

The Sterling Report

Satisfied Tenants: Improved Environmental Performance of Office Buildings



Elia M. Sterling, Director of Building Research, Theodor D. Sterling & Associates Ltd.

Over the past decade while the building industry has concentrated on improved energy performance of buildings and building systems, tenants have demonstrated little interest in energy issues. Alternatively, they have consistently demanded improved comfort and responsiveness of environmental control systems.

In this decade of environmental awareness, successful buildings must not only operate efficiently but also must respond to tenant comfort requirements. Standards are now emerging which enable a building's environmental performance to be evaluated. Many large landlords and tenant companies have also implemented guidelines for building performance with respect to comfort.

It has been estimated that up to 90% of currently available office building stock does not conform to these emerging comfort and quality standards and guidelines. For many owners and managers, the problem now is how to rectify existing problems. Fortunately such problems can be rectified and the environmental performance improved in the majority of existing buildings. However, before improvements can occur building owners and managers and also architects and engineers need to understand the comfort problems that can be created by inappropriate systems, poor building design, poor construction and poor maintenance practices.

The most cost effective solution to this problem, now becoming generally accepted is a phased approach for building performance evaluation. The evaluation strategy consists of five phases. The objectives of the phased approach are to:

- Determine whether an environmental problem exists in a building.
- Identify the probable causes of the environmental problem. For example, indoor air quality, thermal conditions or ventilation inadequacies.
- Design and implement modifications to alleviate the problem.
- Re-evaluate environmental conditions after modifications have been implemented to test the effectiveness of the design solution.

Phase One

consists of the completion of a checklist by the building owner operator or representative, such as maintenance personnel. The checklist contains information on architectural and mechanical and electrical system design and performance (including maintenance practices), the use of the building (both by employees and visitors), workspace design and layout, equipment use and occupant health and comfort concerns and complaints. Review of the information from the building owner/operator provides basic information about systems performance and occupant problems.

Phase Two

includes two component parts:

- Administration of an "Office Work Environment Survey" questionnaire to all building occupants as a method for documenting environmental comfort problems and health symptoms experienced in the building and to locate areas where complaints are more acute for detailed monitoring in Phases Three and Four (if required).
- A walkthrough evaluation of the building, which includes inspection of the mechanical system and review of the mechanical and architectural plans to obtain an overview of building performance. The review of plans also allows comparison of the design specification of the mechanical system with established standards and guidelines.

Phase Three

consists of the measurement of selected key environmental quality parameters, with locations for air sampling determined by the results from Phase Two.

Phase Four

is a detailed evaluation of systems operation, including performance testing.

Phase Five

is the actual implementation of design solutions to the building. Phase Five may be reached at the completion of any of the first four phases, as dictated by results of the specific evaluations.

After modifications have been implemented, a vital further step in a total building performance investigation is a re-evaluation of environmental conditions to determine whether the recommended modifications have been effective.

This phased approach has been developed as a practical strategy designed to locate and identify probable causes of comfort problems in a building in a time and cost effective manner, and to formulate retrofit actions to improve conditions and satisfy tenants.

This method has been applied in a number of projects to successfully integrate energy performance and environmental comfort criteria for audit and retrofits of existing commercial buildings. A modified approach has been applied to new building design. **RE**