Building Commissioning Implications of Proposed Revisions to the ASHRAE Ventilation Standard

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Synopsis

The American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) released a proposed revised draft of ASHRAE Standard 62-1989 on August 15, 1996 for public review. ASHRAE is scheduled to respond to and resolve comments during 1997 followed by the publication of a new ventilation standard in 1998. The proposed ventilation standard is a radical departure from current practice of building and Heating, Ventilating and Air Conditioning (HVAC) systems design, construction, operation and maintenance which will also increase the responsibility and liability of the designer and the commissioning agent with respect to indoor air quality. The presentation will discuss the implications of the proposed standard with respect to building commissioning for indoor air quality.

About the Author

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Introduction

The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) released a proposed revised draft of ASHRAE Standard 62-1989 on August 15, 1996 for public review. ASHRAE 62-1989 is the premier North American indoor air quality standard. The public review period ended on December 12, 1996 with over 8,000 comments received. The Committee is scheduled to respond to and resolve comments during 1997 followed by the ASHRAE publication of a new ventilation standard in 1998.

While the current ventilation standard is limited to the design of ventilation systems assuming that adequate dilution ventilation will result in acceptable indoor air quality, the proposed revisions introduce source elimination and control into the equation for ventilation system design and extend requirements past the design phase into "construction", "start-up", "operation" and "maintenance".

The proposed standard introduces a series of complex procedures for determining design ventilation rates. Though the mechanics are workable, the standard provides little guidance with respect to fundamental decisions such as what is a contaminant and what is an acceptable level of exposure. In addition, because the standard applies to the construction and operation of a building, there are increased requirements to foresee all contaminants that could enter the building at any point in time during lifetime operation as well as potential system performance issues that could result in indoor air quality concerns.

To successfully apply, the proposed ventilation standard would require the implementation of building commissioning procedures such as those described in the ASHRAE Commissioning Guideline.

Building Commissioning for Indoor Air Quality

Indoor air quality commissioning procedures would include requirements for each phase of the project. The following summary outlines basic indoor air quality commissioning procedures necessary to implement the proposed revisions to ASHRAE Standard 62-1989 during the various project phases including:

- program,
- design,
- construction,
- acceptance, and
- post-acceptance.

Program Phase

- Review projected occupant activity, density and locations on which the Heating, Ventilating and Air Conditioning (HVAC) system design was based. Attention should be paid to special-use areas such as kitchens/break areas and meeting/conference rooms. The classification of the air exhausted from each area with respect to air cleaning and recirculation requirements, must comply with the proposed standards. For areas where smoking is allowed, special procedures must be applied.

- Identify major outdoor sources of pollutants in the vicinity of the building site such as exhaust systems, cooling towers of neighboring buildings, and existing or proposed parking garages. Prevailing winds should also be taken into account. This may also include an assessment of soil and groundwater that will interact with the building structure.

- Identify the need for supplemental exhaust from known sources of indoor air pollution, possibly using transfer air.

Design Phase

- Examine manufacturers' safety information for products specified in contract documents that may be suspected contributors to indoor pollutants, including carpets, flooring, adhesives, wall coverings, partitions, and ceilings; insulating and fireproofing materials; sealants on windows, walls, and floors; use of paints, varnishes, etc.

- Request manufacturers provide information on curing, drying, and airing procedures for their products to minimize subsequent emission rates. Manufacturers can be asked the following questions:

  - What information does the supplier have about emissions of volatile organic compounds emitted after manufacture from its product? What chemical content labeling is included with the product?

  - What steps, both in manufacture and construction treatment, does the manufacturer take to reduce emissions from its product prior to installation in the building?

  - Is it possible for the manufacturer to air out the product before installation? If so, for how long and under what conditions?

- Review installation instructions for proposed adhesive materials used for installing sealing compounds, wall and carpet adhesives, paints, varnishes, etc., ensuring minimum use consistent with proper application.

- Review design documentation for compliance with applicable air quality and thermal comfort codes.

- Review design documentation for specification of temporary ventilation and filtration practices during construction and initial occupancy.

- Review design intent under all projected modes of operation and anticipated outdoor conditions, such as minimum and maximum outdoor temperatures and extreme outdoor conditions. Specific attention should be given to ventilation rates and temperature and humidity control during all projected operation modes.

- Review orientation of air intakes and exhausts with respect to cross-contamination and adjacencies to local pollution sources such as garages, loading docks, and cooling towers.

- Assess configuration of office partitions with respect to ventilation effectiveness of HVAC design.

- Review provisions of supplemental exhaust from known indoor pollution sources.

- Review choice of filtration type and design, materials, and location within the ventilation system. This should incorporate placement of air filtration systems based on outdoor air conditions and desired indoor contaminant concentrations.

- Review specifications of HVAC materials according to susceptibility to wind erosion, corrosion and microbial contamination.

- Review design of internal air supply system components such as condensate trays, water baffles, mist eliminators, and cooling towers to control the presence of free water and minimize microbial contamination.

- Ensure availability of access doors and/or inspection ports to all chambers and components of air-handling system's plenums. Ensure access doors on air-handling units are adequate to allow proper cleaning of condensate pans and/or humidifier reservoirs.

- Review specification and placement of HVAC insulation material with respect to potential microbial contamination.

Construction Phase

- Review installation of systems components, such as condensate pans and humidification equipment, to control standing water within the air-handing system.

- Ensure access to all critical components of the air supply systems that will require future cleaning and servicing.

- Ensure proper and careful installation of all HVAC insulation materials.
- Ensure implementation of temporary ventilation and filtration practices during periods of construction such as interior finishing. This may require increased ventilation rates and schedules and the use of items such as temporary operation pre-filters, unitary conditioning/filtering units, and removable windows.
- When the building is partially occupied during construction, the HVAC system should be operated to isolate occupied areas of the building from areas where construction is occurring. For example, this could be achieved by maintaining a relative positive pressure in occupied zones and diverting return air from the construction zones directly outdoors.

Acceptance Phase

- Examine all HVAC internals and filters for cleanliness and readiness for operation.
- Test and verify effective operation of those components of the air-handing systems using free water, including humidification control equipment. Proper drainage of water around the building, especially in the vicinity of al outside air intakes, should be verified.
- Verify that installed materials and equipment are as specified and that appropriate information has been submitted for all substitutes.
- Examine all insulating materials for integrity and proper installation.
- Review test and balance reports and compare to design intent. A spot check of ventilation rates and temperature and humidity control is recommended
- Conduct air quality testing as specified by applicable codes and standards.
- Verify that all system operations and maintenance manuals are available.

Post-Acceptance Phase

- Ensure adoption of temporary ventilation schedules and rates during and immediately after the acceptance phase.
- Review plans for post-commissioning indoor air quality testing compared to applicable standards and codes.
- Periodically undertake an ongoing IAQ audit process. The audit should include information on building occupancy and use changes.

Discussion

The process of building commissioning for indoor air quality, if followed carefully throughout all phases of building design, construction, and operation, will help comply with the complex and often ambiguous requirements of the proposed ASHRAE ventilation standard.