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CASE HISTORY

Regulations without Enforcement + Education = Non-Compliance

Several countries across the globe are considering some form of regulation or guidelines that govern indoor air quality in the workplace. However, even when these measures are introduced, unless there is an enforcement policy coupled with an adequate educational program, they are doomed to failure.

Consider the situation in France. The French authorities have obviously recognized the importance of maintaining ac-

ceptable indoor air quality in the workplace by adopting at least two separate codes to govern indoor air quality and ventilation. Le Code du Travail (The Code of Work) guarantees a workplace where hygiene and safety are paramount concerns. In addition, Building Codes define air quality parameters of non-industrial air conditioned buildings. Specifically, under the building codes, it becomes the responsibility of the construction and the financing

companies to provide ventilation of buildings to ensure occupant safety.

These codes mandate that those responsible for a business must maintain a high standard of air quality. Among these regulations, building owners are required to make periodic inspections of their ventilation systems. Outside air intakes of buildings must be positioned at least eight meters (approximately nine yards) from air exhausts of the same or adjacent buildings or from external sources of pollution such as vehicles and smoke stacks. The maximum allowable concentrations of carbon dioxide is set at 1,000 ppm. This gas is to be used as proof of the adequacy of dilution ventilation. The work codes also demand that inspections be done at least once a year to confirm that minimum ventilation rates are maintained, that the ventilating systems are clean, that the filters meet original specification levels and that the static pressures or air velocities throughout the systems are maintained at design levels. Each of these checks are required to be recorded in an operations log of the building. This log is to be established within one month of the installation of the ventilating system in the building.

During this initial inspection, it is necessary to establish minimum ventilation rates per specified areas of the building. Static pressures and air velocities and particulars of the filtration systems, including their efficiency and their permissible pressure drop before changing of filters, is mandated.

Filtration standards for non-industrial French buildings fall into two classes. Outside air must be filtered if the outside air is thought to be polluted. The suggested efficiency for these filters are 90 percent weight arrestance test, according to the Association Francaise de Normalisation (AFNOR). This standard is roughly equivalent to ASHRAE's weight arrestance test. Neither of these tests are concerned with human health requirements since such crude filtration is designed mainly to keep the ventilation

Employee Attitudes Regarding Their Workplace

A survey of employee attitudes regarding their workplace was conducted in France by SOFRES under a subcontract from Harris Research Center.

This survey, which involved 400 interviews in the business districts of Paris, 300 in Lyon, and 300 in Marseilles was commissioned by Healthy Buildings International, Inc. as part of its ongoing research and work on the diagnosis and treatment of "sick" buildings.

The following are the key findings of the survey:

- ▶ Of those interviewed, 92 percent work in air conditioned offices.
- ▶ 62 percent feel that their work rate could improve in a cleaner, fresher office environment.
- ▶ Approximately 39 percent have complained to management about conditions in the office. More have complained about the temperature (27 percent) and stuffiness (15 percent) than noise (11 percent) or smoke (five percent).
- ▶ 57 percent of the sample could control the temperature level in their workplace: 84 percent of the remainder would like to be able to do so.
- ▶ 48 percent said the office air is sometimes or often stuffy or stale.
- ▶ 40 percent said that there are no smokers in their immediate work areas. Of those who have colleagues who smoke, 34 percent said the surrounding air never gets smoky, 47 percent said it is sometimes smoky, and 19 percent said it is often smoky.
- ▶ 25 percent consider the natural light in their immediate work areas to be poor and not less than 71 percent experience glare from VDU screens.
- ▶ About 15 percent said they often take time off work because of ailments they blame on the office environment, and 33 percent of these employees take multiple days off.
- ▶ Many suffer symptoms typical of "Sick Building Syndrome":
 - tiredness (47 percent)
 - listlessness (31 percent)
 - headaches (35 percent)
 - itchy or watery eyes (27 percent)
 - dry eyes (seven percent)
 - itchy or runny noses (six percent)
 - blocked or stuffy noses (six percent)
 - dry throats (25 percent)
 - flu-like symptoms (23 percent)

Written guidelines or regulatory measures are only useful when they are followed, and, with indoor air quality regulation, education is paramount.

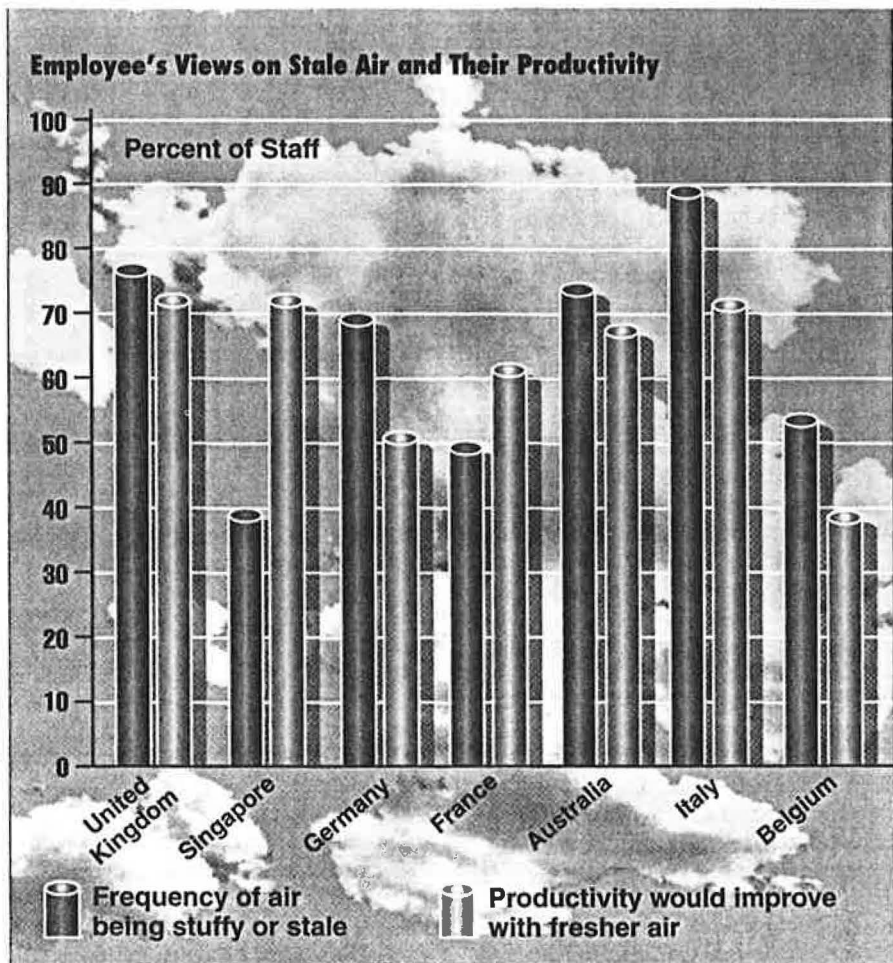
coils clean. Recycled air, however, must meet a higher filtration standard of 50 percent according to its staining characteristics. This standard is essentially the same as the ASHRAE 52-76 Atmospheric Dust Spot Test, and if the minimum acceptance level of 50 percent was realized, this would be a very satisfactory value for both outside and recycled air.

In theory, these regulations alone would be sufficient to ensure that many of the major contributors to sick building syndrome (SBS) would be eradicated from French buildings. The fact is, however, that written guidelines or regulatory measures are only useful when they are followed, and with indoor air quality regulation, education is paramount.

Building Studies

HBI, in 1991, investigated five buildings in different parts of France. Significantly, none of the five buildings had any evidence of the inspection log described above. Furthermore, the buildings located in Paris, Lyon and Marseilles, all violated the building codes with respect to their ventilation rates. Areas within each building showed carbon dioxide rates above the 1,000 ppm limit with one building showing carbon dioxide levels as high as 2,300 ppm. The cause of the ventilation deficiencies varied from building to building.

- Case #1 — There were numerous perimeter air supply grilles covered over with books, files or furniture, blocking ingress of ventilation air.
- Case #2 — Two outside air intakes to this building were equipped with energy recovery wheels. Unfortunately, one wheel had experienced problems in the past and had been removed, connecting the exhaust air directly to the incoming outdoor air, causing short circuiting of the entire ventilating system.
- Case #3 — Here the only sources of outside air were perimeter fan coil units. Each unit had its intake dampers sealed off.
- Case #4 — Interior partitioning inside



the building had interrupted the air flows. Frequently, individual offices had exhausts only, whereas their adjacent office had supply grilles but no exhaust.

- Case #5 — This beautifully designed building with a superb ventilating system used four main air handlers to condition the air. Each of the four received its outdoor air from a fifth air handler dedicated for this purpose. Unfortunately, owing to an electrical fault, this fifth unit was inoperable.

There were several other factors found that were adversely affecting the indoor air quality in these buildings. The air intake of one building was located inside a shaft that had accumulated a pile of dead and rotting leaves. Several flexible ducts carrying supply air in one building had become disconnected from their main branch duct. One mechanical equipment room had deteriorating friable asbestos sprayed on the ceiling and flakes of the asbestos were visible on the HVAC equipment and another building had a cooling tower located within three meters of the main air intake to the building.

The filtration standards defined in the French codes were also being violated in two of the five buildings. One building used a metal screen as a filter and another a washable sponge rubber for recycled air. Neither of these filters had an efficiency of 15 percent according to the French staining techniques or the

ASHRAE dust spot test against a defined minimum of 50 percent. Certainly good quality air filters are available in France as evidenced by their presence in the other three buildings studied.

Conclusions

Obviously, with a tiny sampling of only five buildings, it is impossible to speak about conditions throughout the country. However, the problems encountered in these French buildings are virtually identical to numerous buildings studied throughout the world. This, despite the fact that the existing codes and regulations should, in theory, prevent such deficiencies within France. Once again we see that achieving acceptable indoor air quality in the workplace takes more than a government mandate. As is the case in numerous other countries, the application of building codes are usually forgotten once the construction process is complete.

In HBI's experience, unless some form of commitment is made to enforce the regulations whenever the buildings are occupied, and unless there are ongoing attempts to educate the building operations and maintenance staff, then time spent on writing regulations is time wasted. Conversely, sensible and practical regulations, informed and educated building facilities staff and simple inspection and record keeping programs will ensure the integrity of indoor air for all.