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Is the ventilation engineer responsible for sick building syndrome damages?

Increases in sick building syndrome lost annual productivity put new pressures and responsibilities on ventilation engineers

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The Sick Building Syndrome (SBS) has been recognized as a health problem causing roughly $3 billion in lost annual productivity. Since under-ventilation has arguably been linked to a cause of an SBS condition, indoor air contamination in occupied office buildings may result in the imposition of liability upon the ventilation system designer.

Theoretically, the minimum duty of a ventilation designer may be defined by local or national building codes, the practice in the community, technical standards or other less obvious criteria. However, whether a designer has met the minimum legal duty may instead turn on the reasonably predictable performance of the actual ventilation system. To mitigate exposure to SBS liability, designers may have a duty to warn that certain energy conservation air-handling systems may cause illness. This article assesses both a designer's minimum ventilation duty and potential liability for SBS damages.

About the author

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Analyzing under-ventilation liability requires consideration of both legal and technical criteria, therefore this is a hybrid article. The initial focus is on ventilation design criteria. The discussion then turns to the minimum legal duty of ventilation engineers. The conclusion merges both considerations and summarizes the potential liability of a designer for building-related illness damages.

One published heating, ventilating and air conditioning definition of the Sick Building Syndrome condition is as follows:

"According to industry indoor air quality standards, sick building syndrome is diagnosed if significantly more than 20 percent of a building's occupants complain of such symptoms as headaches, eye irritation, fatigue and dizziness for more than two weeks, if the symptoms are relieved when the complainant leaves the building, and if no specific cause of the problem can be identified." (Rask 1988.)

The effect on building occupants caused by a SBS condition has been termed a building-related illness (BRI). BRI maladies have been reported to vary from headaches and nausea to the more severe respiratory, neurological and carcinogenic disorders.

A recent survey of 30 buildings disclosed that 65 percent of the buildings operated in an SBS condition, and more than half of the SBS buildings exhibited BRI (Rask 1988). This sick-building statistic correlates closely with an earlier study that disclosed ventilation complaints in approximately one-third of 100 buildings studied (Mechler 1985). Ongoing studies of indoor air quality suggest both health risks for building occupants and serious legal problems for engineers and contractors who operate and maintain building ventilation and control systems.

What is the minimum technical ventilation design standard?

Many lawyers might suggest that the applicable state and local building codes define the minimum outdoor air quantity that must be introduced into the building by the ventilation system. However, some local building codes disclose little ventilation guidance for the designer. Some codes provide ventilation criteria for exhausting lavatories, toilets, bathrooms and restrooms. Other building codes provide a minimum outdoor air flow rate based on occupancy.

However, some national technical publications suggest much greater minimum ventilation airflow rates, and also urge designers to schedule outdoor airflow rates far in excess of those listed in the less stringent building codes. Because the building codes and technical publications are inconsistent, attorneys will inevitably argue that a designer's minimum duty was to apply the standard that most closely aligned with the position of the designer's client.

Unlike lawyers, ventilation practitioners might offer a more uniform design standard. Practitioners may suggest that ASHRAE provides the appropriate ventilation design criteria. Support for adopting the ASHRAE design criteria as the appropriate standard of care is found in testimony taken in a judicial proceeding that was conducted more than 13 years ago.

The hypothetical situation analyzed in this article presumes that ASHRAE *Standard 62-1981* established the initial minimum benchmark for the ventilation design of a building before June 30, 1989. *Standard 62-1981* and, later, *Standard 62-1989* expressly purport to define the minimum outdoor air supply rates for various types of occupancies.

Accepting the premise that *Standard 62-1981* defined good practice prior to June 30, 1989, was it always appropriate to use this criteria as the basis of a ventilation design? Before *Standard 62-1989* was adopted, the *ASHRAE Journal* seemed to report that certain problems existed in the former ventilation design criteria:

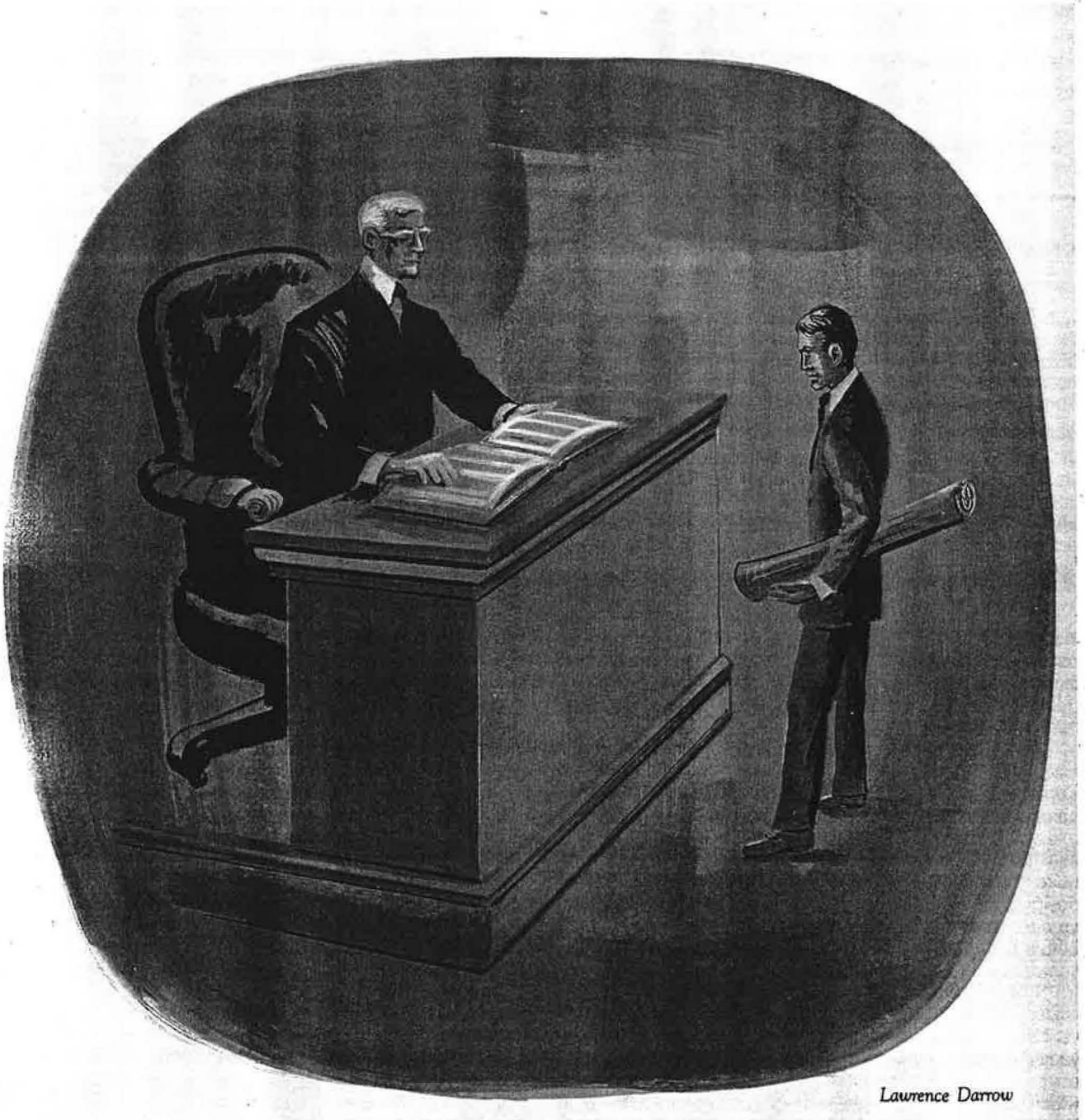
"Many believe it [the revised standard] will provide a margin of safety which will enable designers to be reasonably con-

fident that they are providing work and living spaces that are both healthful and conducive to improved productivity." (Comstock 1988.)

The inference in the comment introducing the proposed revision is that *Standard 62-1981* leads to an unreasonable design. The "unreasonable" design inference may arise out of the failure to include application design criteria in the ventilation recommendation. Alternatively, the criticism may be rooted in the 50-year-old test data underlying the ventilation recommendations contained in *Standard 62-1981.*

Standard 62-1981 merely described the designer's duty to quantify the minimum ventilation airflow rate for an occupied building. The criteria in *Standard 62-1981* were silent as to the minimum part-load ventilation performance of a system. However, adequate indoor air quality is at least partly a function of ventilation airflow rate, filtration and fan operation. Therefore, the actual performance of the system may form the appropriate basis for a minimum designer duty and breach of duty inquiry.

The minimum design duty "litmus test" becomes much more difficult to read when analyzing the part-load ventilation performance of an energy-efficient air distribution system. Some energy-efficient HVAC systems were designed to circulate the maximum design airflow rate only at full-load conditions. These same systems were also intended to circulate a reduced total supply (outdoor and return) airflow rate at part-load cooling conditions. Therefore, a reduction in the ventilation airflow rate at part-load operating conditions may occur, even though the building may be fully occupied. This variable air



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volume (VAV) design process may result in an under-ventilation condition at part-load. Does the reduced part-load ventilation system characteristic of some VAV systems mean that the HVAC designer has breached a minimum legal design duty?

A designer's legal duty to third-party claimants

The threshold inquiry in any tort claim is a judicial policy decision called duty. The answer to the duty inquiry lies in the body of law that has developed around design professional malpractice claims. One of the earliest reported findings of a breach of duty by a design professional to a third party arose out of a boiler explosion that scalded a construction worker.

An engineer's HVAC system design may be ruled negligent even if it conforms to standards

The court decided that the designer's non-contractual (tort) duty ought to be predicated on an expansive reading of the contract for professional services:

"The terms and conditions of the architect's contract with the Building Authority clearly imposed upon the architect the obligation [duty] of supervising installation of all plumbing and heating facilities." (Day 1961.)

However, this harsh and broad policy decision was later reversed, and the scope of the architect's duty was limited to the narrower obligations typically associated with a professional services contract. A contractual-related tort duty has traditionally been applied to third party malpractice claims against designers. Since duty is tied to the obligations of the design contract, what then is the measure of a ventilation system designer's minimum standard of acceptable conduct?

The minimum duty of a design professional is generally to use the standard of skill and care employed by others engaged in the same profession in the same locality. Absent an express contractual provision, an architect does not guarantee a perfect plan or a satisfactory result. Therefore, only when the conduct of the engineer falls below the local standard of skill, does negligence liability ordinarily attach.

Traditionally, design professional malpractice liability is established by expert testimony as to the standard of professional care practiced in the locality, and the designer's failure to adhere to that minimum professional duty. An expert evidentiary rule evolved that barred tort recovery absent the introduction of minimum duty testimony. Competent proof of negligence required that both the local design standard and breach of that design duty be established by expert testimony. Therefore, credible experts were required to demonstrate in open court both a comprehensive knowledge of the professional level of competence in the locality and ventilation expertise.

However, precise expert testimony on emerging ventilation issues may be impossible to adduce in SBS cases. Proof of ventilation malpractice may not be readily available because ventilation design criteria may be changing and engineering opinions critical of existing design practice may not have been widely accepted in the local technical community at the time the design was completed. Nevertheless, a defense grounded on adherence to a minimum design duty based solely on conformance with the prevailing community design standard may not insulate a designer from exposure to all malpractice claims. Some malpractice decisions seem to require a minimum level of competence in the local professional community. Therefore, a designer's conduct can be found to be negligent when the locally accepted, but obviously deficient, ventilation practice was followed.

While the designer's contractual duty may be expected to change with the scope of each professional services agreement, the implied minimum design duty should be consistent. However, some courts appear willing to fashion new duty rules for designer misconduct, and to re-engineer malpractice evidentiary requirements. These liberal liability decisions have alternatively suggested that malpractice claims should be decided on a case-by-case basis and have either adopted, or alluded to, exceptions to the traditional expert evidentiary standard.

At least one court has, without the benefit of adverse expert proof, held an architect liable for omitting "common sense" details from contract documents. That court found that where a professional's conduct was clearly improper and manifestly below reasonable standards, negligence may be proven by the application of ordinary intelligence to the facts. However, SBS facts are highly technical, therefore, it does not appear that the "common sense" malpractice precedent ought to be applied to these complex claims.

The professional's minimum ventilation duty

In the past, a designer relying on *Standard 62-1981* could assert the shield of conformance with the minimum design duty as a defense to an SBS claim. A designer could claim correctly that even the unofficial ASHRAE comments criticizing the part-load ventilation performance of some VAV systems were only released in late 1988. But conformance with the prevailing local design practice is not an excuse for negligence in the face of conduct that constitutes the proximate cause of an injury. Similarly, the fan laws compel the conclusion that a reduction in the ventilation airflow rate into a system was foreseeable VAV part-load performance.

Finally, several years ago, the *ASHRAE Journal* reported that inadequate ventilation in VAV systems would occur most of the time (Carlton-Foss 1988). Therefore, the duty inquiry on SBS claims may be, given that the designer's practice was in conformance with *Standard 62-1981*, was the engineer's reliance reasonable in light of the frequently published technical opinions criticizing the performance of certain VAV ventilation systems? Accordingly, whether conformance with local standards is found to be acceptable or inappropriate, conduct may be a duty inquiry modified by considering both the foreseeability of the system performance and under-ventilation warnings circulating throughout the industry at the time the design was constructed.

Whether an engineer violated a ventilation design duty may also be influenced by professional registration laws. If the registration regulations provide a chronological minimum design test, one could argue that the duty inquiry should be evaluated on the technical information available at the time the design was released for construction. Registration regulations also generally provide that a designer is charged with the responsibility to safeguard the life, health and property of the public. Therefore, because changing technical ventilation guidelines and opinions appear to have evolved over the last decade, the duty inquiry may be a bifurcated test: Was the design in compliance with the local standard of care at the time the design was sealed; and whether a subsequent or continuing duty to warn has arisen.

A recent opinion by the California attorney general sug-

gests that an engineer owes a duty to notify third parties upon the discovery of a building condition that may present an imminent risk of serious injury (Acret 1988). Since inadequate ventilation opinions have been circulating for more than five years, a claimant could argue that the duty of the designer was to follow the published opinions that were critical of *Standard 62-1981* and not to ignore a clear and present health risk. Similarly, claimants could argue that a designer's professional obligation is continuing, and that a duty to warn may arise out of the registration regulations.

Whether the designer has either a retrospective or a prospective obligation to warn will likely depend upon the minimum duty that the court assigns to the engineer's conduct. However, the overriding policy factor in deciding the scope of a designer's duty may be the seriousness of the potential under-ventilation injury.

These policy issues leave several questions unanswered. Does a BRI rise to the dignity of a legally compensable injury? Should the design routinely under-ventilate a building and present an imminent health risk, is there a duty to inform the owner, building authority and occupants of this condition?

However, if there exists a duty to warn, the test ought to be the actual indoor air quality condition, not merely a paper analysis of the outdoor airflow rate introduced into the building. Therefore, filtration, maintenance, operation and other non-HVAC related causes of BRI may all play pivotal roles in determining whether a designer has a duty to warn of potential illness.

How does a ventilation designer cope with SBS professional liability? First, the engineer may argue that there was no duty to design a ventilation system that performed beyond the express requirements set forth in *Standard 62-1981*. Second, the editorial disclaimer set forth in the *ASHRAE Journal* suggests that the opinions critical of *Standard 62-1981* were not accepted by ASHRAE, and therefore, not indicative of acceptable minimum practice. Moreover, before June 30, 1989, these criticisms had not yet been formally addressed by the technical committee in charge of promulgating minimum ventilation design guidelines.

Finally, courts have limited the financial exposure of engineers for design errors or omissions when a less-than-perfect design was knowingly constructed by an informed owner to save money. Emerging BRI claims will surely test the viability of these traditional "no or limited duty" defenses against the right of a claimant to recover for allegedly under-ventilation related damages. ■

Bibliography

A full listing of the citations to authorities, publications, standards and learned treatises in support of the positions articulated in this article are in a previous paper by this author, "Is the design architect or engineer responsible for sick building syndrome injuries?" ASHRAE *Transactions*, AT-90-17-1, Vol. 96, Pt. 1.

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