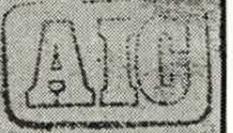


**WARNING:** Buildings may seriously damage your health. This was the message that greeted delegates at a recent conference on indoor air pollution in London sponsored by Vent Axia. Professor Peter Burberry of the University of Manchester Institute of Science and Technology (UMIST) and a speaker at the conference said, "Serious consequences to a comparatively small number of people will certainly occur. "But of more immediate concern is the reduction in well-being and productivity that can assail a much larger number." IAN VALLELY reports on the conference.

# Warning — indoor air pollution can seriously damage your health



WHAT is air pollution? asked Frank Latham, technical sales manager of Vent-Axia. "The term itself is fairly self-explanatory — the pollution of the air we breathe inside buildings, whether they be our homes, offices or public places," he said. The pollutants, he said, included condensation from washing and drying

clothes, combustion from gas cookers and cooking smells, aerosol propellants, solvents from polishes and adhesives, chemicals from paints, woodworm eradication, dusts, smoking, micro organisms, breathing and perspiring. "As if that weren't enough we encounter additional pollutants when we enter the office. Solvents

and thinners, heat and paper dusts from photocopiers, facsimile machines and telexes, as well as the problems associated with some air conditioning, and toxic emissions from the building structure itself," he said. Added to all of these were formaldehyde, carbon monoxide, asbestos fibres and radon, a naturally

occurring radioactive gas which emanates from granite soil areas. "Given that on average we spend 70% of our time indoors, affected by some or all of these pollutants, the problem begins to become apparent," said Mr. Latham. Moving onto the question of who indoor pollution effects, Mr. Latham

said, "The answer, I fear, is everyone." He said that radon could, in extreme cases, cause lung cancer. "Of the radon found in buildings, 50% percolates through ground slab, 25% is due to masonry in the construction and the remaining 25% comes in through air infiltration." Mr. Latham said that areas most at risk were parts of Scotland and South West England where there was a high presence of igneous rock. "In these areas radon levels can be as high as 100 times the normal level, and this represents an equivalent risk to smoking 10 cigarettes a day.

can exist? "In recent years the increased cost of heating buildings has encouraged draught proofing, double glazing and more efficient insulation, all of which have resulted in a dramatic reduction in natural ventilation and air movement in the indoor environment," Mr. Latham argued. And, he said, modern living had produced a whole new range of pollutants.

"The result of these developments is an indoor environment which can be highly dangerous and even lethal to its occupants." But, ventilation could do a lot to alleviate the problem. Air conditioning was one solution but "it is essential that air conditioning units are carefully selected and properly maintained if they are not to cause indoor quality problems through their very presence."

Although mechanical ventilation did not treat the air it could give localised control of the intake and extraction of fresh air with "very minimal" heat loss. "This can provide the solution to the majority of indoor pollution problems," Mr. Latham said.

Deaths "The National Radiological Protection Board suggests that 700 deaths a year can be attributed to radon," he said. Formaldehyde could cause nausea and nose bleeding while dust harboured germs which could cause asthma, sinus trouble and sore throats, he said. And passive smoking was a risk to health. "Dr. Michael Russell of the Addiction Research Unit of the Institute of Psychiatry, London, estimates that 1,000 non-smokers may die from lung cancer every year through inhaling other people's cigarette smoke."

Minimum He said that the absolute minimum acceptable figures which Vent Axia believed should be set down in the Building Regulations were: Kitchens — 10 air changes per hour (ACH); Bathrooms/sanitary accommodation — 6 ACH; Habitable rooms — 1.5 ACH; Offices — 6 ACH.

But the figures currently in the Building Regulations were: Kitchens—3 ACH; Bathrooms/sanitary accommodation 3 ACH; Habitable rooms — 1 ACH; Offices—not stated. Mr. Latham criticised these figures for being too low and it wasn't made clear whether these were minimum or maximum figures anyway. "What is more, they are not mandatory," he said.

Dangerous "In the case of office environments, those buildings seriously affected by indoor pollution of one form or another are often known as 'sick buildings'," he added. "When, then, do people suffer the effects?" Mr. Latham asked. "Since we spend around 70% of our lives indoors, we are almost constantly at risk," he said. And why does the prob-

lem exist? Professor Peter Burberry of UMIST described the place of ventilation in the history of buildings and how this showed up in the factors affecting ventilation rates. He highlighted seven areas:

- The 1965 Building Regulations said that no flues or vents were necessary so ventilation from these sources was inhibited.



It's facts like these that, in a recent research, made Selkirk come out clear leaders in technical advice, price, delivery and quality among contractors and specifiers.

WITH YOUR REPUTATION AND JOB PROFITABILITY AT STAKE, CAN YOU AFFORD TO CHOOSE ANYTHING LESS THAN SELKIRK?

In prefabricated chimney systems SELKIRK set the standards.

**SELKIRK** SET THE STANDARDS

Bassett House, High Street, Banstead, Surrey SM7 2LZ. Tel: 07373 53388.

A HOUSEHOLD

INTERNATIONAL COMPANY

Please send me full details of the 'Selkirk' product range and service.

Name: \_\_\_\_\_

Position: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Postcode: \_\_\_\_\_

Telephone: \_\_\_\_\_

For more details circle 18

AC 1598

● Energy conservation calls for draughts to be removed so there is a propensity, nowadays, for sealed windows.

● Night ventilation, common in days gone by, is now not so prevalent.

● The dense, airtight construction of modern buildings.

● Weatherstripping.

● Security, which dictates that windows remain closed.

● Modern flueless heating or balanced flues which do not drain air from the interiors of buildings.

Dr. Sherwood Burge, consultant physician at Solihull Hospital pointed out the main symptoms of "building sickness". These were, he said, headache, a feeling of lethargy or tiredness, itchy or runny eyes, blocked or runny nose, dryness of the throat, wheezing and breathlessness and, occasionally, a flu-like illness (Humidifier Fever).

He quoted examples of a study he is carrying out in association with Building Use Studies Ltd. The examples seemed to show

that people were generally more affected with building sickness symptoms when at work.

Dr. Burge said that there were four possible causes of building sickness:

- The individual may be blamed.
- Something the person is working with — vdu, photocopier, correcting fluid etc.
- The way the person is employed — the organisational structure.
- Trouble with the building.

Part of Dr. Burge's study indicated that alcohol, smoking, age and status were not very important factors in general susceptibility.

The only significant factors seemed to be job category and sex — females suffered more than males (about one third more on average).

Dr. Burge suggested that job category could be tied in with sex — most typists and clerks (the lower end of

### Category

the scale) were females in the study.

Two companies in the same building were also compared. The work-related symptoms were almost the same, suggesting the possibility that the building was involved rather than the way the companies operated.

Dr. Burge said that more symptoms seemed to occur in air conditioned offices than in naturally ventilated offices.

Sheena Wilson, a sociologist and co-founder of Building Use Studies Ltd, gave details of a major study of employee health and well being in office buildings with different types of ventilation systems.

The study was carried out by a multi-disciplinary team — Ms Wilson's company; Robert Mathew; Johnston Marshall (architects and engineers); Aston University, and Solihull Hospital.

### Surveyed

It surveyed 4,300 office workers in 28 organisations in 46 buildings and broadly established the incidence of building illness symptoms.

Ms Wilson said that the building sickness was caused by indoor air pollution. She said that other possibilities were:

- People simply didn't like being heated by air being blown at them.
- Radiant cold producing discomfort. In other words, in an evenly heated office, the people closest to the window were liable to be colder even if the ambient temperature was normal because of radiant heat loss.

Local heating and cooling because of bad design.

Ms Wilson said that, often, when the heating system was specified, no account was taken of the alteration in air currents caused the people themselves, which could affect the way heating was designed.

- Overheating.
- Claustrophobia, perhaps caused by tinting on windows giving a distorted view of the outside world.
- Uniform lighting, which was unnatural.

Stress, perhaps caused by the individual's inability to control his environment.

A speaker from the floor said that a static environment with evenly controlled heating, lighting, air flow, humidity etc was unnatural and could therefore have some effect on the individual's perception and, hence, how he or she felt.

Professor Burberry said that it was also important for people to understand the operation of sophisticated heating controls that were manufactured nowadays — a lot of people didn't understand them and could not, therefore, adequately control their environment.

Professor Alex Hardy from the University of Newcastle-upon-Tyne said that, following the 1973 oil crisis, there was a need to consider how building energy consumption could be reduced — at that time, he said, some 50% of all UK prime energy was consumed by building environmental services.

Initially thermal insulation standards were improved.

But, "It was soon discovered that predicted energy savings were not achieved in practice and investigations showed that

one of the major factors was the energy loss by infiltration."

This, Professor Hardy said, led to buildings being constructed as airtight as possible which in turn led to means of ventilation being considered — natural or mechanical.

"The popularity of natural ventilation, particularly in multi-storey buildings, declined rapidly as space heating systems became thermostatically controlled."

### Excessive

"The reason for this being that local overheating, usually by solar radiation, resulted in the occupants opening the windows, with the result that there was excessive heat loss and energy consumption."

And, he said, open windows at ground level may be acceptable but in higher buildings wind speeds could be excessive.

"There was therefore an increase in the use of mechanical ventilation and in order to reduce energy consumption, the quality of fresh air as a proportion of recirculated air was reduced."

"It was this action on energy conservation that created the condition now known as the 'sick building syndrome'."

Professor Hardy concluded that the sick building syndrome was caused by a reduction of fresh air input into well-sealed buildings causing increased air pollution by recirculated air.

"If, therefore, this problem is to be avoided then the proportion of fresh air must be increased in relation to the proportion of recirculated air."

"To avoid the energy penalty of increased fresh air proportion the only answer is to install a heat recovery air system."

Peter Austwick of the Robens Institute, University of Surrey said that epidemiology was proving helpful in finding deviations from what was normal in buildings.

Epidemiology is the branch of medical science concerned with epidemic diseases.

Mr. Austwick identified five respiratory diseases associated with air conditioning:

- Legionnaires' Disease.
- Work-related asthma.
- Extrinsic allergic alveolitis — Hypersensitive pneumonitis.
- Sick building syndrome.
- Humidifier Fever.

"Microbiological factors hardly come into the consideration of the planners but have now been shown to play major roles in the air conditioning problems associated with Legionnaires' Disease and with Humidifier Fever," he said.

"Infection by Legionella pneumophila," he continued, "from airborne cooling tower effluent and the deep-seated lung allergy (extrinsic allergic alveolitis) of Humidifier Fever from humidifier sprays are the result of the inhalation of bacteria containing living microbial metabolites respectively."

He said that studies which he and his colleagues had undertaken into microbial contamination in air conditioning revealed patterns "not the least of which is that the heaviest growth contains the greatest number of species and produces the greatest occupational hazard in exposed people."

### Analogy

But, where the sick building syndrome came into "this microbial milieu" had yet to be deduced.

"Certainly humidification appears to increase the incidence of some of the complaints eg, nasal and eye symptoms, of headaches and dry skin, but whether microbial growth is implicated has yet to be determined," he said.

Sir Hugh Rossi MP, chairman of the Select Committee on the Environment, related "what we have heard to what the Government might do about it."

He used the analogy of outdoor air pollution. Atmospheric conditions in 1952 led to a four-day smog in London which caused

turn to page 11

## The New Turner NIBBLER

H.S. SWG SHEET METAL CUTTING HEAD TO 13 SWG PLASTICS (INC. 16 SWG M.S.I.)



● All British design and manufacture

● Corrugated and non-corrugated sheet metal, rubber sheets and cuts in a single pass and cuts with a radius as small as 25mm

● Interchangeable cutting head angle — adjust for cutting down and without downstroke

● The "quick change" feature of further to downstroke — saving



● Precision made

● Patents pending

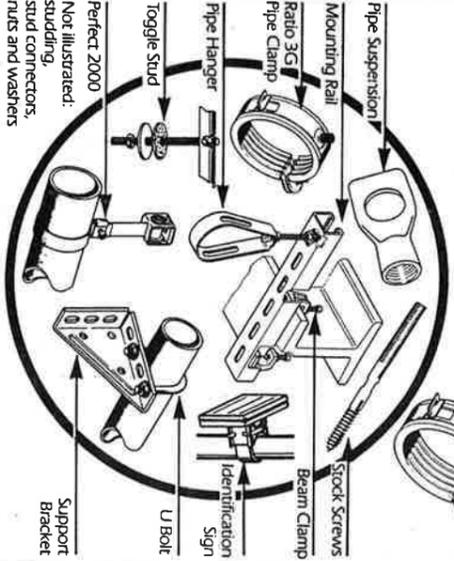
SEND FOR BROCHURE TRADE ENQ. WELCOME

Turner (Pac. Eng.) Products  
Borealis Works Ltd  
Tewantin Rd.  
Gowdon, CH9 6PP  
Tel. 01 656 7765 Telex 935076

For more details circle 19

## sikla® Ratio 3G Pipe Clamp

- ◆ One piece construction with captive clamping screw
- ◆ Vibration damping insert
- ◆ Unique connecting spigot allows suspension/support by M8 or M10 studding and M12, 16 and 1/2" BSP with adaptors
- ◆ Sizes 15mm to 6" metric and Imperial
- ◆ Temperature range — 50°C to +120°C



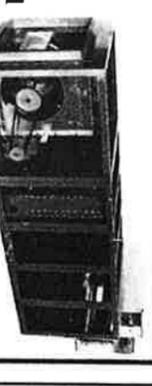
- ◆ Perfect 2000 Not illustrated: studding, nuts and washers
- ◆ Helpful, friendly service
- ◆ Immediate availability
- ◆ Despatched within 24 hours
- ◆ Delivered next morning to site or your works
- ◆ Top quality corrosion protected
- ◆ Relevant approvals such as FM and VDS
- ◆ Easy to fit
- ◆ Cost effective



**KH. BENZ**  
Suppliers of Pipeline Accessories  
PO Box 38, Bracknell,  
Berkshire RG12 4CP  
Telephone: (0344) 428007

For more details circle 20

## Meridian



Sales & Service Ltd  
AIR HANDLING UNITS  
HOT WATER/ELECTRIC HEATING  
DX/CHILLED WATER COOLING  
Dampers options  
300-100000 M3H  
Ex Stock Models  
Phone: 0256 469301  
Telex: 477379 Winsner G

For more details circle 21

## Child's Play! (not with this valve)

### Commissioning Services

- ◆ Double Regulation On/Off control without alteration of flow rate
- ◆ Anti-Tamper Head Means that once set there's no problem of interference.
- ◆ Normal Brass Finish or nickel plated
- ◆ Angle or Straight



For Flows Down to 0.008 L/S

Low cost flow control for radiators, fan coils and complete systems.  
Esterbell Ltd, 66 Stephen Rd., Bexleyheath, Kent DA7 6EE Tel. 0322 51002

For more details circle 22

## ESTERBELL ARCA Qutus

### Standard Iron Connections or compression adaptation

- ◆ Fixed Orifice for easy fast flow setting with electronic direct flow reading meter
- ◆ Mini Test Points with double water seals working up to 10 Bar

## Aid in fan choice

COMPUTAIR says it has developed a range of interactive software that enables designers to select fans from available data, to plot performance curves of a particular configuration, and even to produce quotations and raise work orders.

As Computair has developed this software to meet individual customers' needs, the company has characterised the per-

from p 10

4,000 deaths in the capital directly attributable to it he said.

The Beaver Committee was therefore formed and made recommendations which "eventually led to the Clean Air Act of 1956."

So, Sir Hugh continued, when the same atmospheric conditions occurred in 1962 only four deaths resulted and by 1972, when the same conditions happened again no deaths were attributed to it.

### Lessons

He said the Clean Air Act resulted in a great deal of Government expenditure on smokeless fuels etc.

The lessons to be drawn from this, Sir Hugh said, were:

- "Parliament and

## Options for Economy 7

HEATRAE Sadia's Economy 7 hot water cylinder range is being expanded to offer more options. These include a cylinder with immersions and controller; cylinders with immersions; an individual controller and two kits to convert existing non E7 tanks to the cheaper tariff.

The introduction comes as the Electricity Council has forecast a virtual doubling in the market for E7 hot water cylinders over the next year.

Option One is a comprehensive kit for replacement or new cylinder applications, which includes factory insulated 210 litre cylinder complying with the new

BS699 9E, sized to offer enough hot water to serve the day's requirements for a typical family. The cylinder comes already fitted with a controller and two 14 in Heatrae Sadia Superloy 825 immersion heaters and thermostats.

A battery reserve maintains accurate timekeeping for up to 150 hours in the event of a power failure and neon lights indicate when E7 power is being used, when the boost is being used and even when a boost is required to maintain water temperature.

All the installer has to do with this package is wire in the controller to a suitable power source and make the necessary connections. Option One is available in

## Product News

direct or indirect type with or without a cold water cistern incorporated.

Option Two is suggested for installation where a controller is not required. This option offers factory insulated cylinders, complete with two 14 in Superloy 825 immersion heaters and thermostats.

Again, 240 litres in capacity, Option Two cylinders are available in direct or indirect type with or without a cold water cistern incorporated.

Option Three is for the customer who already has an E7 cylinder, but wants the more accurate, reliable monitoring of a quartz powered controller. Heatrae Sadia is offering the controller as a separate item.

Four) allows standard cylinders with twin side entry bosses to be successfully adapted to run on E7 tariff. It consists of two 14 in Superloy 825 immersion heaters and thermostats plus the quartz controller, electrical cable and full installation and users' instructions.

Option Five, again boxed, enables a standard cylinder with a single top-entry boss to be adapted to run on the E7 tariff. It consists of one 30 in Heatrae Sadia Superloy 825 twin-heat immersion heater and two thermostats plus the quartz controller, electrical cable and full installation and users' instructions.

## HERE & NOW!

IMMEDIATE AVAILABILITY



**ELCOFLEX Flexible Ducting**  
Also Aluminium Galviflex mill finish alloy 3003  
Insulated and uninsulated

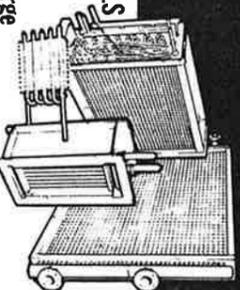
**Galixbrook Eng. Ltd** 2 Millfield Road London E5  
Telephone 01-966-4446

For more details circle 24

## COILS

HEATING AND COOLING COILS

- \* Custom built
- \* Express service
- \* No job too small or too large
- \* Competitive prices



**FAIR-AIR**

Sir Henry Pakes Road,  
Canley, Coventry CV9 6BN  
Tel 0203 712248 Telex 31549

For more details circle 23

# Bigger than U-Thought



Our position as the UK's biggest supplier of burners means we make a habit of exceeding expectations.

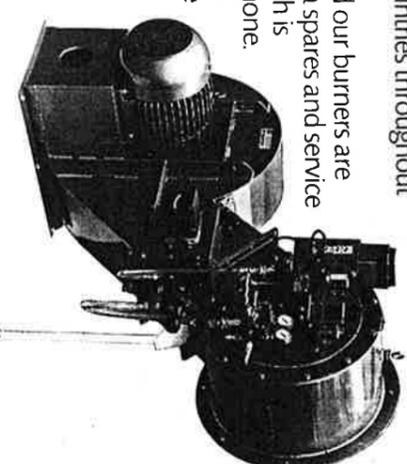
You may already know that we supply oil and gas burners from 50,000 btus/hr output.

What you may not know is that we also supply dual-fuel burners from 500,000 to 375 million btus/hr output.

The size and scope of our range of oil, gas and dual-fuel burners makes them ideal for hot water, heating and steam systems in everything from domestic and commercial applications through to large steam process heating loads. They are used in heating systems and industrial heat processes in over 70 countries throughout the world.

And all our burners are backed by a spares and service facility which is second to none.

So not only are we better but also bigger than you thought.



OIL GAS AND DUAL FUEL BURNERS UP TO 37½ MILLION BTU'S.

**NU-WAY**  
Britain's No.1 in Burners

Nu-way Limited, PO Box 1, Vines Lane, Droitwich,  
Worcs WR9 8NA. Tel. No. 0905 772331 Telex 338551

For more details circle 25