**Performance Measurement Protocols for Commercial Buildings: Best Practices Guide**
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*Performance Measurement Protocols for Commercial Buildings: Best Practices Guide* is the end product of an ASHRAE best practices project committee charged with evaluating building commissioning practices.

This book has two purposes: 1) to enable evaluation and improvements in the performance of commercial buildings throughout their service life and 2) to provide guidelines for commissioning activities for the building's operation and maintenance team.

Specific best practices are described for measurement and verification of energy and water use, plus the four components of indoor environmental quality: thermal comfort, air quality, lighting/daylighting, and acoustics. It is the last item that will be of interest to readers of this journal.

The basis of the commissioning process involves three evaluation levels for assessing human comfort parameters:

1. Basic Evaluation, which uses observations of building characteristics, perception of occupants, and data from utility bills to characterize performance;
2. Diagnostic Measurements, which uses physical measurements to identify problems indicated at the Basic Evaluation level and to categorize performance improvement;
3. Advanced Analysis, which uses the results of the first two levels plus the results of outside specialist consultants to identify specific actions for performance improvement.

Basic Evaluation for acoustics includes an occupant survey, review of service logs and forms, walk-through observations, and interviews. It is assumed that Diagnostic Measurements include A-weighted sound levels, evaluation of room reverberance, and benchmark comparisons with established design criteria for issues discovered in the Basic Evaluation phase. A measurement worksheet is utilized to track acoustical metrics by room. After acoustical issues have been corrected, guidelines are provided for reassessing the acoustical parameters. Key elements to include in the report are identified.

Advanced Analysis advocates the uses of outside specialist-consultants to provide more detailed measurements and analysis than the first two evaluation phases provide. The process is similar to the Diagnostic Measurements phase and includes initial evaluation, remediation measures and remeasurements.

Appendix J is titled Acoustics Verification Workbook and Resources. It provides a description of basic acoustical instrumentation, measurement procedures, and analysis that relates to sound level, reverberation time, speech privacy and HVAC system noise evaluation.

The book outlines what to measure, how to measure it, and the measurement intervals to establish and track human comfort parameters. For each evaluation level, the process, tools and performance levels are described in a step-by-step procedure. The appendices include example forms, worksheets and checklists and are included on a compact disk in industry standard word processing and spreadsheet formats.

Approximately 22 pages of the book are dedicated to acoustical evaluation and commissioning. Acoustical consultants may already use many of these procedures in their day-to-day work, but likely not separated into the hierarchical three-phase commissioning process the book describes. Building owners and their consultants not familiar with acoustical evaluations will benefit from the basics of acoustical evaluation that are explained. While not providing new acoustical evaluation concepts, the defined steps establishing a procedure where recognized methods must be used when commissioning buildings will benefit both novices and experienced professionals.

The only direct criticism relating to acoustics is the treatment of acoustical instrumentation, where only one manufacturer's brand is shown and discussed. There are many other instrumentation manufacturers having equipment suitable for measuring the acoustical parameters that are part of the commissioning process. A listing of available manufacturers is recommended for a future book edition.

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