

Army Policy and ASHRAE 189.1

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US Army Corps of Engineers
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New Army Policy

On October 27, 2010, Ms. Hammack, who was a member of the ASHREA 189.1 development committee, issued an update to the Sustainable Design and Development Policy that changes our MILCON energy performance standard from 40% better than ASHRAE 90.1 to ASHRAE 189.1.

Due to many differences between the private sector and the MILCON project requirements and site circumstances common to Military installations, the policy includes many important exceptions and caveats.

Honorable Katherine Hammack
*Assistant Secretary of the Army
(Installations, Energy, & Environment)
Office of the Assistant Secretary of the Army*



Standard 189.1 Relation to Other ASHRAE Standards

ASHRAE STANDARD 90.1 (current version)

Energy Standard for
Buildings Except Low-Rise
Residential Buildings

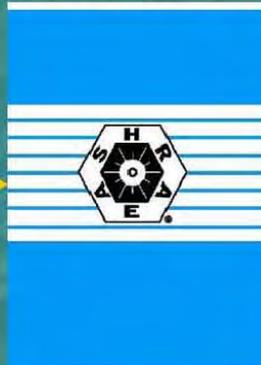


ASHRAE STANDARD 62.1 (current version)

Ventilation
for Acceptable
Indoor Air Quality

Adapt, with
modifications

-30%



BSR/ASHRAE/USGBC/IESNA Standard
189.1P

Public Review
Draft

ASHRAE® Standard

Proposed Standard 189.1P,
Standard for the Design of
High-Performance Green
Buildings Except Low-Rise
Residential Buildings

Adapt,
with minor
modifications

55 (current version)



ASHRAE STANDARD

Thermal
Environmental
Conditions for
Human Occupancy

Adapt

Take away: 189.1 is a combination of existing standards with modifications to increase energy and sustainability requirements



ASHRAE Standard 189.1 Scope

Provides minimum criteria that:

(a) Apply to new commercial and industrial buildings and major renovation projects (new portions or new systems)

(b) Addresses site sustainability, water and energy efficiency, indoor environmental quality (IEQ) the building's impact on the atmosphere, materials and resources.

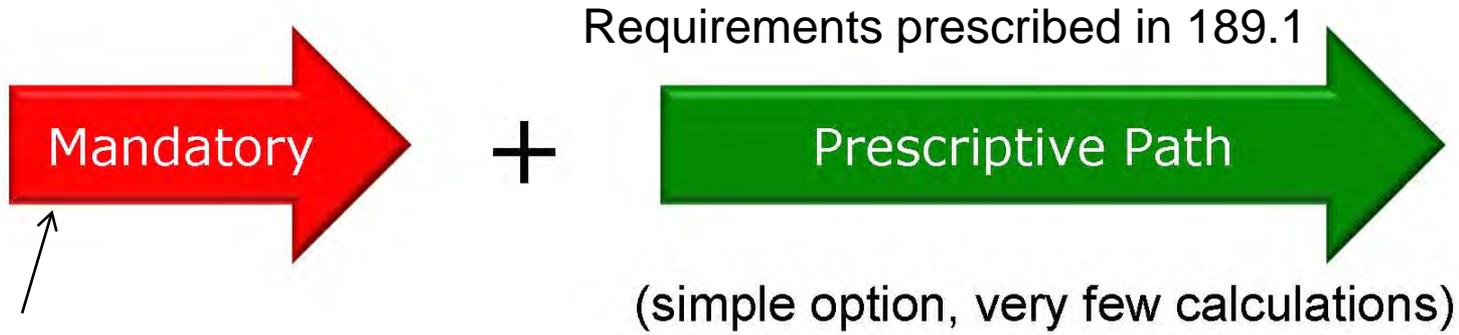
Does not apply to:

(a) Single-family residential, multi-family <3 stories, manufactured houses (mobile or modular homes)

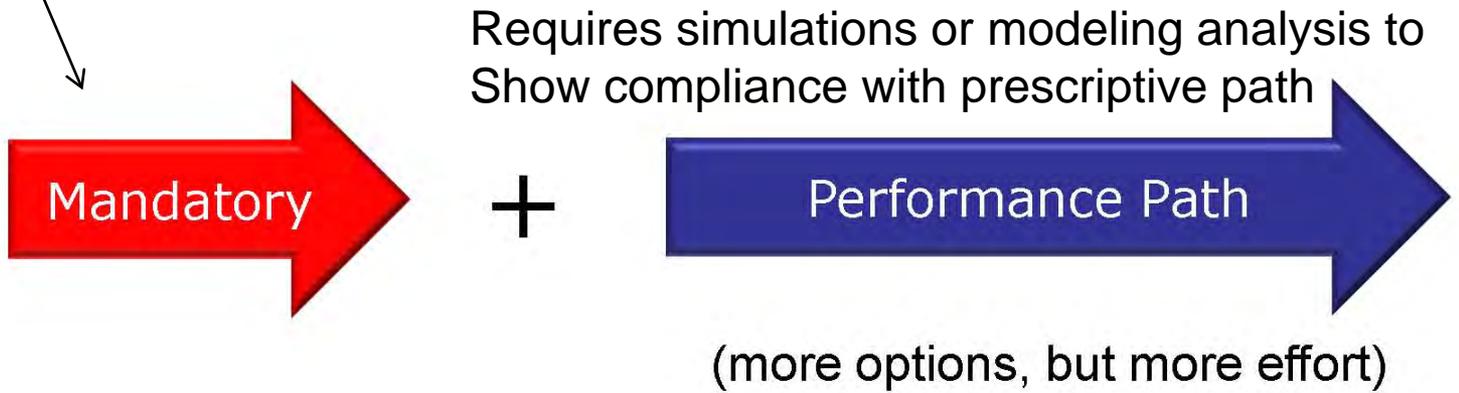
(b) Buildings that do not use electricity, fossil fuel or water.



Compliance Paths



Required for all projects:



ASHRAE Standard 189.1 Topic Areas

SS

Site Sustainability

WE

Water Use Efficiency

EE

Energy Efficiency

IEQ

Indoor Environmental Quality

MR

Building's Impact on the Atmosphere, Materials and Resources

CO

Construction and Plans for Operation



ASHRAE Standard 189.1 - Site Sustainability

Site Selection:

- Prohibits “sprawl” – **incompatible with many Army sites**
- Allowable Sites – Brownfields, Greyfields, or Urban infill
- Prohibited development activity
 - Greenfields
 - Flood plains
 - Wetlands
 - Fish & Wildlife habitat

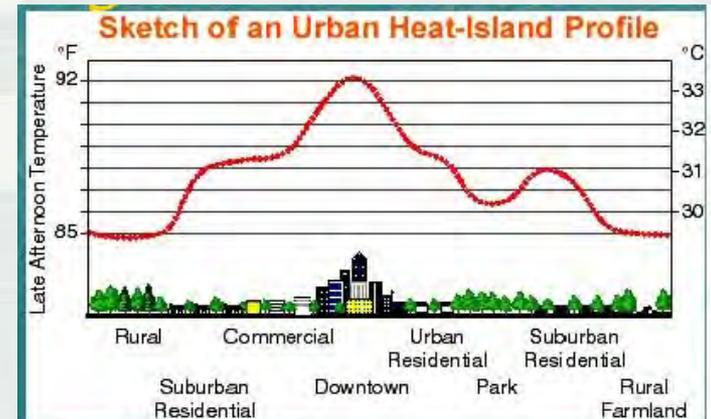
Reduce Heat Island Effect:

- Shaded or higher solar reflective index (SRI) materials

Reduction of Light Pollution:

- Max lumens per site
- Backlight and glare limits

Site Development – Performance or Prescriptive Measures



Mapping 189.1 to Army Requirements

Section 5 – Site Sustainability

FY11/12 FY13

Site Selection – Section 5.3.1

SDD Policy Update states that Project Planners and Master Plan development teams shall review and evaluate 189.1 Sec 5 "Mandatory Provisions" as part of all project site selection activities. ○ ●

Preference will be given to project sites that meet the criteria for "Allowable Sites." ○ ●

Sites meeting the criteria for "Prohibited Development Activity" shall be avoided unless an exception is approved. ○ ●

Exceptions: Facilities typically sited in remote locations due to their function.

Reduce Heat Island Effect – Section 5.3.2 Mitigation of Heat Island Effect ○ ●

SDD Policy Update does not address compliance with 5.3.2.1 (Site Hardscape - vegetation, paving materials with SRI > 29, other buildings, etc) and 5.3.2.2 (Shading of Walls with vegetation, existing buildings, etc).

Full compliance with 5.3.2.3 (Cool roofs) ● ●

Reduction of Light Pollution – Section 5.3.5 ○ ●

SDD Policy Update does not address compliance with 5.3.3 Reduction of Light Pollution.

Site Development – Sec. 5.4.1 (Prescriptive) or 5.5.1 (Performance) ● ●

Army Low Impact Development (LID) Policy 29 July 2010

○ As Project Scope Allows ● Requirement with Exceptions Allowed ● Requirement - No Exceptions[®]



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ASHRAE Standard 189.1 - Water Use Efficiency

Site Water Use Reduction

- bio-diverse plantings
- hydro-zoning
- smart irrigation controllers

Building Water Use Reduction

- Plumbing fixtures & fittings per US EPA WaterSense or ASME Standards (generally 40% lower than EPA Act 1992)
- Appliances per US EPA EnergyStar, with water use factor for public access appliances
- HVAC Systems and Equipment – Once through cooling w/ potable water prohibited
- Roofs

Water Metering

- Lease space >50,000 ft²
- Other users >1000 gal/day

Plus Performance or Prescriptive Measures



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Mapping 189.1 to Army Requirements

Section 6 – Water Use Efficiency

FY11/12 FY13

Site Water Use Reduction – Section 6.3.1 Mandatory Provisions

Design additions require no potable water use for irrigation. Unclear if other 189.1 specifications (landscape design, irrigation systems design, and controls) are required.

Exceptions:

Building Water Use Reduction – Section 6.3.2 Mandatory Provisions

Design additions comply with 6.3.2.1. Unclear if compliance with 6.3.2.2 or 6.3.2.3 is required (appliances and HVAC systems and equipment).

Exception: Public lavatory faucets shall deliver a minimum flow rate of 0.5gpm instead of a 0.5gpm maximum

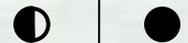
Water Metering – Section 6.3.3 Water Consumption Measurement

AR 420-1 22-15 Metering states "When cost effective, installation of meters and/or submeters is required as a management enhancement tool...c. Water meters.water meters installed in existing buildings or facilities must be equipped with remote metering capability or AMR..." If water meters are installed then it would meet the requirements of 189.1 so long as the Water Supply Source Measurement Thresholds are met. There may be an added cost associated with water data control and storage.

Special Water Features – Sec. 6.4.3

Special water features will not be used in Army facilities

➤ Plus 6.4 Prescriptive Option or 6.5 Performance Option



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ASHRAE Standard 189.1 - Energy Efficiency

**Goal of 30% more energy efficient than Standard 90.1-2007
(Including “Process” Loads and Renewable Energy)**

Renewable energy provisions

- Provisions for future installation with minimum rating of 13 Btu/ft² (40 W/m²) x roof area in ft² (m²)

Energy measurement/metering for verification

- Remote or automatic reading measuring devices
- Communicate to central recording system

Plus Performance or Prescriptive Measures



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Mapping 189.1 to Army Requirements

Section 7 – Energy Efficiency

Sec. 7.3 Mandatory Provisions

FY11/12 FY13

Renewable Energy Provisions – Section 7.3.2 On-Site Renewable Energy



Systems – Requirement to provide for future installation of on-site renewable energy systems based on a minimum rating of 3.7 W/ft² multiplied by the total roof area in ft². Roofs must be designed to account for structural support requirements and local wind conditions

- The planned future location of the renewable energy installation is not limited to the roof - it can be anywhere on the building project site

Exceptions:

- Building projects with roofs that receive limited solar radiation.

Energy measurement/metering for verification – Section 7.3.3 Energy

Consumption Management - Unclear if metering specifications in design covers all 189.1 requirements.



As Project Scope Allows

Requirement with Exceptions Allowed

Requirement - No Exceptions[®]



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ASHRAE Standard 189.1 - Energy Efficiency (Cont)

Prescriptive Measures – When requirement provided it supersedes Standard 90.1-2007. For all other criteria, the project shall comply with 90.1-2007.

Renewable Energy

- Annual energy production equivalent of 6 Kbtu/ft² of conditioned space
- Exception for areas with incident solar radiation less than 4 kWh/m²-day and a cumulative purchase of green power of 70 kWh/ft² for a period not to exceed ten years.

Other Prescriptive Areas

- **Building Envelope** (roof, walls, windows, vestibules, air barriers)
- **HVAC** (equipment efficiencies, ventilation controls, duct and plenum leakage, controls)
- **Power** (peak load reduction)
- **Service Water Heating**
- **Lighting** (lighting power allowance, occupancy sensors, dimming, daylighting controls)
- **Equipment** (appliances, HVAC equipment, electronics, office equipment, lighting)

Prescriptive Option (Building Envelope)

- Example comparisons:

Example:

Climate zone 3	Std 90.1	Std 189.1
Insulation above deck	R-20	→ R-25

- More stringent SHGC

R=4.4 SI

Example for <40% window area:

Climate zone 5

Std. 90.1: 0.40

Std. 189.1: 0.35 all orientations

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Mapping 189.1 to Army Requirements

Section 7 – Energy Efficiency

Sec. 7.4 Prescriptive Requirements

FY11/12 FY13

General Comprehensive Prescriptive Requirements– Section 7.4.1 – When a requirement is provided in 189.1, it supersedes the requirement in ASHRAE Standard 90.1-2007. For all other criteria, the building project shall comply with the requirements of ASHRAE Standard 90.1-2007.



Renewable Energy Requirements – Section 7.4.1.1 – On-site Renewable Energy Systems – Building projects shall contain on-site renewable energy systems that provide the annual energy production equivalent of not less than 6.0kBtu/ft2 of conditioned space. The annual energy production shall be the combined sum of all on-site renewable energy systems.



▷ *Army Solar Thermal Hot Water requirement can be used to meet all or part of the renewable energy requirements in 189.1*

Exceptions:

- Building projects with roofs that receive limited solar radiation.
- ***SDD policy allows the on-site renewable energy requirements to be aggregated into larger scale projects and met on a program-wide basis beginning in FY15.***

Other Prescriptive Areas – Sections 7.4.2-7.4.8 – Building envelope, HVAC, Service Water Heating, Power, Lighting, Other Equipment, Energy Cost Budget)



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◐ Requirement with Exceptions Allowed

● Requirement - No Exceptions[®]



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ASHRAE Standard 189.1 - Energy Efficiency (Cont)

Prescriptive Option - Mechanical

Equipment Efficiency Compliance Options



U.S. EPA Act Baseline

Use equipment with U.S. EPA Act baseline efficiency levels, and:

- Renewable energy system producing annually 6 kBtu/ft² of conditioned floor space
- Peak load reduction of 10%

Higher Efficiency

Use higher efficiency of EnergySTAR requirements and Appendix C, and:

- Renewable energy system producing annually 4 kBtu/ft² of conditioned floor space
- Peak load reduction of 5%

Mapping 189.1 to Army Requirements

Section 7 – Energy Efficiency

Sec. 7.5 Performance Option –

FY11/12 FY13

Section 7.5.2 Annual Energy Cost – Building project shall have an annual energy cost less than or equal to that achieved by compliance with Sections 7.3 (Mandatory Provisions) and 7.4 (Prescriptive Option), and Sections 5.3.2.2 (Walls), 5.3.2.3 (Roofs), 6.3.2 (Building Water Use Reduction – Mandatory Provisions), 6.4.2 (Building Water Use Reduction – Prescriptive), 8.3.1 (Indoor Air Quality), 8.3.4 (Daylighting by Toplighting), and 8.4.1 (Daylighting by Sidelighting)



Section 7.5.3 Annual Carbon Dioxide Equivalent (CO₂e) – Building project shall have an annual CO₂e less than or equal to that achieved by compliance with the prescriptive sections.



Section 7.5.4 Annual Load Factor/Peak Electric Demand – Building project shall have the same or less peak electric demand than achieved by compliance with the prescriptive sections.



As Project Scope Allows

Requirement with Exceptions Allowed

Requirement - No Exceptions[®]



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ASHRAE Standard 189.1 – Indoor Environmental Quality

Indoor Air Quality

- Ventilation rates per ASHRAE Standard 62.1
- Outdoor air flow rate monitoring of minimum outside air
- MERV 8 filter (MERV 13 in PM2.5 non-attainment areas)
- No smoking inside building
- Source contaminant control

Thermal Comfort

Acoustical Control

- ASHRAE Standard 55

Daylighting and Top Lighting

Plus Performance or Prescriptive Measures



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Section 8 – Indoor Environmental Quality

Sec. 8.3 Mandatory Provisions –

FY11/12 FY13

Indoor Air Quality – Section 8.3.1 – The building shall comply with Sections 4 through 7 of ASHRAE Standard 62.1 with modifications and additions from 189.1:

- ▷ 8.3.1.1 Minimum Ventilation Rates
- ▷ 8.3.1.2 Outdoor Air Delivery Monitoring
- ▷ 8.3.1.3 Filtration and Air Cleaner Requirements
- ▷ 8.3.1.4 Environmental Tobacco Smoke
- ▷ 8.3.1.5 Building Entrances
- SDD Policy Memo does not specifically address Indoor Air Quality
- Increased requirements will vary with location and some requirements will result in additional cost

Thermal Comfort – Section 8.3.2 – Thermal Environmental Conditions for Human Occupancy – Building shall be designed in compliance with ASHRAE Standard 55.

Acoustical Control – Section 8.3.3

Daylighting by Toplighting – Section 8.3.4

Sections 8.4/8.5 Prescriptive or Performance Option –

Daylighting by sidelighting (8.4.1) or Simulation (8.5.1) – General provisions in LEED require minimum daylighting factor requirement. 189.1 specifies illuminance levels

Materials (8.4.2 or 8.5.2) – Similar to LEED requirements. General provisions in LEED requires low emitting materials, but does not specify minimum VOC levels.

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○ As Project Scope Allows ● Requirement with Exceptions Allowed ● Requirement - No Exceptions[®]



ASHRAE Standard 189.1 – The Building’s Impact on the Atmosphere, Materials, and Resources

Construction waste management

Extracting, Harvesting, and/or Manufacturing

Refrigerants

Storage and collection of recyclables and discarded goods

Reduced Impact Materials, Recycled Content, Wood Products

Plus Prescriptive or Performance Measures

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Section 9 – The Building’s Impact on the Atmosphere, Materials, and Resources

FY11/12 FY13

Sec. 9.3 Mandatory Provisions –

Construction Waste Management – Section 9.3.1

● ●

Extracting, Harvesting, and/or Manufacturing – Section 9.3.2

○ ●

Refrigerants – Section 9.3.3 – Current Army requirements are similar but not as stringent as 189.1

● ●

Storage and Collection of Recyclables and Discarded Goods – Section 9.3.4 – current policy complies with Section 9.3.4.1 for Recycling but unclear if there is a requirement for Reusable goods (9.3.4.2) and Fluorescent and HID Lamps and Ballasts (9.3.4.3)

○ ●

Sections 9.4 Prescriptive – Reduced Impact Materials, Recycled Content, Regional Materials, Biobased Products, Wood Building Products

○ ●

Section 9.5 Performance Option – There are no Life-cycle requirements for Materials

○ ●

○ As Project Scope Allows

● Requirement with Exceptions Allowed

● Requirement - No Exceptions[®]



ASHRAE Standard 189.1 – Construction and Plans for Operation

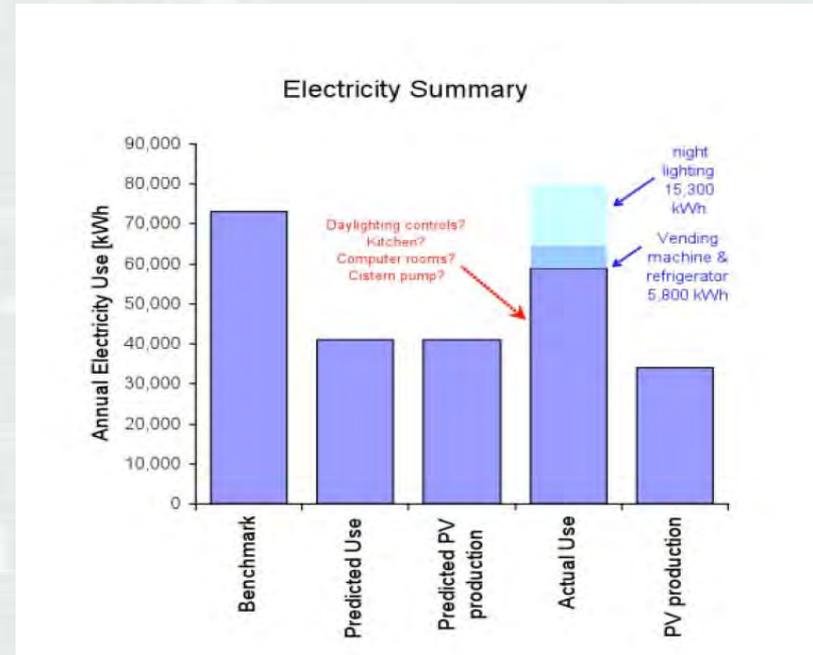
Acceptance Testing / Commissioning

- For projects >5,000 ft²
- HVAC, building envelope, lighting, irrigation, plumbing, domestic water, renewable energy

IAQ Construction Management Plan

Plans for Operation

- High-performance building operation
- Maintenance
- Service Life
- Transportation Management



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Section 10 – Construction and Plans for Operation

FY11/12 FY13

Sec. 10.3 Mandatory Provisions –

Construction – Section 10.3.1 – Compliance with the following sections is currently required:

- ▷ 10.3.1.1 Building Acceptance Testing
- ▷ 10.3.1.2 Building Project Commissioning
- ▷ 10.3.1.3 Erosion and Sediment Control – EPA Requirement
- ▷ 10.3.1.4 Indoor Air Quality (IAQ) Construction Management
- ▷ 10.3.1.5 Moisture Control

Unclear if compliance with the following sections is required:

- ▷ 10.3.1.6 Construction Activity Pollution Prevention

Plans for Operation – Section 10.3.2 – Unclear if compliance with all of the subsections are required by Army policy



○ As Project Scope Allows

◐ Requirement with Exceptions Allowed

● Requirement - No Exceptions[®]



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Where to Find 189.1

USACE Staff (From a USACE Network):

- Go to <http://www.wbdg.org>
 - ▶ Under “Participating Agencies, click DoD Seal 
 - ▶ In the drop-down menu under the Corps logo, click Non-Government Standards.
 - ▶ Click on Select button under IHS
 - ▶ Login or create an account
 - ▶ Click on “IHS Standards Expert”
 - ▶ Under the Search area type “ASHRAE 189.1” and hit Enter

- ▷ BE SURE TO CROSS REFERENCE EXCEPTIONS AND CAVEATS IN ASA(IE&E) SDD POLICY MEMO / ECB

