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ASHRAE Standard 189

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Session Intent

Understand the advanced concepts of ASHRAE 189 and how to prepare for the changes it will bring.

Standard 189.1

Is it Revolutionary
or
Evolutionary ?

Standard 189.1

It is Evolutionary - it creates very little if anything that is new. It is "simply" a repackaging, a unification of what we already are doing in high performance green buildings into a single document.

Let's call it the Grand Unified Standard of High Performance Green Buildings.

For those who are familiar with LEED and ASHRAE Standards, you will see the resemblance.

Standard 189.1

Evolutionary yes but we will be using it to
REVOLUTIONIZE the way that we procure, design,
build, operate and dispose of buildings?

Will 189 be the game changer that many believe we
need to propel High Performance Green Buildings
to a more generally accepted and deliverable
level?

Standardizing High Performance Buildings

Thirty-six years ago, in response to the oil embargo, ASHRAE developed Standard 90.1 for energy efficiency in buildings.

This became recognized as the basis for building codes and the standard for building design and construction throughout the USA and influences designs worldwide.

Standard 189 is poised to have a similar impact as 90.1

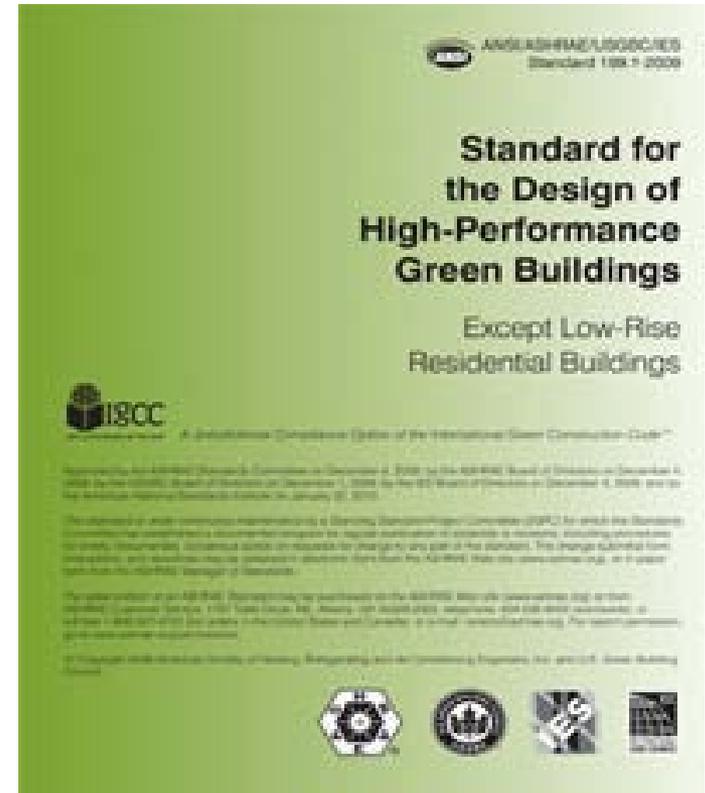
Where 90.1 set the foundation for energy efficiency, 189 builds on that foundation and adds:

- Additional energy efficiency and renewable requirements
- Requirements for site sustainability
- Water use efficiency
- Indoor environmental quality
- Building's impact on the atmosphere, materials and resources.

ASHRAE and USGBC

Intro to ASHRAE Standard 189.1 High-Performance Green Buildings

- In 2002, both organizations entered into a Partnering Agreement and the ASHRAE GreenGuide was developed to assist USGBC in their efforts at promoting sustainable design.
- The latest collaboration between
- ASHRAE, IESNA and the USGBC is
- Standard 189.1 begun in June 2006
- And adopted in Jan 2010.



Standard 189.1 for High Performance Green Buildings

It is the culmination of a joint effort begun in 2006 between ASHRAE, the USGBC, the Illuminating Engineering Society of North America, IESNA, and the International Code Council, ICC.

It is based upon LEED, and ASHRAE Standards 90.1-2007 for Energy Efficiency, 62.1-2007 Ventilation for Acceptable Indoor Air Quality and 55-2004 for Thermal Environmental Conditions for Human Occupancy

Standard 189.1

- It is a Standard
- Applies to all buildings except low rise residential
- Intended for adoption into building codes
- All elements of 189 are required, whereas LEED offers options from a menu to earn points.

- It is not a design guide
- It is not a rating system
- It does not compete with green building rating systems such as LEED – it supports LEED efforts

Standard 189.1 Purpose

“The purpose of this standard is to provide minimum requirements for the siting, design, construction, and plan for high performance, green buildings to:

- a) Balance environmental responsibility, resource efficiency, occupant comfort and well being, and community sensitivity
- b) Support the goal of development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Standard 189.1 Scope

Provides minimum criteria that apply to the following elements of building Projects:

- New Buildings or new building portions and their systems
- New systems and equipment in existing buildings

This Standard does not apply to single family houses, multi-family structures of 3 stories or fewer above grade, mobile homes, and modular homes. It also does not apply to buildings that do not use electricity, fossil fuel or water.

This Standard shall not be used to circumvent any safety, health or environmental requirements.

Standard 189.1 Addresses

- Site sustainability
- Water use efficiency
- Energy efficiency
- Indoor Environmental Quality, IEQ
- Building's impact on the atmosphere, materials and resources.
- Construction and plans for operation

Two Compliance Paths

Mandatory plus the Prescriptive Path – the simpler option with few calculations.

Mandatory plus the Performance Path – provides more options and flexibility but requires more effort and calculations.

Note: for the category of Construction & Operations Plans, there are ONLY Mandatory Requirements!

Site Sustainability

Mandatory Provisions:

- Intent is to minimize development of greenfields and undeveloped sites
- Allowable sites including existing buildings, brownfield site, and greyfield sites. Greenfield sites are allowed under certain conditions.
- Mitigation of heat island effect including site hardscape and roofs
- Reduction of light pollution including backlight and glare

Site Sustainability

Prescriptive Option:

Effective Pervious Areas for All Sites - minimum of 40% of the site shall incorporate any combination of vegetated areas, porous pavers, vegetated roof, and permeable pavements.

Greenfield Sites

- If more than 20% of the predevelopment area is existing native vegetation, they are to be retained
- If less than 20% of the predevelopment area is existing vegetation, the site shall be developed to provide 20% or more native vegetation

Site Sustainability

Performance Option – varying rainfall percentages are required to be managed by infiltration depending upon development type.

- For existing buildings, a minimum of 20% managed through infiltration
- For greyfield and brownfield site, 40% is required.
- For all other types, a minimum of 50% is required.

Water Use Efficiency

Mandatory Provisions:

Site Water Use Reduction

- Landscape design
- Irrigation System design
- Irrigation Controls

Building Water Use Reduction

- Plumbing fixtures
- Appliances
- HVAC Systems
- Roofs

Water Use Efficiency

Mandatory Provisions:

Water Consumption Measurement

- Consumption Management through the use of meters with remote communication capability. Includes consumption data collection and data storage and retrieval

Water Use Efficiency

Prescriptive Option:

- Site Water Use Reduction – limits use of potable water for irrigation and encourages and/or requires use of reclaimed water such as golf courses.
- Building Water Use Reduction – governs cooling tower use, commercial food service operations and medical and lab facilities.
- Special Water Features – includes ornamental water uses, generally limited to non-potable water

Water Use Efficiency

Performance Option:

Site Water Use Reduction – sets limits on potable water use for irrigation based on water demands and climate area.

Building Water Use Reduction – designed to have a total annual interior water use less than or equal to that achieved by compliance with the Prescriptive Option requirements for building use.

Energy Efficiency

Consists of Six Major Categories:

1. Building Envelope
2. On-Site Renewable Energy
3. Mechanical Equipment Efficiencies
4. Energy Consumption Data Collection
5. Peak Load Control
6. Lighting

And all of Standard 90.1 but more stringent at 30% more energy efficient than 2007 version

Energy Efficiency

Mandatory Provisions:

- General for building projects – designed to comply with ASHRAE Std 90.1 those Sections containing mandatory provisions for building envelope, HVAC, service water heating, power, lighting and other equipment
- On- Site Renewable Energy – provide capability of future installation
- Energy Consumption Management – use of smart meters, consumption collection, and data storage & retrieval.

Energy Efficiency

Prescriptive Option:

Looks similar to the Advanced Energy Design Guide, AEDG and based on climate zones.

On-Site Renewable – provide annual energy production equivalent of 6.0 Kbtu/SF of conditioned space.

Building Envelope – prescriptive requirements for walls, windows, roofs, doors, continuous air barrier, etc.

Energy Efficiency Prescriptive Option Cont'd

HVAC Systems:

- Minimum Equipment Efficiencies – either EAct Baseline or Higher Eff. than EnergyStar
- Ventilation Controls for densely occupied spaces
- Duct & Plenum leakage
- Economizers
- Zone Controls
- Fan system power limitations
- Controls
- Exhaust air heat recovery
- Variable speed fans for commercial kitchen hoods

Energy Efficiency Prescriptive Option Cont'd

HVAC Systems Cont'd:

- Pipe & Duct insulation
- Automatic control of lights and HVAC in hotel/motel guest rooms
- Service water heating

Power:

- Peak load reduction
- Lighting power allowance
- Occupancy sensor controls
- Daylight dimming
- Outdoor lighting controls

Energy Efficiency Prescriptive Option Cont'd

Power Cont'd:

- Electric motors
- Supermarket heat recovery
- Energy Star rated appliances and general equipment
- Commercial refrigerators, freezers, & clothes dryers

Energy Efficiency Performance Option

Annual Energy Costs

The building project's annual energy costs are less than or equal to that achieved with the Prescriptive Option

Annual Carbon Dioxide Equivalent

The building project's annual CO₂ emissions are less than or equal to that achieved with the Prescriptive Option

Annual Load Factor/Peak Electrical Demand

The building project's electrical peak demand is less than or equal to that achieved with the Prescriptive Option. And annual load factor to be a minimum of .25

Note: must do all three

Indoor Environmental Quality

Three Critical Components:

1. Source Control – No Smoking,
2. Air Cleaning – air filter MERVs
3. Dilution – Ventilation Rate Procedure

Indoor Environmental Quality

Mandatory Provisions

Indoor Air Quality

- Ventilation per ASHRAE Standard 62.1
- Outdoor air flow monitoring
- MERV 8 air filters or 13 in non-attainment areas
- No smoking in the building
- Building entrances - source containment control

Thermal Environmental Conditions – ASHRAE Standard 55

Acoustical Control

Daylighting including skylights

Indoor Environmental Quality Prescriptive Option

Daylighting by Sidelighting

- Minimum effective aperture
- Office space shading

Materials – similar to LEED

- Adhesives and sealants
- Paints and coatings
- Floor covering materials
- Composite wood products
- Office furniture
- Ceiling and wall systems

Indoor Environmental Quality Performance Option

Daylighting computer simulation - demonstrate illumination of at least 30 fc on a plane 3' above the floor within 75' of daylight zones.

Materials – emissions of all materials used within the building shall be modeled for individual VOC concentrations.

Building's Impact on the Atmosphere, Materials and Resources

Mandatory Requirements address four issues:

1. Management of Construction Waste
2. Origin of building materials
3. Selection of refrigerants
4. Storage and collection of recyclables and discarded goods

Building's Impact on the Atmosphere, Materials and Resources

Mandatory Provisions

- Diversion of min of 50% construction & demo waste from landfills by reuse /recycle
- Total Waste – defines max waste per NC floor area
- Extracting, Harvesting, and/or Manufacturing – to be done in accordance laws & regulations of country of origin.
- Refrigerants – shall not use CFCs for HVAC and R; and fire suppression shall not use CFCs, HCFCs, or Halons.

Materials and Resources

Mandatory Provisions cont'd

Storage & Collection of Recyclables and Discarded Goods

- Dedicated space for recyclables
- Reusable goods –collection and storage
- Fluorescent and HID lamps & ballasts – collection and storage

Materials and Resources

Prescriptive Option:

- Reduced impact materials
- Recycled content
- Regional materials
- Bio-based products
- Wood building components

Materials and Resources

Performance Option:

Life Cycle Assessment – performed in accordance with ISO Standard 14044 for a minimum of two alternative buildings using different materials.

Construction and Plans for Operation

Mandatory Provisions – NOTE: there are NO Prescriptive or Performance Options!!

Two Categories of Requirements:

1. During Construction
2. During Operations

Construction and Plans for Operation

Construction & Prior to Building Permit:

- Building acceptance testing pre and post occupancy
- Systems acceptance testing
- Documentation
- Commissioning
- Erosion & sediment control
- IAQ Construction Management
- Moisture control
- Construction activity pollution prevention

Construction and Plans for Operation

Plans for Operation

High performance building plan

- Site sustainability
- Water use efficiency
- Energy efficiency
- Measure & verification
- Indoor Environmental Quality – outdoor airflow, Indoor Air Quality

Construction and Plans for Operation

Building Green Cleaning Plan

Service Life Plan

Transportation Management in Owner Occupied
Building Projects

Questions?

End of the Presentation
but the Beginning of a Discussion



Discussion and Comments

Audience is composed of three types:

1. The Faithful who believe
2. Those who need some convincing with facts and figures
3. The Infidels

Do we all agree that ASHRAE 189 is “good” for society?

- Weigh up costs vs. benefits
- Are we at the point of “having no choice” but to use 189 or similar standards to achieve a sustainable future at least where the built environment is concerned?

Proponents of 189

Who will drive the adoption of the Standard?

Government

- Federal – the Army requires use of 189 beginning in FY2013
- State
- Local

Business Owners – demonstrates leadership, offers many benefits but will they outweigh the costs?

Concerns

Adds cost to buildings?

The industry is not up to the 189 challenge

The entire built industry needs to be trained including:

- A/E design teams
- Construction Managers
- General Contractors
- Manufacturers
- Code officials

How to verify compliance – need tools such as we have for ASHRAE 90.1 called COMcheck, a DoE software program

Business Growth Opportunities in High Performance Buildings!

A/E Design Firms:

- Demonstrates leadership
- No cut copy paste engineering
- No CAD commodity design

GCs and CM – leadership and superior, quality construction

Contractors – quality workmanship

Manufacturers:

- New products
- Better existing products

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