

## Changes in ASHRAE 90.1-2013

### Introduction

ASHRAE Standard 90.1 is developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) and provides energy efficiency guidelines for all commercial buildings, defined as buildings other than single-family dwellings and multifamily buildings three stories or less above grade. Newly published ANSI/ASHRAE/IES Standard 90.1-2013 incorporates major changes to requirements regarding building envelope, lighting, mechanical and the energy cost budget. Standard 90.1 acts as a benchmark for commercial building energy codes and can apply to all but low-rise residential buildings. It will likely take a few years to become widely used.

### Significant Changes

The most significant changes are:

**Building Envelope:** Opaque elements and fenestration requirements have been revised to increase stringency while maintaining a reasonable level of cost-effectiveness. Opaque and fenestration assemblies in Tables 5.5-1 through 5.5-8 are revised in most climates. These changes include:

- Criteria requiring double glazed fenestration in many climates.
- Minimum visible transmittance/solar heat gain coefficient (VT/SHGC) ratio to enable good daylighting with minimum solar gain, while not restricting triple and quadruple-glazing.
- Simplification of the sky lighting criteria.

**Lighting:** These changes include improvements to daylighting and daylighting controls, space-by-space Lighting Power Density (LPD) limits, thresholds for top lighting and revised controls requirements and format. Per IES director of technology, "While interior LPDs were reevaluated and most lowered, there continues to be an ongoing concern about maintaining quality of lighting installations for occupant satisfaction and comfort while achieving energy savings. The focus in the 2013 standard, therefore, was not just on lowering LPDs but on finding ways to achieve savings by adding more controls and daylighting requirements as well as including lighting limits for exterior applications based on jurisdictional zoning."

Some changes to lighting controls are:

- Occupancy sensors must be set to turn the lights off within 20 minutes (instead of 30 minutes) after a space is vacated.
- Automatic independent control is now required in secondary side lighted daylight zones (covering additional luminaires farther from the windows) rather than just incentivized with a control credit. Daylight harvesting step-dimming control now requires two control points between off and full-on (one dim level between 50–70 percent of design power and one between 20–40 percent—to provide greater flexibility).
- A second automatic lighting shutoff option is required for certain occupancy sensor installations (partial-off to 50 percent of design power within 20 minutes of the space being vacated—spaces where the lights are periodically not needed but must remain on).
- More detailed functional testing requirements are imposed.

**Mechanical:** Equipment efficiencies are increased for unitary air conditioning equipment, condensing units, heat pumps, water chillers, gas and oil fired boilers. Additional provisions address commercial refrigeration equipment, walk-in coolers and freezers, small motor efficiencies, and fan power control and credits, performance requirements of heat rejection equipment for cooling towers and

condensers, water side economizers set points for computer rooms, defines new setback points for cooling and heating, sets temperature at which vestibule heating should be turned off and provides stricter requirements for demand control ventilation of high occupancy areas.

Variable flow on all heating and chilled water systems is required where there are three or more control valves, regardless of the motor HP of the pump. The supply and exhaust energy recovery requirement is enhanced for all recirculated and 100% outside air ventilation systems.

The standard requires multiple-cell heat rejection equipment (cooling towers, dry-coolers, etc.) with variable speed fan drives to operate the maximum number of fans that comply with manufacturer's requirements, and control all fans to the same speed instead of staging them on and off.

Requirement for boiler systems to comply with minimum turndown ratios at various capacities of:

- $\geq 1,000,000$  Btuh = 3 to 1;  $> 5,000,000$  Btuh = 4 to 1;
- $> 10,000,000$  Btuh = 5 to 1

Humidification systems using dispersion tube in the air streams of ducts or AHUs shall be insulated with at least R-0.5 and jacketed humidifiers shall have provisions to shut off valve steam when not in use to minimize unnecessary heating of air.

On multiple chiller and boiler installation the corresponding pumps shall be shut off whenever the chiller or boiler is shut down.

Preheat coils shall have controls that stop their heat output whenever mechanical cooling, including economizer operation, is occurring. The intent is to limit simultaneous heating and cooling in air-handling equipment serving multiple zones. This has large implications for some types of pre-heat coils, such as face and bypass and integral face and bypass (IFB) steam coils. Also, the standard requires that control valves serving preheat coils be closed whenever mechanical cooling or economizer mode occurs. This is to prevent false loading on the cooling coil.

The standard requires provision for monitoring all major utilities in a building, recording at least every 60 minutes of data and reporting and collecting data for at least 36 months. There is also provisions that defines the accuracy of sensors.

**Compliance Path:** Another important change for the 2013 standard is the first alternate compliance path in Chapter 6. The first such alternate path has been developed for computer room systems and was formulated with the assistance of ASHRAE technical committee 9.9, Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment. This path uses the Power Usage Effectiveness (PUE) metric established by the datacom industry. This alternate efficiency path format provides a framework that could be considered for other energy using facets of buildings not easily covered in the prescriptive provisions of the standard.

This bulletin has only discussed some of the major changes. For detailed information, please refer to the standard.

### References

1. <http://www.ashrae.org/news/2013/ashrae--ies-publish-2013-energy-standard-changes-for-envelope-lighting-mechanical--sections>
2. <http://www.csemag.com/single-article/what-s-new-in-ashrae-901-2013/85cefb05bf5d6ceacbfd804fe32d2945.html>
3. <http://www.ecmag.com/section/lighting/introducing-ashraeies-901-2013>

