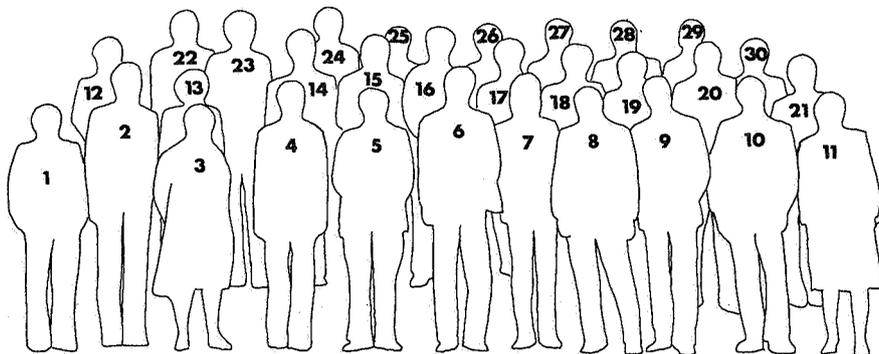
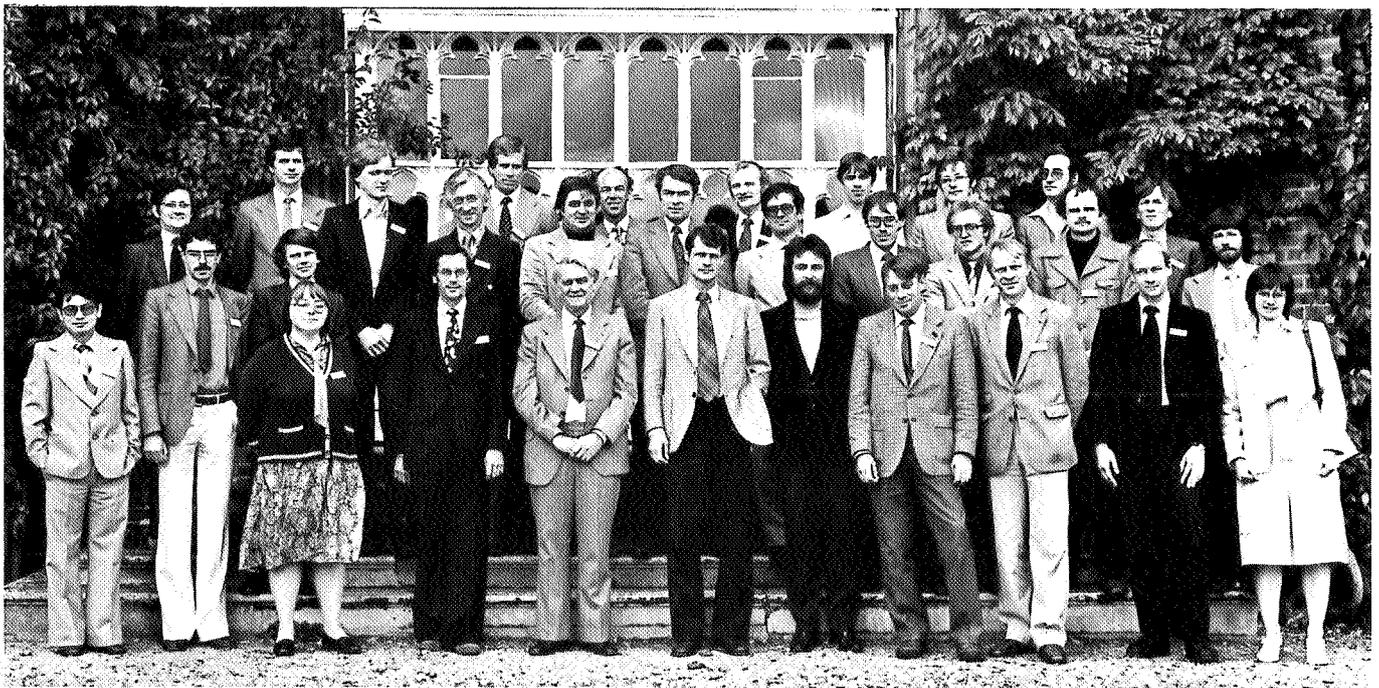


Air Infiltration Review

a quarterly newsletter from the IEA Air Infiltration Centre

Vol. 2 No. 1 November 1980

Delegates at 1st AIC Conference



- | | | |
|---------------------|------------------------|----------------------|
| 1. Chia Shaw | 11. Sheila Manning | 21. Martin Liddament |
| 2. Gabriel Huber | 12. Peter Warren | 22. Willem de Gids |
| 3. Carolyn Allen | 13. Peter Robertson | 23. Hans Phaff |
| 4. Peter Jackman | 14. Brian Warren | 24. Steve Irving |
| 5. James Dick | 15. Dick Grot | 25. Peter Hartmann |
| 6. Peter Collet | 16. David Harrje | 26. Gordon Kennedy |
| 7. Rod Gale | 17. Michele Cali | 27. Robert Scott |
| 8. Per Olof Nylund | 18. Thomas Baumgartner | 28. Brian Webb |
| 9. Arne Elmroth | 19. Per Levin | 29. Max Sherman |
| 10. Johnny Kronvall | 20. Rob Dumont | 30. David Etheridge |

1st AIC Conference

'Instrumentation and Measuring Techniques'

October 6-8, 1980

Cumberland Lodge, Windsor, UK

Air infiltration was much in evidence at the first AIC conference—it featured prominently not only in the content of the proceedings, but also as the result of fortuitous gale-force winds which revealed some deficiencies in the air-tightness of the 111 year old conference centre!

The conference, attended by 32 delegates representing all of the participating countries, was formally opened by Peter Coles, the Director of the Building Services Research and Information Association (BSRIA) which operates the AIC. In welcoming the attendees, he outlined the important role played by BSRIA in furthering the knowledge and proper application of engineering services in buildings.

The principal guest was James Dick who retired in 1979 after 10 years as Director of the Building Research Establishment (UK). His pioneering work in the 1940's and 1950's on ventilation rate measurement in houses is widely acclaimed as the inception of modern infiltration studies in dwellings. In his keynote address, James Dick recalled those early days of experimental work, the tracer-gas and other measurement techniques involved and the lessons learned from the problems encountered.

One was impressed by the careful, methodical way in which the research was conducted. Although nowadays the available instrumentation is much more advanced and sophisticated, there is still the need for the comprehensive attention to detail evident in the original studies.

A lively discussion followed the presentation of papers on the alternative tracer-gas methods of measuring air exchange rates. There were some who favoured the decay-rate method and others who advocated the use of constant concentration or constant flow-rate methods. It was apparent that the suitability of each method depended on the type of application and the intended use of the measured data.

Further papers described equipment for the long-term automatic measurement of ventilation rates and techniques for leakage testing of small and large buildings by pressurisation. Another subject which generated considerable debate was the prediction of infiltration rates from data derived from leakage tests. More work is evidently required before conclusive relationships can be derived.

Descriptions of alternative methods of measuring rapidly fluctuating velocities were given—one based on hot-wire anemometry and the other on a pressure sensor. Projects for determination of odour production rates and concentrations were outlined in a paper which also described an experimental facility for evaluating the odour perceptions of people. Noses will be used as sensory detectors!

On the final morning of the conference, participants were taken to the AIC itself and shown a demonstration of *AIRBASE*, the newly established bibliographic database on air infiltration and related subjects. The results of the AIC survey of on-going research were also described. In addition, some of BSRIA's other activities in the international field of research and information services were presented.

The proceedings of the conference will be published in the near future. Details will be circulated as soon as they become available.

2nd AIC Conference

Arrangements are currently being made for a conference to be held at the Royal Institute of Technology in Stockholm, Sweden from 21-23 September 1981. The conference will be directly related to the international handbook on the design of buildings for minimum air infiltration which is now being compiled. The following subjects will be considered:

- Building design
- Infiltration and ventilation
- Energy conservation
- Methods of calculation
- Site measurement techniques

Look out for more details in the next issue of AIR.

AIC-TN-1-80—The AIC's First Technical Note

A current problem in air infiltration research is to assess the relative importance of components of a building shell as routes of infiltrating air. The AIC's first technical note briefly reviews published work on the problem and gives a table of results analysed by type of building and method used.

Future technical notes will include reviews and bibliographies of topics of current interest in air infiltration.

Air Infiltration Research Survey

The survey of current research into air infiltration in buildings has now been published as AIC Technical Note No. 2 (AIC-TN-2-80) and is available to organisations in participating countries. As part of the 'exchange of information arrangement', contributors from non-participating countries will be receiving a listing of the research summaries.

The report is based on a total of 68 research summaries received from organisations in 15 countries. Each summary gives a brief description of research currently taking place, its expected duration and a list of associated published papers. In the first part of the report the replies to the survey are summarised in terms of specific objectives, project details and parameters with which air infiltration is related. These results are presented in tabular form and serve as an index to the research summaries which are reproduced in full in the second part of the report. An index of organisations submitting replies and an index of principal researchers is included.

The research summaries are stored on computer in an AIC database and a structured retrieval service is available to organisations in participating countries. Please contact AIC giving brief details of your area of interest. This database will be updated as new information comes to light and the full survey will be repeated next year.

Both the above Technical Notes are available direct from the AIC.

Technical Visits in the UK

The programme of technical visits by staff of the Air Infiltration Centre continued in August with a visit by Martin Liddament and Carolyn Allen to the British Gas Corporation's Research Establishment at Watson House, London and to the South Eastern Gas (SEGAS) Central Laboratories, London (where ventilation studies sponsored by Watson House are carried out). The visit was hosted by Dr David Etheridge of British Gas and by Dr Rodney Gale of SEGAS.

The work of the British Gas Corporation in air infiltration research was first discussed. There then followed an inspection of the British Gas test house in which the equipment for the automatic monitoring of individual room fresh air ventilation rate was demonstrated. This equipment, known as 'Autovent', was developed by the British Gas Corporation and is a computer-controlled tracer gas injection/sampling system. The tracer gas concentration in each room of the house is measured sequentially and is maintained at a constant concentration. The fresh air infiltration into each room along with the relevant temperature and weather data is recorded at half hourly intervals.

The pressure generated on the external fabric of the test house due to the action of wind was determined from wind tunnel tests on a 1/200 scale model of the house and its surroundings within a radius of 200 metres. A course grid and array of plastic bricks, positioned upwind of the model was used to generate the necessary scale of turbulence.

The visit ended with a demonstration of the British Gas mathematical model for calculating ventilation. Input requirements for the multi-cell model include weather data and the desired air temperature of each room. Output includes ventilation rate and the energy consumption needed to maintain the required internal air temperatures.

A technical visit was made in September to the Building Research Establishment, Garston, where Carolyn and Martin had detailed discussions on air infiltration research with Dr Peter Warren and Dr Earle Perera. The visit included a demonstration of the automatic instrumentation, developed by BRE, to measure the pressure acting on the external surfaces of wind tunnel models of buildings. The model on show was of a house in Bracknell, UK, on which actual pressure measurements have been made by staff of the Building Services Research and Information Association (BSRIA). The field measurements are shortly to be compared with the wind tunnel results.

Up-to-date information on the air infiltration research of British Gas and BRE was included amongst the papers presented at the AIC Conference in October.

Forthcoming Conferences



1. The UK Chartered Institute of Building Services (CIBS) are holding a one-day seminar 'Natural Ventilation by Design' on 2nd December, 1980.

The papers include:

A review of ventilation requirements.
Natural ventilation principles.
Ventilation measurement in housing.
Problems in commercial and industrial ventilation.
Natural ventilation in the P.S.A. estate.
Natural ventilation in the modern hospital.



2. ASHRAE semiannual meeting, Chicago, USA. January 26-29, 1981.
3. I.E.A. Conference 'New Energy Conservation Technologies'. West Berlin, 6-10 April, 1981 (see accompanying details).
4. 'Comparative experimentation of low energy houses' Université de Liège, 6-8 May, 1981.

Information from:

Dr Albert Dupagne
Laboratoire de Physique du Bâtiment
Université de Liège
Avenue des Tilleuls 15
B-4000 Liège
Belgium



5. ASHRAE semiannual meeting, Cincinnati, USA. June 28-July 2, 1981.

Symposium on the Design of Insulated Buildings and their Services

This symposium was organised by the UK Chartered Institution of Building Services and held at their headquarters in London. There were presentations on the design of the building envelope for energy conservation, the use of thermal insulation to improve energy consumption, the client's viewpoints regarding energy-effective buildings and heating systems for insulated buildings.

The effects of excessive air infiltration on energy consumption featured widely in the presentations and discussion.

A bound volume containing the papers presented at this symposium is available at £4.50 to members of CIBS and at £5.00 for non members from:

The Accounts Department
The Chartered Institution of Building Services
Delta House
222 Balham High Road
London SW12, UK.

IEA Conference on New Energy Conservation Technologies. Berlin, 6–10 April, 1981

In April 1981, the IEA is sponsoring a major conference on energy conservation. The conference will present and provide a forum for discussion of recent results of energy conservation research, development, and demonstration (R, D&D) in the industrialized countries, both within the IEA R, D&D programme and in national programmes. These results will be related to their future applications and market prospects in national economies.

Information from:

Congress Organisation Company
Postfach 696
Berlinerstr. 175
D 6050 Offenbach am Main 4
Federal Republic of Germany

Programme

Monday 6 April (afternoon) — Opening Plenary

- Welcoming address by the Governing Mayor of Berlin
- Addresses by energy Ministers and IEA officials
- Certainties and doubts about reversible cycles and energy conservation; an engineer's point of view
- The IEA R, D&D Group Strategy

Tuesday 7 April — End Use Sector Sessions

Three parallel sessions on:

- residential/commercial/communities
- industrial
- transportation

end-use sectors, covering:

- current energy consumption in the industrialized countries and conservation potential.
- current government energy conservation programmes and policies
- current and near-term markets for existing and advanced technologies; impacts on national economies
- future R, D&D requirements to expedite market development

Wednesday — Thursday 8-9 April

Technology Application and "Cross Cutting" Sessions: 20 parallel sessions with papers on R, D&D results and commercialization prospects:

- 15 specific technology-application areas
- 5 "cross cutting" areas involving more than one technology or end-use sector

Friday 10 April (morning) — Closing Plenary

Panel discussions led by end-use sector session chairmen. The Closing Plenary will be the climax of the conference allowing debate among those who presented the end-use sector conservation requirements at the outset of the conference and those who presented the R&D results available to meet these requirements. Together these groups will define future R&D or policy needs.

Social Programme and Site Visits

(to be announced later)

Technology Application Sessions

- Heating plants and commercial buildings
- Indoor air quality and infiltration measurements and control
- Heat pumps for residential and commercial buildings
- Thermal storage in residential and commercial buildings
- Retrofits to residential and commercial building envelopes
- Low-energy building design including passive solar
- Planning and control of air-conditioning systems for commercial buildings
- Alternative fuels
- Heat pumps in industry and power generation
- Heat recovery and recuperation in industry and power generation
- Industrial process development and control
- Urban waste
- Combined heat and power in industrial applications
- Energy storage for transportation and power generation
- Combustion research for improved IC engine economy

Cross-Cutting Sessions

- District heating applications including combined heat and power generation and new technologies
- Advanced cycles for power generation
- Management of distributed power sources in the electric power grid
- More energy-efficient cities and communities
- Reduced energy consumption in passenger transportation

Recent Acquisitions

The following papers have recently been acquired by the Air Infiltration Centre's library:

1. Brunsell, J.T. and Uvsløkk, S.
Boligers lufttethet
(Airtightness of buildings)
Norges Byggforskningsinstitutt Report No. 31, 1980
ISBN 82-536-0125-5
= AIC Translation No. 7

Presents the results of a major airtightness survey carried out on Norwegian dwellings using pressure tests (in Norwegian and English).
2. Evans, R.A. and Lee, B.E.
Some observations on the problem of defining mean wind speeds representative of flow over urban and suburban terrain.

Dept. of Building Science, University of Sheffield
Report No. BS52, January, 1980.

Assesses mean wind structure using wind tunnel modelling techniques. Concludes that a representative mean wind speed can only be defined for heights considerably in excess of 10m.
3. Moul, A. and Dean, R.B.
CAFE—A computer program to calculate the flow environment.
CAD80—4th International Conference on Computers in Design Engineering, Brighton, 1980.
4. Smay, V.E.
Plugging all those heat leaks can cause home pollution.
Popular Science, October 1980, Vol. 217, No. 4, p76—77.

Briefly outlines the problems from air pollution that can arise when a house is tightly built.
5. Hand, A.J.
Blow out stale air but save the heat.
Popular Science, October 1980, Vol. 217, No. 4, p77—79, 162.

Describes use of domestic air-to-air heat exchangers and discusses the efficiency of three commercially available heat exchangers.
6. Jardinier, P.
Ventilation et transparence a l'air des habitations. (Ventilation and permeability of dwellings).
Cahiers Techniques du Bâtiment, No. 27, Feb/Mar 1980 = AIC Translation No. 5.

Discusses the causes and paths of air infiltration.
7. Design of insulated buildings and their services. Proceedings of CIBS Symposium, 23 September, 1980, London, 55pps.

Contains 6 papers about the energy conscious design of buildings.

THE AIR INFILTRATION CENTRE was inaugurated through the International Energy Agency and is funded by eight of the member countries:

Canada, Denmark, Italy, Netherlands, Sweden, Switzerland, United Kingdom and United States of America.

The primary role of the Air Infiltration Centre is the technical support of active research in air infiltration in buildings. Its main aim is to bring the prediction of air infiltration rates and the associated energy implications up to a level comparable with that developed for other energy transfer processes in buildings.

Representatives and Nominated Organisations

Participant	Steering Group Representative	Other Nominated Organisations		
Canada	R. Dumont, Division of Building Research, National Research Council, Saskatoon, Saskatchewan, Canada S7N 0W9. (Tel: 306-655-4204) (Telex: 2107 62459)	J. Shaw, Division of Building Research, National Research Council, Ottawa, Canada, K1A 0R6.		
Denmark	P. F. Collet, Technological Institute Gregersensvej, DK 2630 Tastrup, Denmark. (Tel: 02-996611) (Telex: 33416)			
Italy	M. Cali, Istituto di Fisica Tecnica, Politecnico di Torino, Corso Duca degli Abruzzi, 24, 10129 Torino, Italy. (Tel: 011-537353) (Telex: 220646)	Roberto Zecchin, Istituto di Fisica Tecnica Universita degli Studi Via Marzolo, 9/11, 35100 Padova, Italy.	Walter Esposti, ICITE, Viale Lombardia, 49, Fraz. Sesto Ulteriano, 20098 S. Giuliano Milanese (M1), Italy.	
Netherlands	W. de Gids, Institute for Environmental Hygiene—TNO, P.O. Box 214, Delft, Holland. (Tel: 015-569330) (Telex: 38071)			
Sweden	L. Sundbom, Swedish Council for Building Research, St. Göransgatan 66, S-112 30 Stockholm, Sweden. (Tel: 08-540640) (Telex: 10398)	A. Elmroth, Royal Institute of Technology, Division of Building Technology, Fack, S-100 44 Stockholm, Sweden. (Tel: 08-787 70 00) (Telex: 10389)		
Switzerland	P. Hartmann, EMPA, Section 151, Ueberlandstrasse, CH 8600 Duebendorf, Switzerland. (Tel: 01-8234251) (Telex: 53817)			
The Oscar Faber Partnership (UK)	D. Curtis, The Oscar Faber Partnership, Marlborough House, Upper Marlborough Road, St. Albans, Herts, AL1 3UT. Great Britain. (Tel: 0727-59111) (Telex: 889072)	G. J. Kennedy, ETSU, AERE, Harwell, Oxon, OX11 0RA, Great Britain. (Tel: 0235-834621) (Telex: 83135)	P. Robertson, BSRU, University of Glasgow, 3 Lilybank Gardens, Glasgow, Great Britain. (Tel: 041-334-2269) (Telex: 778421)	BSRIA, Old Bracknell Lane, Bracknell, Berks RG12 4AH, Great Britain. (Tel: 0344-25071) (Telex: 848288)
USA	H. Ross, Department of Energy, Buildings Division, Mail Stop GH-068, 1000 Independence Avenue S.W., Washington D.C. 20585, USA. (Tel: 202/252-9191) (Telex: 255 710 822 0176)	R. Grot, Building Thermal & Service Systems Division, Centre for Building Technology, National Bureau of Standards, Washington D.C. 20234, USA. (Tel: 301/921-3560)	D. T. Grimsrud, Energy & Environment Division, Building 90, Room 3078, Lawrence Berkeley Laboratory, Berkeley, California 94720, USA. (Tel: 415/486-4023) (Telex: 255 910 386 8339)	Dr D. Harrje, Centre for Energy & Environmental Studies, Princeton University, Princeton, New Jersey 08544, USA. (Tel: 609-452-5190/5467)



Published by

Air Infiltration Centre
Old Bracknell Lane
Bracknell
Berkshire RG12 4AH
Great Britain

Tel: National **0344 53123**
International +44 344 53123

Telex: 848288 (BSRIAC G)

Head of AIC: Peter J. Jackman
BTech CEng MIMechE MCIBS

ISSN: 0143-6643