

CONTENTS

Host Chapter: New York	x
Program Committee and Transactions Staff	x
State of the Society Report by Frederick H. Kohloss	xi
Plenary Address by Donna R. Fitzpatrick	xiii
Abstracts	xvi

TECHNICAL PAPERS

FIRST TECHNICAL SESSION

3013	Resistance to Flow of Round Galvanized Ducts (RP-383) by E.I. Griggs, W.B. Swim, and G.H. Henderson	3
3014	Evaluation of Numerical Methods for Ductwork and Pipeline Optimization by R.J. Tsal and M.S. Adler	17
3015	Thermodynamic Properties of Lithium Bromide/Water Solutions by K.E. Herold and M.J. Moran	35
3016	Effects of the Natural Convection in a Partially Supercooled Water Cell on the Release of Supercooling by T. Kashiwagi, S. Itoh, Y. Kurosaki, and S. Hirose	49
3017	Effectiveness of Finned-Tube Heat Exchanger Coated Hydrophilic-Type Film by M. Mimaki	62

SECOND TECHNICAL SESSION

3018	Climatic Indicators for Estimating Residential Heating and Cooling Loads by J. Huang, R.L. Ritschard, J.C. Bull, and L. Chang	72
3019	Estimation of Average-Day Solar Heat Gain Factors by A.S. Lau	112
3020	Experimental Study of Heat Transfer in Attics with a Small-Scale Simulator by S. Katipamula, D. O'Neal, W.D. Turner, and W.E. Murphy	122
3021	A Simplified Estimation Method in Calculating Cooling and Heating Degree Hours by H.T. Lin, K.H. Yang, and R.C. Su	135
3022	Experimental Determination of the Z-Transfer Function Coefficients for Houses by S.A. Barakat	146

THIRD TECHNICAL SESSION

3023	Demand-Controlled Economizers by S.T. Tom and K.H. Hawks	162
3024	Measurement of Combustion Products from Kerosene Space Heaters in a Two-Story House by G.T. Tamura	173
3025	Research Requirements in the Evaporative Cooling Field by R.H. Turner and F.C. Chen	185
3026	Operating Experience of Plant Sizing and Controls by R.W. John and A.C. Salvidge	197
3027	Application of Numerical Simulation for Residential Room Air Conditioning by K. Yamazaki, M. Komatsu, and M. Otsubo	210

FOURTH TECHNICAL SESSION

3028	Precision and Correlation of Instruments that Measure Heat Transfer through Windows by M. Grasso, P.E. Horridge, E. Woodson, and S. Khan	226
3029	The Impact of Glazing Orientation, Tilt, and Area on the Energy Performance of Room Apertures by J.W. Place, J.P. Coutier, M.R. Fontoynt, R.C. Kammerud, B. Andersson, W.L. Carroll, M.A. Wahlig, F.S. Bauman, and T.L. Webster	238
3030	The Experimentally Measured Performance of a Linear Roof Aperture Daylighting System by F.S. Bauman, J.W. Place, B. Andersson, J. Thornton, and T.C. Howard	259
3031	A Study of the Effects of Window Night Insulation and Low-Emissivity Coating on Heating Load and Comfort by A.K. Athienitis and J.D. Dale	279
3032	Efficiency of a Solar Collector with Internal Boiling by D.A. Neeper	295
3033	Experiences with Heat Meters for Evaluating Performance of Active Solar Energy Systems by G.R. Guinn, Sr. and R. Quick	310

FIFTH TECHNICAL SESSION

3034	Characterizing Losses in Reversing Valves: Heat Transfer Losses by G. Damasceno, H. Nguyen, W. Lee, V.W. Goldschmidt, and L. White	327
3035	The Effect of Void Fraction Correlation and Heat Flux Assumption on Refrigerant Charge Inventory Predictions by C.K. Rice	341
3036	An Analysis of Choked Flow Conditions in a Capillary Tube-Suction Line Heat Exchanger by M.B. Pate and D.R. Tree	368
3037	Predicting Vibration and Noise Generated from Refrigerator Tubes by K. Nakanishi, K. Nagayasu, and T. Suzuki	381
3038	A Survey of Refrigerant Heat Transfer and Pressure Drop Emphasizing Oil Effects and In-Tube Augmentation (RP-469) by L.M. Schlager, M.B. Pate, and A.E. Bergles	392

SIXTH TECHNICAL SESSION

3039	An Approach to the Verification of Simple Building Energy Analysis Computer Programs by G.K. Yuill and C.P. Wray	417
3040	Verification of a Microcomputer Program Implementing the Mitalas Below-Grade Heat Loss Model by G.K. Yuill and C.P. Wray	434
3041	Dynamic Insulation Systems and Energy Conservation in Buildings by N.R. Bailly	447
3042	An Experimental Study of a Multipurpose Commercial Building with Three Different Heating Systems by R.R. Trewin, F.M. Langdon, R.M. Nelson, and M.B. Pate	467
3043	Energy Characteristics of a Residential Masonry Structure by L.W. Kostiuk and J.D. Dale	482

SEVENTH TECHNICAL SESSION

3044	Subjective Human Response to Low-Level Air Currents and Asymmetric Radiation (RP-353) by L.G. Berglund and A.P.R. Fobelets	497
3045	Airflow Characteristics in the Occupied Zone of Ventilated Spaces by H. Hanzawa, A.K. Melikow, and P.O. Fanger	524
3046	Physical Causes for Draft: Some New Findings by E. Mayer	540
3047	Evaluation of Built Environment from the Thermal Comfort Viewpoint by Z. Yilmaz	549
3048	Thermal Comfort Requirements During the Summer Season in Japan by S.I. Tanabe, K.I. Kimura, and T. Hara	564

EIGHTH TECHNICAL SESSION

3049	Electrical Energy Consumption and Demand Reduction Using Heat Pump Controls by D.G. Colliver, G.M. White, and L.W. Turner	578
3050	Field Testing of Electric Heat Pumps and Gas Furnaces by D.R. Brewster	588
3051	Development of a Heat Pump Heating, Cooling, and Hot-Water-Generating System with Refrigerant Mixture by N. Tanaka, M. Ikeuchi, H. Iijima, M. Endo, and F. Kasahara	601
3052	A Prototypical Direct-Expansion Solar Heat Pump System by Y. Shinobu, K. Matasuki, and M. Yoshikawa	615
3053	Examination of the Feasibility of an Earth Coolant Tube to Provide Residential Space Cooling by W.J. Bowman and P.J. Bishop	626

SYMPOSIUM PAPERS

NY-87-01	NEW DEVELOPMENTS IN VOC EMISSION CONTROL	
	Low-Energy Solvent Recovery from Carbon Adsorption Beds by J. Gronvaldt and D. Dietrich	645
	Air Pollution Control Using an Inert Gas Regenerated Carbon Bed by H.V. Rothman	651
	Commercial Regeneration Experience for Catalysts in Air Pollution Control Applications by R.M. Heck, M. Durilla, A.G. Bouney, and J.M. Chen	657
	New Technology for VOC Emission Control by R.L. Benamy	677
NY-87-02	STRATIFIED CHILLED AND HEATED WATER STORAGE: DESIGN AND OPERATING EXPERIENCE	
	Operating Experience with a Large Thermally Stratified Chilled-Water Storage Tank by C.S. Trueman	697
	Influence of Discharge Characteristics on Design of Chilled Water Storage by E.I. Mackie	708
	Office Building Chilled Water Storage System by T. Okajima	722
	Results from Operation of a Large Membrane Stratified Cool Storage System with Heat Recovery by R.K. Tackett	728
NY-87-03	GROUND COUPLING CALCULATION METHODS	
	Calculation of Below-Grade Residential Heat Loss: Low-Rise Residential Building by G.P. Mitalas	743
	F-Factor Correlations for Determining Earth Contract Heat Loads by D.S. Parker	784
	Estimating 3-D Heat Loss from Rectangular Basements and Slabs Using 2-D Calculations by G.N. Walton	791
NY-87-04	INDUSTRIAL APPLICATIONS OF APPLIED HEAT PUMPS	
	Closed-Cycle Heat Pumps in Industry by D.K. Miller	801
	How to Retrofit Heat Pumps to Evaporators by B. Yundt	810
	The Role of the Consultant in Marketing Industrial Heat Pumps by R.C. Niess and J.S. Gilbert	824
	The Utility's Role in the Industrial Application of Applied Heat Pumps by F.J. Pucciano	830
NY-87-05	COMPUTERS IN UNIVERSITY HVAC EDUCATION	
	Refrigerant Property Routines for HVAC and Thermodynamics Classes by W.E. Murphy and D.G. Colliver	839
	Introduction to the Computer ERA through HVAC Education by P. Damshala	850
	Spreadsheet Analysis of Laboratory Data by D.P. Lyons, W.J. Wepfer, and R.L.T. Oehmke	860
	An Interactive Computer Program for Analyzing Refrigeration Cycles in HVAC Courses by T.E. Smith, R.M. Nelson, and M.B. Pate	870
	Effects of Personal Computers on HVAC Instruction at a University by H.G. Lorsch	883

NY-87-06	GROUND COUPLING CALCULATION METHODS AND APPLICATIONS	
	Measurement and Prediction of Insulated and Uninsulated Basement Wall Heat Losses in a Heating Climate by M. Ackerman and J.D. Dale	897
	Procedure for Determining the Optimum Foundation Insulation Levels for New, Low-Rise Residential Buildings by J.E. Christian and W.R. Strzepek	909
	Bridge Deck Heating with Ground-Coupled Heat Pipes: Analysis and Design by J.E. Nydahl, K. Pell, and R. Lee	939
NY-87-07	ENERGY MANAGEMENT	
	Monitoring and Control Capabilities of Energy Management Systems in Large Commercial Buildings by H. Akbari, M. Warren, and J. Harris	961
	Waste-to-Heat Incineration for Hospitals by V.A. Williams	974
	An Expert System for Building Energy Consumption Analysis: Prototype Results by J.S. Haberl and D.E. Claridge	979
	Energy Analysis for Renewable Energy Technologies by F. Kreith, R.E. West, and C.J. Cleveland	999
	Federal Research and Development on Energy Efficiency: A \$50 Billion Contribution to the U.S. Economy by A.H. Rosenfeld, H. Geller, J.P. Harris, and M. Levine	1011
NY-87-08	HVAC IS FOR PEOPLE	
	Human Response to Hot Environments: A Comparison of ISO and ASHRAE Methods of Assessment by K.C. Parsons	1027
	Thermal Comfort: Advantages and Deviations by T.M. Nelson, T.H. Nilsson, and G.W. Hopkins	1039
	Measurement and Prediction of the Insulation Provided by Bedding Systems by E.A. McCullough, P.J. Zbikowski, and B.W. Jones	1055
	Thermal Comfort: A New Approach for Subjective Evaluation by J.E. Laviana and F.H. Rohles, Jr.	1069
	Comfort Education for Energy Conservation by R.B. Hayter	1080
NY-87-09	RELIABILITY AND MAINTENANCE OF RESIDENTIAL HEATING AND COOLING SYSTEMS	
	Heat Pump Service Life and Compressor Longevity in a Northern Climate by K.A. Pientka	1087
	Heat Pump Compressor Life in Alabama by C.C. Hiller and N.C. Lovvorn	1102
	Survey of Residential Air-to-Air Heat Pump Service Life and Maintenance Issues by J.E. Lewis	1111
	Cost of Servicing Heat Pumps in Alabama by N.C. Lovvorn, A.A. Bartolucci, and R. Birch	1128
NY-87-10	COMPONENT IMPROVEMENTS FOR UNITARY HEAT PUMPS	
	Rotary Compressor Design Evolution for Heat Pump Application by T.R. Barratt and E.J. Murzinski	1139
	An Overview of the Four-Way Refrigerant Reversing Valve by G.D. Black	1147
	Heat Pump Defrost Controls: A Review of Past, Present, and Future Technology by R.L. Eckman	1152
	Heat Transfer: A Contemporary Analytical Tool for Developing Improved Heat Transfer Surfaces by C.H. Bemisderfer	1157
	Motors: Technology and Manufacturing Improvements in Fan Motors in the Air-Conditioning Industry by H.E. Fischer	1168
NY-87-11	RADIANT HEATING AND COOLING	
	Engineering Principles Support an Adjustment Factor When Sizing Gas-Fired Low-Intensity Infrared Equipment by N.A. Buckley and T.P. Seel	1179
	A Computer Program for Radiant Cooling of High Bay Buildings by J.B. Olivieri and T. Singh	1192
	The Effect of Wall Reflectivity on the Thermal Performance of Radiant Heating Panels by J.H. Saunders and J.W. Andrews	1217
	Development of a Standard Test Method for Measurement of the Radiant Heat Output of Gas-Fired Infrared Heaters by T.S. Zawacki, V. Huang, and R.A. Macriss	1226
NY-87-12	EVAPORATIVE AIR CONDITIONING: AN EFFICIENT COOLING ALTERNATIVE	
	Nationwide Evaporative Cooling is Here! by J.R. Watt	1237
	Investigation of a Plate-Type Indirection Evaporative Cooling System for Residences in Hot and Arid Climates by H. Wu and J.I. Yellott	1252
	Indirect Evaporative Cooler Performance by D.R. Crum, J.W. Mitchell, and W.A. Beckman	1261
NY-87-13	HVAC APPLICATIONS IN PHARMACEUTICAL FACILITIES	
	Energy Conservation for Pharmaceutical Manufacturing Facilities Using Recirculated Air by A.S. Accatatta	1279
	Facility Microbiological Test Procedures by E.L. Galson	1289
	Air Movements—The Dispersion of Pollutants: Studies with Visual Illustrative Methods by B. Ljungqvist ..	1304
	Enthalpy Recovery in Low-Humidity Pharmaceutical Clean Rooms by M. Viscovich	1319
NY-87-14	MULTIZONE INFILTRATION: MULTIZONE MEASUREMENTS, AND DATA FROM MEASUREMENTS AND MODELS	
	Approaches to Estimating Airflows in Large Multifamily Buildings by D.L. Bohac, G.S. Dutt, and D. Feuermann	1335
	Airtightness Testing Methods for Row Housing by J.A. Love and R.S. Passmore	1359

	Measurement of Air Change Rate in an Inhabited Building with a Constant Tracer Gas Concentration Technique by C. Roulet and J.L. Scartezzini	1371
	Predicting a Time-Varying Flow Rate Using the Constant Concentration and Decay Technique by M.G. Sandberg	1381
	Spread of Gas in Buildings Exposed to Poisonous Outdoor Air by P.O. Nylund	1394
NY-87-15	FENESTRATION PERFORMANCE WITH LOW-E COATINGS AND FILMS—PART 1	
	Field Measurement of Thermal and Solar/Optical Properties of Insulating Glass Windows by M.E. McCabe and D. Hill	1409
	Experimental Verification of a Model of Heat Transfer through Windows by D. Arasteh, J. Hartmann, and M. Rubin	1425
	Thermal Performance Measurements of Sealed Insulating Glass Units with Low-E Coating Using a Mobile Field Test Facility by J.H. Klems and H. Keller	1432
NY-87-16	NEW HEATING AND COOLING SYSTEM TEST INFORMATION	
	Measured Cooling Performance of Central Forced-Air Systems and Validation of the SP43 Simulation Model by K.E. Herold, R.D. Fischer, and L.J. Flanigan	1443
	Air-Conditioning and Heat Pump Operating Cost Savings by Maintaining Coil Cleanliness by B.C. Krafthefer, D.R. Rask, and U. Bonne	1458
	Laboratory Examination and Seasonal Analysis of Frosting and Defrosting for an Air-to-Air Heat Pump by W.A. Miller	1474
	Residential Gas Furnace Retrofit in 150 Homes in Illinois by R.A. Macriss, T.S. Zawacki, and J.T. Cole	1490
	Experimental Validation of the Duct Submodel for the SP43 Simulation Model by F.E. Jakob, R.D. Fischer, and L.J. Flanigan	1499
NY-86-17	FENESTRATION PERFORMANCE WITH LOW-E COATINGS AND FILMS—PART 2	
	Low-E Films for Window Energy Control by R.R. Dahlen	1517
	Residential Heating and Cooling Energy Cost Implications Associated with Window Type by R. Sullivan and S. Selkowitz	1525
	The Relative Benefits of Low-Emissivity Windows for Florida Residences by H.K. Vieira	1540
	Effects of Low-Emissivity Glazings on Energy Use Patterns in Nonresidential Daylighted Buildings by G. Sweitzer, D. Arasteh, and S. Selkowitz	1553
NY-87-18	MONITORING PROTOCOLS	
	Results-Oriented Methodology for Monitoring HVAC Equipment in the Field by P.J. Hughes, R.E. Hough, R.J. Hackner, and W.E. Clark	1569
	Commercial Building Energy Use Monitoring for Utility Load Research by R.P. Mazzucchi	1580
	Monitoring Methodology for the Energy Edge by C.M. Gardner and L.A. Lambert, II	1597
	A Data Specification Guideline for DOE's Single-Family Building Energy Retrofit Research Program by M.P. Ternes	1607
	A Uniform Procedure for the Development and Dissemination of Building Monitoring Protocols by H.P. Misuriello	1619
NY-87-19	DUTY CYCLING OF RESIDENTIAL HEAT PUMPS, AIR CONDITIONERS, AND FURNACES	
	Project H.E.A.T.: Residential Duty Cyclers Demonstration by A.D. Bournakis and J.M. Porterfield	1633
	On the Use of Duty Cyclers in Residential HVAC Systems by V.W. Goldschmidt	1652
	Duty Cycling of Residential HVAC Equipment: A Manufacturer's Perspective by J.G. Crawford	1665
	Another Aspect of Duty Cycling: Effects on Indoor Humidity by M.K. Khattar, M.V. Swami, and N. Ramanan	1678
	A Study of the Preprogrammed Thermostat Timer as a Load Control Device by M. Thedford and M.L. Wallace	1688
NY-87-20	INTERNATIONAL OVERVIEW: FROM WASTE TO ENERGY FOR DISTRICT HEATING AND COOLING	
	Municipal Solid Wastes as Additional Fuel in Fluidized Bed Boilers by A. Jahkola, O. Forsen, E. Moilanen, and O. Lehtonen	1701
	County Waste-to-Energy Facility by R.E. Evenson and R.S. Miller	1710
	Olmsted County, Minnesota, Waste-to-Energy Facility by J.W. Booty	1722
	Heat Pricing and Tariff Policies in District Heating Supplied from Waste Incineration by H.J. Christiansen ..	1731
NY-87-21	NON-AQUIFER SEASONAL ENERGY STORAGE	
	Developing an Innovative Building Cooling Technology by E.L. Morofsky	1741
	Design and Operation of an Ice Pond for Cooling a Large Commercial Office Building by A.E. McGarity, D.L. Kirkpatrick, and L.K. Norford	1749
	Annual Cycle Ice Production and Storage by C.E. Francis and R.T. Tamblyn	1760
	Charging and Discharging Long-Term Ice Storage by C.D. MacCracken and B.M. Silveti	1766
NY-87-22	BUILDING SYSTEMS AND COMPONENT DYNAMICS	
	Dynamic Performance of PI Controllers: Experimental Validation by D.P. Mehta	1775
	Models for Variable-Speed Centrifugal Chillers (RP-409) by J.E. Braun, J.W. Mitchell, S.A. Klein, and W.A. Beckman	1794
	Recursive Estimation Methods Applied to a Single-Zone HVAC System by X.M. Li and W.J. Wepfer	1814
	Performance and Control Characteristics of a Large Cooling System (RP-409) by J.E. Braun, J.W. Mitchell, S.A. Klein, and W.A. Beckman	1830

The Results of Dynamic Interactions of Occupants and Passive Solar Technologies in a Small Commercial Building
by W.M. Kroner 1853

NY-87-23 REVITALIZATION OF STEAM SYSTEMS FOR DISTRICT HEATING AND COOLING

The Changing Market for District Heating by R.D. Feldman and N.P. Rogers 1869
 Revitalization of St. Louis and Baltimore District Heating Systems by W.T. Schmidt and B. Mitchell 1874
 Expansion of Nashville's Refuse-Fired District Heating and Cooling System and Addition of Cogeneration by
 C.W. Chambliss, D.E. Nichols, J.J. Wimberly, III 1887
 Environmental Regulation of New or Modified Energy Facilities for District Heating by M.L. Wollschlager .. 1897

SOCIETY BUSINESS

ASHRAE Officers, Directors, Committeemen and Staff 1915
 ASHRAE Chapter Officers 1918
 ASHRAE Past Meetings 1920
 Society Presidents 1921
 ASHRAE Honors and Awards 1922
 ASHRAE Intersociety Representatives 1928
 ASHRAE International Associates 1929
 Index of Technical and Symposium Papers, Volume 93, Part 1 1931