



ENERGY STAR Multifamily High Rise California Performance Path Requirements, Version 1.0

ENERGY STAR MFHR Performance Path Requirements:

To earn the ENERGY STAR using this performance approach, a building must meet the requirements specified below, the Performance Target, and be verified and field-tested in accordance with the *ENERGY STAR MFHR Testing and Verification Protocols*. Note that compliance with these guidelines is not intended to imply compliance with all 2013 Title 24 requirements that may be applicable to the building to be built.¹ All mandatory measures of 2013 Title 24 must still be met and the Performance Compliance Approach (Section 140.1) must be followed. Any references within this document to Prescriptive Requirements within 2013 Title 24 Sections 140.2-140.8, are mandatory requirements of the ENERGY STAR MFHR program. Any references within this document to residential requirements of 2013 Title 24 that typically do not apply to nonresidential buildings are intentional and mandatory requirements of the ENERGY STAR MFHR program.

To meet the certification guidelines, the developer of a project participating in the ENERGY STAR MFHR program must provide EPA or its designated agent with program specific submittals. These submittals, which must be validated by a licensed professional (registered architect or professional engineer), are used to demonstrate that the ENERGY STAR MFHR program's performance target has been met, that all ENERGY STAR MFHR program prerequisites are included, and that each energy conservation measure chosen by the design team is installed to specification.

Performance Target:

In California, the Performance Target is 15% time dependent valuation (TDV) energy savings over the 2013 Title 24 Standard, using CEC approved Title 24 modeling software. TDV energy savings associated with on-site power generation, including cogeneration, photovoltaics, and wind turbines, may not be used to meet the Performance Target of 15%.

ENERGY STAR MFHR Testing and Verification Protocols (T&V Protocols):

The *T&V Protocols* are mandatory requirements for the inspection, testing, and verification of components related to the building's energy performance. All inspections and diagnostic tests described within these protocols are required for each of the energy-related components and systems that exist in the participating building. Results of inspections must be documented and kept on record with the building file by a licensed professional and submitted to EPA, or its designated agent, at the completion of construction. These inspections shall be conducted throughout the project construction phase at a time that is best suited to determine whether the energy efficiency element is installed to specification.

ENERGY STAR MFHR Submittal Requirements:

To meet the certification guidelines, EPA or its designated agent must approve a complete Proposed Design Submittal and a complete As-Built Submittal. EPA or its designated agent will not approve incomplete submittals, but will communicate with Developer Partners and licensed professionals on which requirements must be met to bring the submittal into compliance with program requirements.

Proposed Design Submittal (Submitted prior to construction)

The Proposed Design Submittal is used to ensure that the project design meets the Performance Target and that the mandatory requirements of the ENERGY STAR MFHR program have been included in the construction documents. The licensed professional is responsible for submitting a Proposed Design Submittal, with an *ENERGY STAR MFHR Submittal Validation Form* to EPA, or its designated agent for approval, prior to beginning construction. The Proposed Design Submittal includes the following:

- Proposed Design Performance Path Calculator

The Proposed Design *Performance Path Calculator* summarizes the modeling results of the proposed building design, and is used to demonstrate achievement of the Performance Target. The *Performance Path Calculator* is a set of worksheets in an Excel file designed to provide a consistent format for reporting the results of the Performance Rating. Many of these worksheets are optional, however, submission of the Excel file, with Basic Info, Reporting Summary, In-Unit and Interior Lighting worksheets completed, is mandatory.



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- Testing and Verification Worksheets

A full review of all construction documents must be conducted prior to construction and documented using the *T&V Worksheets*. The *Prerequisites Checklist* is used at this stage to demonstrate that ENERGY STAR MFHR prerequisites and energy conservation measures chosen by the design team have been properly specified within the construction documents. The checklist is included as part of the *T&V Worksheets* and is automatically completed when the other *T&V Worksheets* are used to document the plan review process.

Developer partners may not promote the units within their project as ENERGY STAR until all program requirements are met and confirmed by EPA or their designated agent. Eligible projects may use the Designed to Earn the ENERGY STAR mark after the design phase of the project if they have an approved Proposed Design Submittal and the design receives a score of 75 or higher, using EPA’s Portfolio Manager. More information is available in the *Designed to Earn the ENERGY STAR for MFHR* document available on the [Guidance Documents](#) page.

As-Built Submittal (Submitted post construction)

The As-Built Submittal is used to ensure that the energy conservation measures chosen by the design team are installed to specification. After the final inspection, the licensed professional is responsible for submitting an As-Built Submittal, with an *ENERGY STAR MFHR Submittal Validation Form* to EPA, or its designated agent for approval. Once EPA has determined that the project has fulfilled all of the ENERGY STAR MFHR program requirements, the Developer Partner will be notified that the building has earned the ENERGY STAR and that it can be marketed and promoted per the *ENERGY STAR Logo Identity Guidelines*. The As-Built Submittal includes the following:

- As-Built Performance Path Calculator

The As-Built *Performance Path Calculator* summarizes the modeling results of the completed building, and is used to demonstrate achievement of the Performance Target. Any modifications to the project’s energy conservation measures during construction must be reflected in the *As-Built Performance Path Calculator*.

- Testing and Verification Worksheets and Photo Template

The *T&V Worksheets* and *Photo Template* are used to demonstrate that ENERGY STAR MFHR prerequisites and energy conservation measures chosen by the design team are included in the completed building and meet all requirements of the *ENERGY STAR MFHR Testing and Verification Protocols*. (Note, once a licensed professional or Developer Partner has successfully certified 3 buildings, submission of a Photo Template as a component of the Testing and Verification Protocols is no longer required.)

ENERGY STAR MFHR Prerequisites²:

Appliances	When provided in common areas and/or apartments, refrigerators, dishwashers, clothes washers, ceiling fans and vending machines must be ENERGY STAR certified.
Heating and Cooling Equipment	<ul style="list-style-type: none"> ▪ Per subsection (a) of Section 140.4, mechanical heating and mechanical cooling equipment shall be the smallest size, within the available options of the desired equipment line, necessary to meet the design heating and cooling loads of the building, as calculated according to 2013 Title 24 Standards subsection (b) of Section 140.4. ▪ Atmospherically vented gas furnaces and boilers shall not be specified.
Heating and Cooling Distribution^{3,4,5}	<ul style="list-style-type: none"> ▪ Total duct leakage for in-unit systems shall be ≤10% of the nominal air handler airflow rate as confirmed through field verification and diagnostic testing, in accordance with the applicable procedures in 2013 Reference Nonresidential Appendices NA1 and NA2. Sampling procedures and tolerances are described Nonresidential Appendix NA1.6. ▪ Heating and cooling duct systems shall be sized and installed according to the latest editions of ACCA Manual D, ASHRAE Handbook of Fundamentals, or a substantively equivalent procedure.



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	<ul style="list-style-type: none"> ▪ Construction documents shall specify that piping and ductwork must be inspected before access is covered up to visually verify compliance with 2013 Title 24 Standards Sections 120.3 and 120.4, respectively. ▪ Hydronic systems must comply with 2013 Title 24 Section 140.4(k)1.
<p>Envelope^{6,7,8}</p>	<ul style="list-style-type: none"> ▪ Per 2013 Title 24 Section 110.7, all joints, penetrations and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weather stripped, or otherwise sealed to limit infiltration and exfiltration. The building plans shall demonstrate a continuous, unbroken air barrier separating the conditioned space of the building from the following spaces: <ul style="list-style-type: none"> - the exterior, - unconditioned spaces within the building, - commercial spaces, - mechanical rooms vented with unconditioned air, - mechanical chases opening to unconditioned spaces, - elevator shafts, and - garages or other vehicle/equipment storage facilities. ▪ All roof, wall, floor, and slab insulation shall achieve compliance with Quality Insulation Installation (QII) as specified in the 2013 Reference Residential Appendix RA3.5 or, alternatively, contain a layer of continuous, air impermeable insulation ($\geq R-3$ in CA CZ01 - CZ15 and $\geq R-5$ in CZ16). ▪ For metal-framed and metal building walls, continuous exterior insulation ($\geq R-3$) is required on above grade walls⁹. For light mass or heavy mass walls with metal framing, continuous interior or exterior insulation ($\geq R-3$) is required on above grade walls. ▪ Specified windows must be double or triple-pane, with low-emissivity glass or coatings.
<p>Garages and Sidewalks^{10,11}</p>	<p>Attached garages shall be fully compartmentalized from the rest of the building through air sealing. All pipe and conduit penetrations shall be sealed with material compatible with the surface and resilient to temperature fluctuations.</p>
<p>Ventilation and Infiltration</p>	<ul style="list-style-type: none"> ▪ Apartments shall be sealed to reduce air exchange between the apartment and outside as well as the apartment and other adjacent spaces. Specific apartment air leakage paths to be sealed are listed in <i>T&V Worksheets 8.1</i> or <i>2013 Title 24 Residential Compliance form CF2R-ENV-02-E</i>. A maximum air leakage rate of 0.30 CFM50 per square feet of enclosure is allowed. Sampling, blower door testing procedures, and tolerances are described in the 2013 Reference Residential Appendices RA2.6.3 and RA3.8. ▪ Common area ventilation systems shall be designed and tested to satisfy minimum requirements for ventilation of 2013 Title 24 Section 120.1(a) through 120.1(e). ▪ Apartment ventilation and local exhaust systems shall be designed and tested to satisfy minimum requirements of ASHRAE 62.2-2007, without reliance on natural ventilation (Section 120.1(b)1 of 2013 Title 24 is not allowed). Mechanical ventilation rates must be no less than the larger of 120.1(b)2A or 120.1(b)2B or ASHRAE 62.2-2007 equation 4.1a)¹². ▪ Apartment in-line and ceiling exhaust fans must be ENERGY STAR certified. ▪ Central exhaust systems that serve one or more apartments must be tested for duct leakage, before access is covered up, where the maximum leakage allowance is calculated as 5 CFM per register per shaft plus 5 CFM per floor per shaft. ▪ Construction documents shall specify that dwelling unit and common area ventilation ductwork must be inspected before access is covered up to visually verify compliance with Section 120.4.



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Domestic Water Heating ^{13,14}	<ul style="list-style-type: none"> ▪ Atmospherically vented gas water heaters, tankless coils and side-arm water heaters shall not be specified. Indirect water heaters, with or without storage, are acceptable. If storage is provided, the maximum storage tank capacity shall be specified based on occupancy. ▪ The average flow rate for all faucets must be ≤ 2.0 gallons per minute (rated at 80 psi)¹⁵. ▪ All showerheads must be WaterSense® labeled. ▪ All tank-type toilets must be WaterSense® labeled.
Lighting ^{16,17}	<p><u>Occupancy Sensing Controls</u></p> <p>All non-apartment spaces, except those intended for 24-hour operation or where automatic shutoff would endanger the safety of occupants, must have occupancy sensors or automatic bi-level lighting controls.</p>
	<p><u>Common Space Lighting</u></p> <p>80% of installed light fixtures in common spaces must be ENERGY STAR certified or have ENERGY STAR certified lamps installed. Alternatively, 100% of installed light fixtures in common spaces must have high-efficacy lamps installed, as defined in 2013 Title 24 Table 150.0-A or B. Total specified lighting power for the combined common spaces must not exceed 2013 Title 24 allowances (Table 140.6-C) for those combined spaces by more than 20%.</p>
	<p><u>In-Unit Lighting</u></p> <p>80% of installed light fixtures within apartments must be ENERGY STAR certified or have ENERGY STAR certified lamps installed. Alternatively, 100% of installed light fixtures within apartments must have high-efficacy lamps installed, as defined in 2013 Title 24 Table 150.0-A or B. Lighting power density in apartments cannot exceed 1.1 W/SF as calculated using the Performance Path Calculator.</p>
	<p><u>Exterior Lighting</u></p> <ul style="list-style-type: none"> ▪ 80% of outdoor lighting fixtures shall be ENERGY STAR certified or have ENERGY STAR certified lamps installed. Alternatively, 100% of outdoor lighting fixtures must have high-efficacy lamps installed, as defined in Table 150.0-A or B. Actual outdoor lighting power must not exceed the allowed outdoor lighting power per 2013 Title 24 Section 140.7(d) by more than 20%. ▪ Per 2013 Title 24 Section 130.2, all installed outdoor lighting shall be controlled by a photocontrol or outdoor astronomical time-switch control that automatically turns OFF the outdoor lighting when daylight is available.
	<p><u>Exit Signs</u></p> <p>All exit signs shall be specified as LED (not to exceed 5W per face) or photo-luminescent and shall conform to local building code; fixtures located above stairwell doors and other forms of egress shall contain a battery back-up feature.</p>
Pump Motor Efficiency ¹⁸	<p>All three-phase pump motors 1 horse-power or larger shall meet or exceed efficiency standards for NEMA <u>Premium</u>TM motors, where available.</p>

ENERGY STAR MFHR Benchmarking and Designed to Earn the ENERGY STAR:

Although eligible units in a multifamily high rise building may earn the ENERGY STAR based on the mandatory requirements listed above at completion of construction, building performance is as much a function of proper building management as the energy conservation measure incorporated into the structure. Therefore, after earning the ENERGY STAR, the developer/owner must commit to benchmarking their building in Portfolio Manager for a period of at least two years.



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Portfolio Manager is a free, online, interactive energy management tool that allows developer/owner to measure and track their building's energy and water consumption, identify investment priorities, and verify improvements over time. Developers/owners can use Portfolio Manager to track weather-normalized energy use intensity (EUI), energy costs, greenhouse gas emissions, and water consumption. For more information on how to use Portfolio Manager, see the [Portfolio Manager - Multifamily Housing Quick Reference Guide](#) document.

To accomplish this goal, the developer/owner or an entity working on their behalf, must be capable of evaluating the utility consumption of the residential-associated spaces independent of any commercial/retail space. These nonresidential associated parts of the building shall be separately metered (or sub-metered) for electricity, gas, fuel oil, water, steam, and hot water for domestic and/or space heating purposes. Also, they should work with tenants to secure consumption information. If the building is direct-metered for utilities to the apartments, the building owner may need signed releases from individual apartment occupants to allow for benchmarking or find alternative methods to assessing whole building energy consumption such as a whole-building meter or asking the utility for aggregated data.

All data uploaded to Portfolio Manager is strictly confidential and only used to estimate the energy performance of the building as a whole, not of individual apartments.

ENERGY STAR MFHR Website:

More information on program requirements, submittals, processes, and benchmarking can be found at www.energystar.gov/mfhr, including our Current Policy Record, which contains policy issues that were received and have been resolved since the last revision of the program documents. Questions? Please email us at mfhr@energystar.gov.



ENERGY STAR Multifamily High Rise California Performance Path Notes

1. Where requirements of the local codes, manufacturers' installation instructions, engineering documents, or regional ENERGY STAR programs overlap with the requirements of these guidelines, EPA offers the following guidance:
 - a. In cases where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;
 - b. In cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these guidelines shall not be met. Qualification shall only be allowed if the licensed professional, or EPA's designated agent, has determined that no equivalent option is available that could meet the intent of the conflicting requirement of these ENERGY STAR guidelines (e.g., switching from exterior to interior slab edge insulation).
2. Each building that participates in the ENERGY STAR MFHR program must meet certain mandatory program requirements. These requirements are listed within this document and outlined in the *Prerequisites Checklist*, a worksheet within the *ENERGY STAR MFHR Testing and Verification Worksheets*. These prerequisites establish the minimum program requirements within which the design team may make performance trade-offs in the design of an ENERGY STAR certified building. While these prerequisites can contribute to the achievement of the Performance Target, these requirements alone are not sufficient to earn the ENERGY STAR. As used in this document, the word 'shall' means that the action specified is mandatory and must be accomplished.

Heating and Cooling Distribution

3. For hydronic distribution systems, all terminal heating and cooling distribution equipment must be separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the apartment distribution equipment when there is no call from the apartment thermostats.
4. The piping for all space-conditioning systems with fluid temperatures listed in 2013 Title 24, Table 120.3-A, shall have the amount of insulation specified in Subsection (a) or (b) of Section 120.3. Construction documents must account for piping total thickness including required insulation when passing through planks or any other penetrations. For heating/cooling systems that require branch pipe insulation, the insulation thickness must be considered when designing room dimensions and access chases.
5. For in-unit forced air distribution systems, bedrooms must be pressure-balanced using any combination of transfer grills, jump ducts, dedicated return ducts, and/or undercut doors.

Envelope

6. When required by local building code, entranceways shall be designed with vestibules with weather-stripping hard-fastened to the door or frame.
7. If installing sleeves for through-wall AC units, insulated covers must be provided by the building for use during heating season and when AC units are not installed.
8. Ductwork penetrating the building envelope shall be sealed to prevent air leakage through the duct system and/or the building envelope. This includes, but is not limited to, roof curbs and exterior wall exhaust/intake vents.
9. Where specific details cannot meet this continuous insulation requirement, the Licensed Professional shall provide the detail to EPA to request an exemption prior to the building's certification. Projected balconies are currently exempt, however EPA recommends that they be thermally broken.



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Garages and Sidewalks

10. Garages, including plenums and dropped ceilings within the garage, shall not be heated for comfort or to prevent pipes from freezing. Piping design and layout shall locate piping within conditioned spaces or grouped and properly insulated to prevent freezing. If heat tape is used for freeze protection, it must be activated based on pipe wall temperature, rather than air temperature. The heat tape thermostat set point must be no higher than 40°F and the set point must be confirmed by a field inspection.
11. Radiant heating (i.e. infrared), either wall or ceiling-mounted, or heating within the garage floor (or sidewalks) may be used to prevent ice formation on the ground as a safety feature only. These systems must have automatic controls capable of shutting off the systems when outdoor air temperatures are above 40°F.

Ventilation and Infiltration

12. Kitchen and bath exhaust systems must exhaust to the outside. The Whole-Building Ventilation airflow required by Section 4 of ASHRAE Standard 62.2-2007 and the Local Exhaust airflow required by Section 5 of ASHRAE 62.2-2007 shall be confirmed through field verification and diagnostic testing in accordance with the applicable procedures in Reference Residential Appendix RA3.7. Providing outdoor air to each unit directly from the outdoors is recommended, but not required. For kitchen exhaust fans, prescriptive duct sizing requirements described at www.energystar.gov/newhomesresources may be used in lieu of measuring the actual air flow rate.

Service Water Heating

13. The temperature setting of in-unit storage water heaters must not exceed 140°F. For both in-unit and central DHW systems, temperatures measured at faucets and showerheads must not exceed 125°F. Domestic hot water piping must be insulated per 2013 Title 24, Section 120.3.
14. Self-contained or electronic mixing valves shall be used to control hot water temperature for central domestic water heating systems serving apartments.
15. If flow ratings at 80 psi are not available, WaterSense® labeled faucets or aerators may be used to meet this prerequisite.



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Lighting

16. Calculate lighting power density following procedures in 2013 Title 24 Section 140.6.
17. At a minimum, interior lighting must be designed or measured to meet light levels (footcandles) by space type as recommended by the Illumination Engineering Society (IESNA) Lighting Handbook, 9th edition. Values for commonly used spaces are listed below. For senior housing, minimum illumination requirements may follow recommendations in IESNA's 2007 Lighting and the Visual Environment for Senior Living, and an increase in lighting power densities and allowances corresponding to the increase in footcandles, is permitted.

Space Type	Lighting Power Densities (W/ft ²)	Recommended Light Levels (Weighted Avg. Footcandles)	Space Type	Lighting Power Densities (W/ft ²)	Recommended Light Levels (Weighted Avg. Footcandles)
Apartments	1.1	10	Stair	0.6	15
Storage, active	0.6	20	Restroom	0.6	12
Storage, inactive	0.6	8	Office Area ≤ 250 ft ²	1.0	35
Food Preparation	1.6	40	Conference/meeting/multipurpose	1.4	30
Dining Area	1.1	23	Electrical/Mechanical	0.7	30
Lobby/Elevator	1.1	16	Laundry	0.9	30
Corridor	0.6	10	Parking garage	0.14	7

Motors

18. Many motors are NEMA labeled and this label alone, does not ensure that a motor is energy-efficient. This requirement refers specifically to the **NEMA Premium** energy efficient motors program. Participating companies may be found at http://www.nema.org/Policy/Energy/Efficiency/Documents/NEMA_Premium_Partners.pdf. Motors for fire pumps and booster pumps are exempt from this requirement.