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Highlights from Version 1.0, Revision 02

Revision 02 of the MFHR Version 1.0 guidelines has now been posted to the [ENERGY STAR website](http://www.energystar.gov). Partners are permitted to use this Revision immediately, at their discretion, but must apply this Revision to all Multifamily High Rise buildings with applications submitted on or after January 1, 2014.

As part of this Revision, all major program documents have been updated. EPA strongly encourages partners to review these documents. The most substantial updates are summarized below:

Multiple Program Documents

- All references to 'Qualified' homes and products have been revised to 'Certified' homes and products to align with the current terminology of the ENERGY STAR program.
- The use of the word "shall" has been defined as action that is mandatory and the word "should" as action that is recommended, but not required. The use of these words has been revised where applicable.

ENERGY STAR MFHR Performance & Prescriptive Path Requirements

- Where continuous exterior or interior insulation is required to reduce thermal bridging, this insulation has been defined to be at least R-3. Projected balconies have been clarified as being exempt from this continuous insulation requirement.
- If an NFRC label is not available, LBNL's WINDOW 6.3 software or NFRC's CMAST may be used to establish the assembly U-values.
- Insulated through-wall AC covers no longer have a minimum required R-value due to issues obtaining consistent documentation.
- The Domestic Water Heating prerequisite was clarified such that indirect water heaters with or without storage are acceptable.
- Prerequisites related to low-flow plumbing fixtures are based on GPM at 80 psi. WaterSense labeled faucets or aerators must be installed if flow ratings for those low-flow fixtures are not rated at 80 psi.
- Plenums and dropped ceilings within garages have been explicitly included in the garage prerequisite that prohibits heating in that space.
- Pipe insulation requirements have been revised to require different heating and cooling pipe insulation thicknesses, to align with ASHRAE 90.1-2010.
- For hydronic distribution systems, automatic balancing valves are now an accepted alternative to designing supply/return headers in a "reverse return" configuration.
- 100% "high efficacy" lighting has been added as an alternative path to the 80% ENERGY STAR certified lighting requirement. A definition has been added to the Appendix and aligns with 2012 IECC.
- To align with ENERGY STAR Certified Homes (Rev. 07), an alternative total duct leakage test may be performed at rough-in with a maximum of ≤ 4 CFM25 per 100ft², with air handler and all ductwork installed.
- To align with ENERGY STAR Certified Homes (Rev. 07), kitchen exhaust fans that meet prescriptive duct size requirements, are exempt from testing.
- For clarification, non-apartment spaces required to meet ASHRAE 62.1-2007, may use natural ventilation, if eligible per Section 5 of that Standard.

ENERGY STAR MFHR Performance Path Requirements

- Maximum leakage allowances for central exhaust systems serving apartments have been revised from 10 CFM per floor to the sum of 5 CFM per register per shaft plus 5 CFM per floor per shaft.

ENERGY STAR MFHR Prescriptive Path Requirements

- Total building UA calculation (excluding fenestration) is now acceptable for meeting the climate-specific insulation requirements of Table 2 and Table 3.



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- Maximum leakage allowances for central exhaust systems serving apartments have been revised from 5 CFM per floor to the sum of 2.5 CFM50 per register per shaft and 2.5 CFM50 per floor per shaft.
- Garage exhaust fan sensors required in this Path must now detect both CO and NO₂.
- Lighting controls have been clarified as not being permitted to further reduce lighting power density to comply with lighting power allowances.
- Minimum equipment efficiencies for gas-fired PTACs are now explicitly provided, in conjunction with other requirements.
- Reduced minimum efficiencies for “Boiler, hot water (>300,000 Btuh)” are provided in conjunction with other requirements.

ENERGY STAR MFHR Testing and Verification Protocols, Version 1.0 Revision 02

- Developer Partners or Licensed Professionals who have successfully certified 3 MFHR buildings are exempt from submitting the *Photo Template*.
- Improved organization to clarify procedures and aligned with changes to Path requirements noted above.
- Clarified terminology related to “common” and “central” systems and timing/application of central exhaust leakage testing.
- Clarified locations where weather-stripping of doors is mandatory.
- Added language for inspections of slab-on-grade insulation.

ENERGY STAR MFHR Simulation Guidelines, Version 1.0 Revision 02

- Aligned with changes to Path requirements noted above.
- Improved organization and definitions; italicized “defined” terms and enumerated sections to facilitate referencing.
- Corrected Baseline modeling procedure of perimeter edges of intermediate floor slabs to align with ASHRAE 90.1 User’s Manual, which requires that these floor edges be modeled with the same U-factor as the steel-frame wall.
- Provided example of de-rating a wall assembly to account for thermal bridging due to metal shelf angles.
- Clarified that decorative lighting may not be used to increase the Baseline lighting allowance.
- Provided specific lighting space type mapping for spaces not specifically identified in ASHRAE 90.1-2007, Section 9.6; expanded performance credit allowance for sensors to spaces previously excluded.
- Limited the use of the “high” hot water demand per occupant modeling assumption to affordable housing only.
- Removed instructions to combine infiltration with ventilation in model; these should be modeled separately.
- Conversions have been provided for HSPF to COP and SEER to EER, if the modeling software does not allow HSPF or SEER as inputs.
- Clarified modeling requirements to allow exhaust fans that provide both local exhaust and whole-unit ventilation to use the greater of the two rates recommended by ASHRAE 62.2-2007, without penalty.
- Clarified selection of Baseline HVAC system, based on building type, heating fuel, and “predominant” conditions.
- Clarified the temperature settings to be used when modeling the auxiliary electric space heating for Baseline PTHPs.
- Clarified how to model PTAC and PTHP fan power in the Baseline; examples provided for typical HVAC configurations.
- Clarified performance credit for certain motors and for demand controlled ventilation in garages.

ENERGY STAR MFHR Performance Path Calculator, Version 1.3

- Added field for “60 psi” or “80 psi” for proposed fixture types in the Water Savings Worksheet, which then factor into average faucet and showerhead gpm calculations on the DHW Demand Worksheet.
- Aligned Low/Medium/High DHW Demand with Water Savings worksheet.



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- Revised footcandle calculations to be based on light source & distribution and room type on the Interior Lighting Worksheet. An alert shows up if the space is underlit, and the calculation has been revised based on IESNA and proposed footcandle calculations, so the project cannot earn credit for an insufficiently lit space. Additional ASHRAE space types have been added. Proposed lighting power density calculation has been revised to account for sensors.
- Added similar lookup for illumination (footcandles) on the In-Unit Lighting Worksheet. An alert shows up if the space is underlit, so the project cannot earn credit for low lighting power density if the space is insufficiently lit.
- Added “Standard and Zone” dropdown to include both Table 9.4.5 of ASHRAE 90.1-2007 and ASHRAE 90.1-2010 Zones 2-4 on the Exterior Lighting Worksheet. The values for the baseline are automatically calculated based on the “Standard and Zone” dropdown. An alert shows up for proposed building façade lighting that exceeds the baseline. Added “Base Site Allowance” dropdown to add into tradable or non-tradable equations. Non-tradable surfaces cannot exceed 90.1. Fields for apartment balconies have been added.
- Added energy efficiency rating conversion calculator (SEER to EER; HSPF to COP).

ENERGY STAR MFHR T&V Worksheets, Version 1.5

- Added instruction on ERMs tab for succinct descriptions. Added instruction not to update “Proposed ERM” to match As-Built, for a complete record of project.
- Added requirement for WaterSense labeled plumbing fixtures on the Prescriptive Path Checklist, Prerequisites Checklist, and 2.1-2.2 Domestic Hot Water tabs.
- Added alerts to the Prescriptive Path checklist and Prerequisites Checklist tabs if the “Verified in Plan Review” column is insufficient.
- Added “Location”, “% of component area”, and “Appendix A table referenced” cells to the assembly description tables on the Envelope tabs. Added more specific description instructions as follows: “Include: Stud- framing spacing (Ex. 16” oc); Stud material (ex. Wood or steel); Stud depth/configuration (ex. 2x4)”.
- Added columns that calculate rough-in and final testing maximums to the Duct Leakage Summary table in 5.1, 5.3 Heating and 5.2, 5.4 Cooling tabs. Cells turn red when the requirement is not being met by the tested rates.
- Revised “location” to “location/serves” in equipment tables since equipment is not always located in the same space it serves.
- Added separate columns in equipment tables in the 5.2, 5.4 Cooling tab for outdoor unit and indoor coil model numbers.
- Added Exterior Lighting to a table in the 6.1, 6.2, 6.3 Lighting tab.
- Added columns that calculate maximum allowed leakage rate on the 8.1 Infiltration/Blower Door Test tab. Cells turn red when the requirement is not being met by the measured rates.
- Added Design and Tested CFM columns to the ventilation fans table on the 8.2 Vent Schedules & Tab Report tab. Added columns for design and final testing rates to the tables for Non Apartment Spaces, Apartment Spaces and Local Exhaust. Cells turn red when the requirement is not being met by the measured rates.
- Added more space types from ASHRAE 62.1-2007 to the table in the 8.2 Vent Schedules & Tab Report tab.
- Added columns that calculate maximum Duct Leakage rate on the 8.2 Vent Duct Tightness tab. Cells turn red when the requirement is not being met by the measured rates.