Area Vents to Maintain Indoor Air Quality in Houses", Proc. Indoor Air Quality '92, ASHRAE/ACGIH/AIHA Conf., San Francisco, October 1992. ASHRAE, Atlanta, GA.
- Wilson, D.J., and Walker, I.S., (1991), "Wind Shelter Effects for a Row of Houses", Proc. 12th AIVC Conf., Ottawa, Ontario, Canada. Vol. 1., pp. 335-346. Air Infiltration and Ventilation Centre, Coventry, U.K.
- Forest, T.W., and Walker, I.S., (1991), "Field Study on Attic Ventilation and Moisture", Proc. CANCAM '91, University of Manitoba, Winnipeg, Canada.
- Wilson, D.J. and Walker, I.S., (1991), "Passive Ventilation to Maintain Indoor Air Quality", University of Alberta Dept. of Mech. Eng. Report # 81.
- Forest, T.W., Walker, I.S., and Checkwitsch, K., (1991), "Moisture Accumulation in a Building Envelope - Final Report - The AHHRF 1989-1990 Heating Season", University of Alberta Dept. of Mech. Eng. Report #80.
- Walker, I.S., and Wilson, D.J., (1990), "Including Furnace Flue Leakage in a Simple Air Infiltration Model", Air Infiltration Review, September 1990, Vol.11, No.4, Air Infiltration and Ventilation Centre, Coventry, England.
- Wilson, D.J., and Walker, I.S., (1990), "Combining Air Infiltration and Exhaust Ventilation", Proc. Indoor Air '90, July 1990, Toronto, Canada. pp.467-472.
- Walker, I.S., and Wilson, D.J., (1990), "The Alberta Infiltration Model, AIM - 2", University of Alberta Dept. Mech. Eng. Report #71.
- Forest, T.W. and Walker, I.S., (1990), "Drying of Walls - Prairie Region", CMHC report.
- Walker, I.S., (1989), "Single Zone Air Infiltration Modeling", M.Sc. Thesis, University of Alberta Dept. Mech. Eng., Edmonton, Alberta, Canada.
- Many of these publications are downloadable from: http://epb1.lbl.gov/EPB/Publications/pub_index.html*