● The requirement for smoke ventilation is now widely recognised, but is still too often viewed by many as a luxury which can be omitted whenever budgets need to be reduced, thereby missing major opportunities to improve the safety of new or refurbished buildings, argues BRIAN SEARLE, a senior consultant with Airstream Environmental Products' smoke control division.

Correct smoke ventilation can offer many major benefits

THERE is no doubt that the presence of a smoke control system within a building enhances the overall fire protection strategy and protects escape routes. Added to this, the fire-fighting potential and building stability are significantly improved, provided that it is considered at the design stage — in full knowledge of the overall strategy.

The main question the designer should ask is: why is venting needed and what will it be expected to do?

Perhaps it is to protect human life by preventing smoke-logging and allowing safe means of escape. When one hears of cash and carry warehouses with mezzanine floors and a potential occupancy of two thousand people and then one recalls that in Building Research Establishment tests smoke took just two minutes to build down from 4 m to the floor, the most terrifying pictures can be conjured up.

Perhaps the reason for venting is to remove excess heat and to stop the temperature rising to the point where steelwork may collapse.

Or maybe it is to stop the hot layer building down to the top level of palletised stored goods which would otherwise allow flash-over fires.

Sprinkler efficiency

It may also be an enhancement to the sprinkler system to ensure that convected heat is not spread, thus allowing only those sprinkler heads in the vicinity of a fire to operate, increasing sprinkler efficiency and preventing water damage in areas remote from the fire. It is in fact a policy of the Smoke Ventilation Association to recommend combined installations of sprinklers and ventilators.

Fires, of course, differ greatly in their characteristics, and thus it is important that system designers understand how the fire will act in its early stages.

In its initial stages will it produce a lot of heat or will it produce masses of smoke — or will it produce both? A rubber fire will almost certainly be very smokey in its early stages, while a degreasing tank will quickly produce fierce heat. On the other hand, certain plastics will produce both heat and toxic smoke.

Know your fire

Without experience and understanding of these possibilities it is not easy to determine the right type of operating device. There is certainly no sense in putting one's faith in a heat-actuated device if there is little heat given off in the initial stages of the fire!

How high is the building? And how far will the gases have to travel before coming into contact with a ventilator operating device?

A hot column of gases will rise off the fire. As this column rises it will entrain the surrounding air. Hence it will expand in an ever-increasing inverted cone, and the higher it has to travel the greater its volume will become.

The prime consideration should be that as the column ascends and expands its temperature will fall. This feature will have a large influence on the selection and siting of equipment.

What will be the attendance time of the fire brigade once the alarm has been raised? The answer to this coupled with a knowledge of the building will allow some considered judgement to be made as to the likely fire size to be encountered by the firefighters; but in turn this answer depends upon several other factors.

Mr. Searle's company, Airstream Environmental Products, installed a smoke ventilation system in the new Olympia Shopping Centre, East Kilbride.

How will the alarm be raised? Will it depend upon someone seeing the fire? Or will it be automatic, being triggered by a sprinkler flow switch or smoke detector? If it is by the flow switch then one must go back to an earlier question and consider both the height of the building and the operating temperature.

What means of regular testing should be provided and where should it be sited? Discussion with interested parties such as the fire prevention office will often provide the answer, since, after all, it is the fire brigade which will operate the system in an emergency.

Having arrived at the answer to these questions it should be possible to design a system. The designer knows what to expect of the venting system, and so he should be able to determine how far he is prepared to allow the hot layer to build down and to what extent the roof should be compartmented. He needs to ensure an equilibrium between the generation and extraction of hot gases.

There will always be a smoke layer, and sometimes it is possible to let it grow down to

Continued overleaf

VOICE-GUIDED EVACUATION

TOA Electronics Ltd says its new voice evacuation system is a direct response to growing demands for improved safety procedures within public areas and buildings.

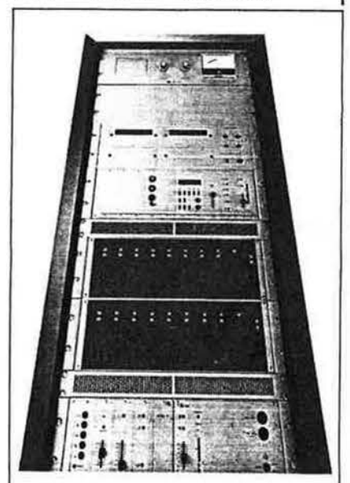
Used in conjunction with the public address, the TOA voice evacuation system, with its pre-recorded, digitally stored messages facility, provides clear information in a calm and reassuring manner, so playing a strategic and command role during an emergency, says TOA.

Utilising its extensive acoustic design resource, TOA claims the voice evacuation system attains 'exceptional levels of intelligibility in the most demanding environments'. The system meets in total the requirements of *BS 5839, Parts 1 and 4, 1989*, the British Standard for fire protection and alarm systems.

Modular in format for ease of design and flexibility, the system operates in conjunction with the majority of fire alarm panels via a special interface module. An integrated monitoring system allows self diagnosis of faults; while an instantaneous switchover to battery back-up under mains failure is a central feature.

A monitored fire officer's microphone provides the option to manually override all automatic messages.

For further information please contact: TOA Electronics Ltd, Tallon Road, Hutton Industrial Estate, Brentwood, Essex CM13 1TG (tel: 0277 233882).



The TOA voice evacuation system.

Lighting systems boast high safety levels

ABB Control has enhanced its range of emergency lighting systems with the launch in the UK of a new GVL group supply lighting system, featuring high safety levels due to decentralised installation of units within separate floors or fire zones of a building.

Although each system functions independently, up to 64 individual GVL systems can be connected to a centralised status monitoring system. Designated 'CEWA-GUARD' it significantly reduces maintenance costs by providing constant monitoring of battery charge, a weekly function test cycle, a programmable periodic battery test and specific fault indication within individual group supply systems, says ABB.

As a result, the maintenance engineer is alerted immediately to potential faults and systems failures, and is directed straight to the defective unit.

'Minimum disruption'

Installation of the GVL emergency lighting system causes minimum disruption to occupants, has no detrimental effects on the aesthetic appearance of buildings since it utilises existing standard light fittings, claims ABB. The system combines normal and emergency lighting such that its presence is not obvious until a power failure occurs, and then the group supply system takes over, providing power to the lighting system for 1-3 hours in either maintained or non-maintained mode.

ABB's GVL group supply system complies fully with British Standard 5266, Part 1, 1988, and the new European standard CEN 169/WG3. Each GVL system is situated in sheet steel housing giving protection to IP 54. Within the cabinet the batteries are hermetically sealed, so that they are separated from the electronics.

More details from: ABB Control Ltd, Grovelands House, Longford Road, Exhall, Coventry CV7 9ND (tel: 0203 368500).

For details of features planned for FIRE next year ring Pam Radford on 0737 768611

Correct smoke ventilation continued from page 31

within 3 m of the floor, leaving enough clear airspace for occupants to escape and for firefighters to enter the building. More frequently, circumstances such as stock, machinery, large doors or even building design demand a higher clear layer.

Having determined the amount of ventilation required the designer then looks at the best way of achieving it — either natural or powered ventilator units.

Both types of equipment have advantages and disadvantages. For instance natural ventilators are relatively light but powered units are considerably heavier; and fans require a fully maintained, uninterruptible power supply whereas natural ventilators do not.

Advantages of powered units

However, powered units usually extract cool smoke better than natural ventilators — the exhaust rate through natural ventilators increases as the temperature rises — while powered units exhaust at a constant rate.

Natural units are generally more pleasing to the eye, but powered units can be sited remote from the protected area and ducted. But to compensate for this natural ventilators in the non-fire zone can be used to provide replacement air.

Natural ventilators require large inlet surface areas, whereas powered units overcome resistance and, therefore, require a relatively small inlet area.

Whatever, the preferred system specification, all equipment should be tested in compliance with *British Standard 7346, Part 1 Natural Ventilators, Part 2 Powered Ventilators* or *Part 3 Smoke Curtains and Screens.*

Any proposed system should be fitted with fully automatic controls otherwise it cannot be classed as a system. Manual overrides can be fitted for discretionary use by the fire brigade, but care should be taken to prevent unauthorised use.

The statistics concerning fire in the UK paint a frightening picture — more than 900 dead and 10,000 injured, of which more than 1,000 are fire brigade personnel. Coupled with this are losses of over £600 million directly, and over £1 billion if consequential losses are taken into account.

The fact that these losses continue growing in the UK and other industrialised countries suggests that attitudes and practises concerning building fire safety leave something to be desired. Attention must be given to the conditions which prevail in a building in the event of fire. And most importantly, all sprinklers, detectors, extinguishers and smoke ventilation systems must be able to work in unison without impeding each other, or people's ability to escape.

Enclosure sealing for halons continued from page 26

My firm suggests that the interval at which repeat integrity tests should be carried out upon protected enclosures be determined by the results of the initial test, thus:

Predicted retention time (minutes)	Cycle for repeat integrity test (years)
10 to 15	1
15 to 20	2
20 to 60	3
60+	5

A repeat integrity test should also be carried out following any major alterations to a protected enclosure. Where an organisation has large numbers of protected enclosures (and assuming that they have examined their halon usage and have eliminated any halon systems which are redundant or unnecessary) we suggest that they aim to test all their enclosures over a three-year period, prioritising those which (a) are known to be leaky and (b) contain particularly valuable or critical equipment.

Major companies in the UK, and around the world, are recognising the opportunity provided by regular testing, and are now specifying that integrity testing of their halon-protected enclosures be repeated annually. The 1991 edition of the NFPA 12A standard, due out shortly, will recommend that all enclosures are inspected for additional leakage every six months and retested as necessary, while the current draft of the revised *BS 5306, Part 5.1,* suggests that all enclosures be retested annually. One of Pressure Test's financial sector clients, based in London, is considering retesting some of their 30+ halon installations quarterly, since additional cables are run most weekends.

Key installations

Halon extinguishing systems are installed to protect key installations to minimise the risk of fire and consequent losses from equipment destruction and business interruption. It is sensible to ensure that halon systems would be effective in the event of a fire, and that they remain so. The leakiness of protected enclosures increases over time as modifications and alterations are made. In time this will compromise the security against fire provided by a halon system. Implementing improved sealing procedures and instituting regular integrity testing, together with the other actions outlined, will guarantee the effectiveness of the halon systems.

LETTERS TO THE EDITOR

Firefighters deserve helmets which meet British Standard

I REFER to the letter from CFO John Craig of Wiltshire contained in the September issue of FIRE magazine and headlined 'British Helmets Standard Criticised'.

In his letter, CFO Craig states that "a very high proportion of incidents attended by British fire crews are special service crash rescue situations". Nothing new here, that has been the case for decades. The problem of head protection when working in confined spaces is not new either. In my former brigade general purpose protective helmets were carried on appliances for such work in the 1960s.

But CFO Craig states that the problem of head protection in confined spaces has been created by BS 3864 of 1989, in that helmets manufactured to that standard are not suitable for such work.

The fact is that helmets produced over the last 30 years have not been suitable for work in these confined spaces, that is why many brigades carry alternative head protection.

It would appear that what Mr. Craig is trying to justify, by describing the feature of removing the outer shell from the inner liner, is that his brigade purchased helmets that did not meet the British Standard specification and one could be forgiven for believing that this was the only area of non compliance with the British Standard.

The fact is that those helmets described in his letter failed on SEVEN counts when submitted to the British Standard Test House in 1989 for testing in accordance with BS 3864. The areas of failure included brim, protrusions, internal protrusions, retention system and strength of retention system.

It was not until April of 1991 that the manufacturer of these helmets 'claimed' BSI 'approval' for the modified helmet.

I have been a member of the British Standard Committee since 1984, together with the Home Office, fire officers, manufacturers and representatives of CACFOA. I am alarmed, as I believe they will be, in the manner in which management in Wiltshire — in discussion with the manufacturers of these helmets — dismissed the areas of failure as 'irrelevant', 'immaterial', 'subjective' and generally to be 'disregarded'.

Not very British, Mr. Craig.

Firefighters deserve better than that, they need helmets that do meet the British Standard. — **Dave Higgs,** Fire Brigades Union, Kingston upon Thames.

Sprinkler trade not depressed

COLIN Todd in his letter (September 1991) headed 'Storm has passed over many heads' chooses to respond to recent debate about legislation on sprinkler systems in hotels in the UK and elsewhere in Europe with an unfortunate blend of irony and flippancy.

He concentrates on the comments made by the chairman of the British Automatic Sprinkler Association (BASA) — though the speaker was wearing his company rather than trade association hat — and conveniently ignores the very similar conclusions by Roy Young of the LPC, made on the same occasion.

However, as Mr. Todd has drawn in BASA, and taken a more general swipe at 'the depressed sprinkler industry', the time has come for a response from those quarters.

Surely the reason a number of the largest hotel chains worldwide — household names such as Sheraton, Marriott, InterContinental and Holiday Inn — are now moving towards complete sprinklering is because of *experience:* they know what the needs are and what has been found wanting, and it is their business to be aware of the expectations of international travellers. Marketing, in a word.

This kind of impetus will certainly draw legislation and regulations along with it, and I would have thought it was for Mr. Todd and others in fire consultancy to work with their clients to produce economically engineered solutions, rather than to give the impression of acting as apologists for parts of the UK hotel industry.

For their part, and thinking longer term, members of this association and the UK sprinkler industry in general look forward to this kind of constructive relationship, and to offering their already wide experience in the hotel market to a growing number of clients. The 'depressed sprinkler industry', Mr. Todd? Never! — **I. S. Brown,** Secretary General, British Automatic Sprinkler Association Ltd.

Waste water is a safety measure

THE criticism levelled at Fire Service pump operators in Vigilium's August column provoked much discussion at station level. While he may 'abhor' the act of running water to waste through spare pump deliveries, is he (a) fully aware why this is done?; and (b) able to suggest a practical alternative?

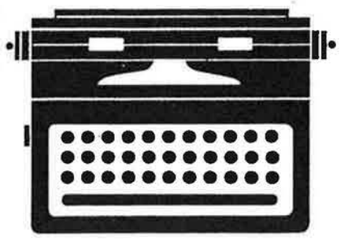
At a large fire, the demand placed upon high (LPM) output is accompanied by equally excessive amounts of pressure at the pump. On occasions, as water flow fluctuates on the fireground, some of this excess pressure must be 'dumped' from the pump, for fear of transporting it to firefighters manning nozzles.

A common feature engineered into North American fire pumpers is a 'pressure control device' that prevents excessive pump pressures from developing. While the primary purpose of such a feature is the protection of firefighters at the nozzles, a secondary purpose is to protect the hose and pump from damage.

Unfortunately, this innovation has yet to find its way onto the majority of local authority Fire Service pumpers and the UK firefighter must resort to 'manual' techniques for 'dumping' excess pressure at the pump. Other than utilising spare deliveries to do this, the pump operator may elect to divert his incoming supply directly into the appliance water tank, allowing the excess to 'overflow', and discharging a 'tank to pump' flow.

Alternatively, he may attempt to control output through nozzles by partially closing deliveries in use. The *Manual of Firemanship* advises against the use of these alternatives for varying reasons.

The next time you see a pump operator running water to waste consider his actions — and applaud him! He is demonstrating his professionalism in being alert to the fact that excess pressure discharged from the pump can kill! — **Paul Grimwood,** London Fire Brigade.



Minimising building site safety cost

I READ with interest the editorial in your September issue concerning fires on construction sites and in particular your reference to temporary fire detection.

Many construction companies balk at the cost of such systems because even though the components can be re-used elsewhere, the wiring and the cost of refixing it cannot be recouped.

However, most of the installation cost is eliminated where radio-linked detection systems are fitted. If sounders are not used (and on a construction site they may not be required) the only wiring cost would be the mains supply to the control panel. Even if sounders are required, they need only be wired to local repeater panels which receive and send signals by radio.

Smoke, heat detectors and manual call points all have integral transmitters and long-life batteries which, as stated, eliminates the cost of wiring. — **H. Unger,** Director, Insaf Ltd, Kingston-upon-Thames, Surrey.

Fire brigades map

A LIMITED number of 1,000 colour prints of Fire Services and their Badges 1990 are being sold in aid of the Fire Services National Benevolent Fund.

Prints are from an original hand painting by Sub-Officer Dick Dolan from Hitchin Fire Station. They are £5.00 each (plus £1.00 p and p). Cheques should be made payable to Mrs. S. Lemon and sent to SubO Lemon, Fire Station, Baldock Street, Royston, Herts SG8 5BD.

Strongroom saves treasures

WORKS of art valued at £25 million were recovered from a London warehouse destroyed by fire last month. The artefacts were in a specially built strongroom fitted with temperature and humidity controls and walls between nine and 18 inches thick.