

MINHERS Addendum 53f

Modifications and Clarifications for Implementation of ANSI/RESNET/ICC 301-2019 in the RESNET HERS

Date Approved:	September 5, 2021
Voluntary Compliance Date:	September 5, 2021*
Mandatory Compliance Date:	January 1, 2022*
Transition Period:	September 5, 2021 – December 31, 2021
Proponent:	Software Consistency Committee and SDC 300
Organization:	RESNET

* Addendum 53f replaces Addenda 53i and 55i which remain in place until the Mandatory Compliance Date. Parties may comply with Addendum 53f in lieu of Addenda 53i and 55i during the Transition Period

Purpose:

Addendum 53f establishes changes to Standard ANSI/RESNET/ICC 301-2019 and ANSI/RESNET/ACCA/ICC 310-2020 for the RESNET HERS by amending the MINHERS Section 303.1 which adopts the Standards by reference. The changes were proposed by the RESNET Software Consistency Committee to improve consistency in the way accredited software calculates components of the energy use of homes utilized in calculating HERS ratings. Changes also establish exceptions for the Mandatory Compliance Date for affordable housing projects utilizing tax credits and funding obtained via government competitive bidding processes and for Dwelling and Sleeping Units in multifamily buildings over three stories.

Amendment:

Insert new Exception 3 in Section 301.2 as follows.

301.2 Scope

These Standards apply to existing or proposed, site-constructed or manufactured, one- and two-family Dwellings and to Dwelling Units in Residential Buildings not over three Stories Above Grade Plan in height containing multiple Dwelling Units.

Exception 1: These Standards also apply to Dwelling Units in multi-family buildings four and five stories above grade that are certified through the EPA’s ENERGY STAR certified homes program.

Exception 2: These Standards also apply to Townhouses and single-family Dwellings four Stories Above Grade Plane in height.

Exception 3: These Standards also apply to Dwelling Units and Sleeping Units in multifamily buildings over three Stories Above Grade Plane in height, if they are compliant with RESNET’s Guidelines for Multifamily Energy Ratings.

Add new Exceptions 4 and 8 to section 303.1 as follows and renumber sections accordingly:

303 Technical Requirements

303.1 Applicable Standards

All RESNET Home Energy Ratings conducted in accordance with this Standard shall comply with the provisions of ANSI/RESNET/ICC 301.

Note: The RESNET Home Energy Ratings adopt Standards ANSI/RESNET/ICC 301 and ANSI/RESNET/ICC 380 including all of their addenda and normative appendices. See 304 Normative References. Standards 301 and 380 Addenda are effective on the date they are approved by ANSI. The Standards Management Board may establish a Transition Period during which addenda may be used. If a Transition Period is authorized these addenda must be used after a Mandatory Compliance Date designated by the Standards Management Board. If no Transition Period is authorized they must be used beginning on the Mandatory Compliance Date established by the Standards Management Board.

Exception 1:

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(Exceptions 1, 2 and 3 are repealed when Addendum 42 becomes mandatory January 1, 2021 and the Exceptions below will be renumbered)

Exception 4:

RESNET Home Energy Ratings conducted on Dwelling and Sleeping Units in multifamily buildings over three stories in height shall comply with one of the following as determined by the Mandatory Compliance Date requirements for ANSI/RESNET/ICC 301-2019 and this section,

a) ANSI/RESNET/ICC 301-2014 and ANSI/RESNET/ICC 380-2016 and their addenda and with RESNET's Guidelines for Multifamily Energy Ratings,

or

b) ANSI/RESNET/ICC 301-2019 and ANSI/RESNET/ICC 380-2019 and their addenda.

Exception 8: RESNET Home Energy Ratings shall be calculated using the modifications of Standards ANSI/RESNET/ICC 301-2019 and ANSI/RESNET/ACCA/ICC 310-2020 below.

Revise ANSI/RESNET/ICC 301-2019 Definitions as Follows:

Bathroom – A room with at least one sink and at least one toilet.

Cooling Load – The quantity of sensible heat that must be removed from the building to keep the space temperature at a specified thermostat setting. The cooling load is independent of the distribution system(s) used to remove heat from the spaces.

Dwelling Unit Mechanical Ventilation System – A Ventilation system, operating continuously or through a programmed intermittent schedule, consisting of powered Ventilation equipment, related mechanical components, and automated¹ control devices that provides Dwelling Unit Ventilation at a known or measured airflow rate.

Load – The quantity of heat that must be added to or removed from the building (or the hot water system) to satisfy specific levels of service. In other words, to keep the space temperature at a specified thermostat setting or to supply a given quantity of hot water at a given temperature.

Multifamily Buffer Boundary – An unconditioned building space located directly adjacent to the Compartmentalization Boundary of the Dwelling Unit.² For modeling purposes, the temperature of this space shall be the average of conditioned space & outside temperatures but shall be no lower than 50°F.

Unrated Heated Space – A building location used only in Ratings of attached units for shared service equipment such as shared laundry, heating, cooling, hot water, or Ventilation. Unrated Heated Space is outside of the Conditioned Space Volume and only interacts with the Rated Home via the shared services located within. The energy for heating the Unrated Heated Space is not counted in the Rated Home or Energy Rating Reference Home. For modeling purposes, the temperature of this space shall be the average of conditioned space & outside temperatures but shall be no lower than 68°F.

¹ (Normative Note) A switch or thermostat setting, which enables the occupant to turn a system on and off, is not considered automated, continuous, nor programmed. The presence of a ventilation override control is permitted, if the override control is labeled with text or an icon that clearly indicate its function is to turn off the ventilation system.

² (Informative Note) Such as stairwells, elevator shafts, and refuse closets.

Revise ANSI/RESNET/ICC 301-2019 by adding the following definition to clarify the intent of Deviation. Note that the same definition will be added to 310:

Deviation - The measured percent change from a design condition, whereby the measured value minus the design value is divided by the design value and expressed as percent change.

Revise ANSI/RESNET/ICC 301-2019 to clarify accounting of dehumidification loads/energy:

- 1.
- 2.
- 3.
- 4.

a)

4.1.1.

4.1.2. Calculating the Energy Rating Index. The Energy Rating Index shall be determined in accordance with Equation 4.1-2.

$$\text{Energy Rating Index} = \text{PEfrac} * [\text{TnML} / (\text{TRL} * \text{IAFRH})] * 100 \quad (\text{Equation 4.1-2})$$

where:

$$\begin{aligned} \text{TnML} &= \text{nMEUL}_{\text{HEAT}} + \text{nMEUL}_{\text{COOL}} + \text{nMEUL}_{\text{HW}} + \text{EUL}_{\text{LA}} + \text{EUL}_{\text{DH}} \\ &\quad (\text{MBtu/y}). \\ \text{TRL} &= \text{REUL}_{\text{HEAT}} + \text{REUL}_{\text{COOL}} + \text{REUL}_{\text{HW}} + \text{REUL}_{\text{LA}} + \text{REUL}_{\text{DH}} \\ &\quad (\text{MBtu/y}). \\ \text{IAFRH} &= \text{Index Adjustment Factor of Rated Home in accordance with} \\ &\quad \text{Equation 4.3-2.} \end{aligned}$$

and where:

$$\begin{aligned} \text{EUL}_{\text{LA}} &= \text{The Rated Home end use loads for lighting, appliances and} \\ &\quad \text{MELs as defined by Section 4.2.2.5.2, converted to MBtu/y,} \\ &\quad \text{where MBtu/y} = (\text{kWh/y})/293 \text{ or } (\text{Therms/y})/10, \text{ as} \\ &\quad \text{appropriate.} \\ \text{REUL}_{\text{LA}} &= \text{The Reference Home end use loads for lighting, appliances and} \\ &\quad \text{MELs as defined by Section 4.2.2.5.1, converted to MBtu/y,} \\ &\quad \text{where MBtu/y} = (\text{kWh/y})/293 \text{ or } (\text{Therms/y})/10, \text{ as} \\ &\quad \text{appropriate.} \\ \text{EUL}_{\text{DH}} &= \text{The Rated Home end use loads for dehumidification, converted} \\ &\quad \text{to MBtu/y, where MBtu/y} = (\text{kWh/y})/293. \\ \text{REUL}_{\text{DH}} &= \text{The Reference Home end use loads for dehumidification,} \\ &\quad \text{converted to MBtu/y, where MBtu/y} = (\text{kWh/y})/293. \end{aligned}$$

Revise ANSI/RESNET/ICC 301-2019 Table 4.2.2(1) as Follows:

4.2. Energy Rating Reference Home and Rated Home Configuration.

4.2.1.

4.2.2. Residence Specifications. The Energy Rating Reference Home and Rated Home shall be configured and analyzed in the Approved Software Rating Tool as specified by Table 4.2.2(1).

Table 4.2.2(1) Specifications for the Energy Rating Reference and Rated Homes

Building Component	Energy Rating Reference Home	Rated Home
Air exchange rate	Specific Leakage Area (SLA) ^f = 0.00036 assuming no energy recovery, supplemented as necessary <u>with balanced mechanical ventilation</u> to achieve the required Dwelling Unit total air exchange rate (Q _{tot}). ^{g, h}	<p>In accordance with Standard ANSI/RESNET/ICC 380, obtain airtightness test results for:</p> <ul style="list-style-type: none"> • Building enclosure (for Detached Dwelling Units) • Compartmentalization Boundary (for Attached Dwelling Units). <p>For Attached Dwelling Units with airtightness test results ≤ 0.30 cfm50 per ft² of Compartmentalization Boundary, the test results shall be multiplied by reduction factor A_{ext}^i to determine the Infiltration rate. For Attached Dwelling Units with airtightness test results > 0.30 cfm50 per ft² of Compartmentalization Boundary, the test results shall be modeled as the Infiltration rate.</p> <p>For residences without Dwelling Unit Mechanical Ventilation Systems, or without measured airflow, or where $A_{ext}^i < 0.5$ and the Mechanical Ventilation System is solely an Exhaust System, the Infiltration rate^j shall be as determined</p>

Table 4.2.2(1) Specifications for the Energy Rating Reference and Rated Homes

Building Component	Energy Rating Reference Home	Rated Home
		<p>above, but not less than 0.30 ACH.</p> <p>For residences with Dwelling Unit Mechanical Ventilation Systems, the total air exchange rate shall be the Infiltration rate^j as determined above, in combination^h with the time-averaged Dwelling Unit Mechanical Ventilation System rate,^{g, k} which shall be the value measured in accordance with Standard ANSI/RESNET/ICC 380.</p> <p>The Dwelling Unit Mechanical Ventilation System rate shall be increased as needed <u>The dwelling unit total air exchange rate shall be no less than $Q_{tot} = 0.03 \times CFA + 7.5 \times (Nbr+1)$. To ensure that the total air exchange rate is no less than $Q_{tot} = 0.03 \times CFA + 7.5 \times (Nbr+1)$ efm</u> <u>sufficient, if needed, the Dwelling Unit Mechanical Ventilation System runtime operation shall first be increased, if possible, followed by increasing the airflow rate as needed. Supply and exhaust ventilation shall increase proportionally to the proposed home's entered values, or if no mechanical ventilation system was specified a balanced ventilation system shall be modeled</u></p>
Dwelling Unit Mechanical Ventilation System fan energy	None, except where a mechanical Ventilation system is specified by the Rated Home, in which case:	Same as Rated Home ^{m, n} , <u>except when the Dwelling Unit Mechanical Ventilation System airflow has been increased to meet the total</u>

Table 4.2.2(1) Specifications for the Energy Rating Reference and Rated Homes

Building Component	Energy Rating Reference Home	Rated Home
	<p>Where Rated Home has supply-only or exhaust-only Dwelling Unit Mechanical Ventilation System: $0.35 * \text{fanCFM} * 8.76 \text{ kWh/y}$</p> <p>Where Rated Home has balanced Dwelling Unit Mechanical Ventilation System without energy recovery or a combination of Supply and Exhaust Systems: $0.70 * \text{fanCFM} * 8.76 \text{ kWh/y}$</p> <p>Where Rated Home has balanced Dwelling Unit Mechanical Ventilation System with energy recovery: $1.00 * \text{fanCFM} * 8.76 \text{ kWh/y}$</p> <p>And where fanCFM is the minimum continuous Dwelling Unit Mechanical Ventilation System fan flow rate^g for the Rated Home.¹</p>	<p><u>air exchange rate, in which case:</u></p> <p><u>Where only the runtime has been increased, the fan energy shall be proportionally increased to maintain the Rated Home fan Wh/cfm.</u></p> <p><u>Where airflow rate has been increased, the fan power shall be proportionally increased to maintain the Rated Home fan W/cfm.</u></p>
Heating systems ^{p, q}	<p>Fuel type: same as Rated Home</p> <p>Efficiencies:</p> <p>Electric: Air Source Heat Pump in accordance with Table 4.2.2(1a)</p> <p>Non-electric Furnaces: natural gas Furnace in accordance with Table 4.2.2(1a)</p> <p>Non-electric Boilers: natural gas Boiler in accordance with Table 4.2.2(1a)</p> <p>Capacity: sized in accordance with Section 4.4.3.1.</p> <p>Installation Quality Grade of Forced-Air HVAC System with Furnace or Heat Pump: configured in accordance with Section 4.2.2.3.1 and modeled in accordance with Section 4.2.2.3.2.</p>	<p>Same as Rated Home^q</p> <p>Same as Rated Home</p> <p>Same as Rated Home</p> <p>Same as Rated Home</p> <p>Same as Rated Home <u>except not smaller than the Rated Home design heating load.^r</u></p> <p>Same as Rated Home, configured in accordance with Section 4.2.2.3.1 and modeled</p>

Table 4.2.2(1) Specifications for the Energy Rating Reference and Rated Homes

Building Component	Energy Rating Reference Home	Rated Home
		in accordance with Section 4.2.2.3.2.
Cooling systems ^{p, s}	<p>Fuel type: Electric</p> <p>Efficiency: in accordance with Table 4.2.2(1b)</p> <p>Capacity: sized in accordance with Section 4.4.3.1.</p> <p>Installation Quality Grade of Forced-Air HVAC System with Air Conditioner or Heat Pump: configured in accordance with Section 4.2.2.3.1 and modeled in accordance with Section 4.2.2.3.2.</p>	<p>Same as Rated Home^s</p> <p>Same as Rated Home</p> <p>Same as Rated Home <u>except not smaller than the Rated Home design cooling load.</u>^r</p> <p>Same as Rated Home, configured in accordance with Section 4.2.2.3.1 and modeled in accordance with Section 4.2.2.3.2.</p>
Dehumidification System	<p>None, except where a dehumidification system is specified by the Rated Home, in which case:</p> <p>Type: <u>Stand-alone dehumidifier of same type (portable or whole-home) as the Rated Home</u></p> <p>Capacity: Same as Rated Home</p> <p>Efficacy: Integrated energy factor (liters/kWh) determined as a function of capacity in pints/day, as follows: 25.00 or less: 0.79 liters/kWh 25.01 – 35.00: 0.95 liters/kWh 35.01-54.00: 1.04 liters/kWh 54.01-74.99: 1.20 liters/kWh 75.00 or more: 1.82 liters/kWh</p> <p>Dehumidistat setpoint: 60% RH</p>	<p>Type: Same as Rated Home</p> <p>Capacity: Same as Rated Home^{aa}</p> <p>Efficacy: Same as Rated Home</p> <p>Dehumidistat setpoint: Same as Energy Rating Reference Home</p>

Revise ANSI/RESNET/ICC 301-2019 Table 4.2.2(1) Note m. as follows:

- m. Where Dwelling-Unit Mechanical Ventilation Systems are specified but lack controls to either provide continuous or programmed operation, the system does not qualify as a Dwelling-Unit Mechanical Ventilation System and the Rated Home shall be treated as a Dwelling Unit without a Dwelling-Unit Mechanical Ventilation System. Dwelling Unit Mechanical Ventilation System fan watts shall be the value observed in the Rated Home for the highest airflow setting. Where not available, fan watts shall be based on Table 4.2.2(1a) for the given system. For systems other than Central Fan Integrated Supply (CFIS), where the airflow cannot be measured, the cfm used to determine fan watts shall be assumed to be equal to Q_{fan} , as determined in accordance with Note g. of Table 4.2.2 (1), with a minimum of 15 cfm. For CFIS systems, the cfm used to determine fan watts shall be the larger of 400 cfm per 12 kBtu/h cooling capacity or 240 cfm per 12 kBtu/h heating capacity. For systems that consume energy beyond what is needed to operate the ventilation fan³, fan watts shall be the value observed either per OEM specifications or through direct measurement in the Rated Home for the highest airflow setting in ventilation-only mode.

Table 4.2.2(1a) Default Ventilation System Fan Power for Rated Home

Equipment Type	Watts/ cfm
Exhaust Ventilation fans	0.35
Supply Ventilation fans	0.35
Balanced Ventilation fans	0.70
HRV/ERV fans	1.00
CFIS fans	0.50
Range hoods	0.70

- p. For a Rated Home with multiple heating, cooling or water heating systems using different fuel types or having different efficiencies, the applicable system capacities and fuel types shall be weighted in accordance with the loads distribution (as calculated by accepted engineering practice for that equipment and fuel type) of the subject multiple systems. For the Energy Rating Reference Home, the minimum efficiencies given in Table 4.2.2(1b) below will be assumed for:

- 1) A type of device not covered by NAECA in the Rated Home;
- 2) A Rated Home heated by electricity using a device other than an air-source Heat Pump; or
- 3) A Rated Home that does not contain one or more of the required HVAC equipment systems.

³ (Informative Note) Such as dehumidifying ventilation systems.

Revise ANSI/RESNET/ICC 301-2019 Table 4.2.2(2) as Follows:

**Table 4.2.2(2) Component Heat Transfer Characteristics
for Energy Rating Reference Home^a**

Climate Zone ^b	Fenestration and Opaque Door U-Factor	Glazed Fenestration Assembly SHGC	Ceiling U-Factor	Frame Wall U-Factor	Floor Over Unconditioned Space U-Factor	Basement Wall Interior Insulation R-Value U-Factor ^c	Slab-on-Grade R-Value & Depth ^{d,e}
1	1.20	0.40	0.035	0.082	0.064	0.3600	0
2	0.75	0.40	0.035	0.082	0.064	0.3600	0
3	0.65	0.40	0.035	0.082	0.047	0.3600	0
4 except Marine	0.40	0.40	0.030	0.082	0.047	0.05910	10, 2 ft.
5 and Marine 4	0.35	0.40	0.030	0.060	0.033	0.05910	10, 2 ft.
6	0.35	0.40	0.026	0.060	0.033	0.05910	10, 4 ft.
7 and 8	0.35	0.40	0.026	0.057	0.033	0.05910	10, 4 ft.

Notes:

- ~~Nonfenestration U Factors shall be obtained from measurement, calculation or an Approved source.~~ U-Factor values are from the 2006 IECC, Table 402.1.3 and R-Values are from the 2006 IECC, Table 402.1.1.
- Climates zones shall be as specified by the 2006 IECC.
- For basements that are within the Conditioned Space Volume-, basement wall insulation shall be continuous across the entire area of the wall.
- R-5 shall be added to the required R-Value for slabs with embedded heating.
- Insulation shall extend downward from the top of the slab vertically to the depth indicated.

Revise ANSI/RESNET/ICC 301-2019 Section 4.2.2.6.2.11 as Follows:

4.2.2.1.1.1. Service Hot Water Use. Service hot water system use in gallons per day for the Rated Home shall be determined in accordance with Equation 4.2-35.

$$HWgpd = (DWgpd + CWgpd + F_{eff} * adjF_{mix} * (refFgpd + oWgpd + sWgpd * WD_{eff})) \quad \text{(Equation 4.2-35)}$$

where:

- HWgpd = gallons per day of hot water use in Rated Home.
- DWgpd = dishwasher gallons per day.
- = ((88.4+34.9*Nbr)*12/dWcap*(4.6415*(1/EF)-1.9295))/365

$$CW_{gpd} = \text{clothes washer gallons per day} = 60 * ((LER * (\$/kWh) - AGC) / (21.9825 * (\$/kWh) - (\$/therm))) * ACY / 365.$$

Where more than one water heater exists in a Rated Home or building, and it is evident which water heater provides an appliance with hot water, the DW_{gpd} load and CW_{gpd} load must be attributed to the water heater providing that appliance with hot water.

$$F_{eff} = \text{fixture effectiveness in accordance with Table 4.2.2.5.2.11(1).}$$

Table 4.2.2.5.2.11(1) Hot water fixture effectiveness

Plumbing Fixture Description	F_{eff}
Standard-flow: showers ≤2.5 gpm and <u>Bathroom sink faucets</u> ≤2.2 gpm	1.00
Low-flow: all showers ¹ and <u>Bathroom sink faucets</u> ≤2.0 gpm	0.95

¹ (Normative Note) A shower with multiple showerheads that operate simultaneously meets the low-flow criteria if the sum of the flow rates of all showerheads is less than or equal to 2.0 gpm.

Revise ANSI/RESNET/ICC 301-2019 as follows:

Replace Q_{DEV} with E_{AF} in Equations 4.2-10, 4.2-12, 4.2-22, 4.2-24

Revise ANSI/RESNET/ICC 301-2019 Section 4.2.2.3.1.2 as follows:

4.2.2.3 HVAC Installation Quality Grade.

4.2.2.3.1 Configuration of Energy Rating Reference Home, Index Adjustment Design, and Rated Home.

4.2.2.3.1.1 Energy Rating Reference Home. For each Forced-Air HVAC System with an Air Conditioner, furnace, or Heat Pump in the Energy Rating Reference Home, the installation quality of the Blower Fan airflow, Blower Fan watt draw, and (for Air Conditioners and Heat Pumps) refrigerant charge shall be designated Grade III, per Standard ANSI/RESNET/ACCA 310, and configured with the values in Table 4.5.2(6)⁴.

4.2.2.3.1.2. Index Adjustment Design. For each Forced-Air HVAC System with an Air Conditioner, Furnace, or Heat Pump in the Index Adjustment Design, the installation quality of the Blower Fan airflow, Blower Fan watt draw, and (for Air Conditioners and Heat Pumps) refrigerant charge shall be designated Grade III, per Standard ANSI/RESNET/ACCA 310, and configured with the values in ~~Table 4.2.2(1)~~Table 4.5.2(6)^{4,5}.

Table 4.2.2(1) Air Conditioner and Heat Pump Installation Quality Grade Values for Index Adjustment Design

Parameter	Value
Blower Fan Airflow Deviation	$F_{AF} = 0\%$
Blower Fan Watt Draw Efficiency	Blower Fan Efficiency = 0.45 W/CFM
Refrigerant Charge Deviation	$F_{CHG} = 0\%$

4.2.2.3.1.3 Rated Home. For each Forced-Air HVAC System with an Air Conditioner, Furnace, or Heat Pump (excluding a WLHP) in the Rated Home, the installation quality of the total duct leakage, Blower Fan airflow, Blower Fan watt draw, and (for Air Conditioners and Heat Pumps) refrigerant charge shall either be assessed in accordance with Standard ANSI/RESNET/ACCA 310, designated Grade

⁴ (Informative Note) While total duct leakage must be assessed and graded in the Rated Home as a prerequisite to assessing Blower Fan airflow, no grade need be assigned for the Energy Rating Reference Home or Index Adjustment Design, because the parameter does not directly impact the energy consumption of the home.

I, II or III, and configured with the values in ~~Table 4.2.2(2)~~Table 4.2.2(6); or, if not assessed, shall be designated Grade III, configured with the values in Table 4.5.2(6), and recorded as “Not assessed” in the rating.

**Table 4.2.2(26) Air Conditioner, Furnace, and Heat Pump Installation
Quality Grade Non-Default Values for Rated Home**

Parameter	Value
Blower Fan Airflow Deviation	$F_{AF} = \text{As Rated}$
Blower Fan Watt Draw Efficiency	Blower Fan Efficiency = As Rated ⁵⁶
Refrigerant Charge Deviation	$F_{CHG} = 0\%$ if Rated Grade I $F_{CHG} = -25\%$ if Rated Grade III <u>Undercharge</u> $F_{CHG} = +25\%$ if Rated Grade III <u>Overcharge</u>

Revise ANSI/RESNET/ICC 301-2019 Sections 4.4.3 and 4.4.5 as follows:

4.3.

4.4.

4.4.1.

4.4.2.

4.4.3. HVAC Sizing. Manufacturer’s Equipment Performance Ratings shall be corrected for local climate conditions and mis-sizing of equipment.⁷ To determine equipment mis-sizing, the heating and cooling capacity shall be selected in accordance with ACCA Manual S based on building heating and cooling loads calculated in accordance with Manual J, 8th Edition, ASHRAE *Handbook of Fundamentals*, or an equivalent computation procedure, using the following assumptions. Where an HVAC system installation Grade II or Grade III occurs, system sizing shall be adjusted accordingly, if necessary to meet the design load, to account for capacity losses due to installation quality.

4.4.3.1. Energy Rating Reference Home.

4.4.3.2. Rated Home.

⁵ (Normative Note) For a Forced-Air HVAC System that is entirely in Conditioned Space Volume and has a supply-side distribution system with a total length that does not exceed 10 ft., inclusive of both ductwork and distribution building cavities, and for which the Blower Fan Efficiency has not been calculated, the Blower Fan Efficiency shall not be considered.

⁶ (Informative Note) This is based on the assumption that, in the absence of significant ductwork, the operating fan efficiency should equal the rated fan efficiency and thus is already captured by the Manufacturer’s Equipment Performance Rating. For example, the EER rating of a room AC will reflect the efficiency of the Blower Fan it contains, and the installation will not degrade the performance of the Blower Fan.

⁷ (Informative Note) Examples: HSPF, SEER and AFUE.

4.4.3.2.1.

4.4.3.2.2.

4.4.3.2.3.

4.4.3.2.4.

4.4.3.2.5.

4.4.3.2.6.

4.4.3.2.7. Heat Pump equipment capacity shall be sized to at least equal the larger of the building heating and cooling loads calculated in accordance with these procedures. Heating equipment shall be sized to at least meet the building design heating load and cooling equipment shall be sized to at least meet the building design cooling load.

4.4.4.

4.4.5. Air Source Heat Pumps and Air Conditioners.

4.4.5.1. For Heat Pumps and Air Conditioners where a detailed, hourly HVAC simulation is used to separately model the compressor and evaporator energy (including part-load performance), the back-up heating energy, the distribution fan or blower energy and crank case heating energy, the Manufacturer's Equipment Performance Rating (HSPF and SEER⁸) shall be modified ~~as follows~~ to represent the performance of the compressor and evaporator components alone⁹: ~~HSPF, corr = HSPF, mfg / 0.582 and SEER, corr = SEER, mfg / 0.941~~. The energy uses of all components, including compressor and distribution fan/blower and crank case heater, shall then be added together to obtain the total energy uses for heating and cooling.

4.4.6.

⁸ (Normative Note) For Commercial Variable Refrigerant Flow (VRF) Multi-Split Air Conditioning and Heat Pump Equipment, use IEER in place of SEER.

⁹ (Informative Note) Such approaches are described in Cutler et al. 2011 and Fairey et al. 2004.

Revise ANSI/RESNET/ICC 301-2019 Table 4.5.2(1) as follows:

Table 4.5.2(1) Minimum Rated Features	
Building Element	Minimum Rated Feature
15. Service Hot Water Equipment	<p>For Residential Equipment - Equipment type, location, Energy Factor or Uniform Energy Factor, extra tank insulation R-Value, flow rates of showers and <u>Bathroom sink</u> faucets.</p> <p>For Commercial Equipment - Equipment type, location, Uniform Energy Factor or Thermal Efficiency and Standby Loss, extra tank insulation value, flow rates of showers and <u>Bathroom sink</u> faucets.</p> <p>Distribution Related: Distribution System Type (standard, recirculation), Recirculation System controls [none, timer, temperature, demand (manual) or demand (sensor)], pipe insulation R-Value, pipe length for standard distribution, branch length for recirculation, supply + return loop length, pump power (Watts, HP).</p>
24. Dwelling Unit Mechanical Ventilation System(s)	<p>Ventilation strategy (Supply, Exhaust, or Balanced), equipment type (individual or shared), <u>controls (continuous or programmed intermittent schedule)</u>, <u>daily run hourtime</u>, measured exhaust airflow, measured supply airflow, system rated airflow and fan wattage.¹⁰</p> <p>Where shared systems occur, include percentage of outdoor air in supply air, rated exhaust airflow and rated supply airflow of the shared systems. Fan motor efficiency and horsepower are acceptable substitutes for fan wattage.</p>

Table 4.5.2(6) Default Air Conditioner, Furnace, and Heat Pump Installation Quality Grade Values

<u>Parameter</u>	<u>Value</u>
Blower Fan Airflow Deviation	$F_{AF} = -25\%$
Blower Fan Watt Draw Efficiency	Blower Fan Efficiency = 0.58 W/CFM
Refrigerant Charge Deviation	$F_{CHG} = -25\%$

¹⁰ (Informative Note) A source for fan wattage is the Certified Home Ventilating Products Directory available from the Heating and Ventilation Institute (HVI).

Revise ANSI/RESNET/ICC 301-2019 Section 7 as follows:

7. Informative References.

American National Standards Institute, (ANSI) <http://www.ansi.com>

Bureau of Labor Statistics, <http://www.bls.gov/CPI/#tables>

Bureau of Labor Statistics, Table 3A from detailed reports listed at
http://www.bls.gov/cpi/cpi_dr.htm

Cutler, D., Winkler, J., Kruis, N., Christensen, C., and Brandemuehl, M. 2013. *Improved Modeling of Residential Air Conditioners and Heat Pumps for Energy Calculations.* NREL Technical Report. Golden, CO.

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Revise ANSI/RESNET/ICC 301-2019, Appendix A Inspection Procedures for Insulation Grading and Assessment, as follows:

A-1.1 Minimum General Installation Requirements:

1. Insulation shall be installed according to manufacturer's installation instructions.
2. No air spaces shall be allowed between different insulation types or systems.

Exception: When claiming the R-Value of an enclosed airspace in accordance with the ASHRAE *Handbook of Fundamentals*, Chapter 26, Table 3 or the ASHRAE 90.1-2016 Section A9-4 (or addendum ac to the 2013 edition) or ASTM C1224.

3. Insulation shall be installed to the density and thickness required to attain the specified R-Value. The base R-Value of fibrous batt insulation that is compressed to less than its full rated thickness in a completely enclosed cavity shall be assessed according to the manufacturer's documentation. In the absence of such documentation, use ~~R-Value correction factor (CF) for Compressed Batt or Blanket from ACCA Manual J, 8th edition, Appendix 4~~Estimated R-values for Compressed Fiber Glass Batt Insulation (NAIMA BI506).
4. Insulation shall fill around obstructions including, but not limited to, framing, blocking, wiring, pipes, etc. without substantial gaps or voids.

A-1.2 Minimum Specific Application Requirements:

1. Insulation installed in framed floor assemblies shall be in substantial and permanent contact with the subfloor.

Exception: The floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing where combined with insulation that meets or exceeds the minimum wood frame wall R-Value in Table 402.1.2 of the International Energy Conservation Code (IECC) and that extends from the bottom to the top of all perimeter floor framing members. Perimeter floor insulation is not required to extend from the bottom to the top of framing members that separate the Unconditioned Space Volume of the floor cavity from the Conditioned Space Volume.

The cavity insulation between floor joists, beams or other horizontal floor supports that create cavities under the subfloor shall be permitted to be in direct contact with any additional continuous insulation attached to the underside of the horizontal supports. The combination of both cavity and continuous insulation shall meet or exceed the minimum required floor R value in Table 402.1.2 of the IECC. Instances of reflective insulation system installed beneath hydronic floors are not required to meet this standard.

1. For rim or band joist applications, insulation shall be in substantial and permanent contact with rim or band joist framing and tightly fitted to intersecting solid floor joists, wood i-joists or extend continuously through open web floor trusses. Interior sheathing or air barrier is not required provided there is an air barrier on the exterior side or the insulation material is installed as an air barrier material.
2. Air permeable insulation in ventilated attics and vented sloped roofs shall have an effective air barrier (wind block, air chute, or eave baffle) securely fastened and installed at the eave or soffit edge vent of every cavity. The effective air barrier shall extend up and beyond the surface of the insulation or to the ridge vent.

A-1.3.2 Fibrous Batt Insulation:

1. Insulation shall fill the cavity being insulated side to side, top to bottom.
2. Insulation shall be enclosed on all six sides with durable materials.

Exceptions:

- a. Insulation installed in attics above ceilings shall not require an air barrier on the exterior side.
- b. Insulation installed under floors directly above an unvented crawl space shall not require an air barrier on the exterior side.
- c. Insulation installed in rim or band joists located in conditioned space shall not require an air barrier on the interior side.
- d. Insulation installed on conditioned basement and conditioned crawlspace walls where an air barrier material meeting code requirements for exposed applications and tested in accordance with ASTM E2178 (air permeance less than 0.004 cfm/ft²) is installed on the interior side.

3. Faced batts shall be stapled to the face of the studs or side stapled to the studs with no buckling of the stapling tabs or the tabs shall be permitted to be left unstapled. Faced batt products without tabs and friction fit products shall not be required to be stapled when installed in walls. Compression of face stapled batts shall be graded in accordance with the criteria outlined in Sections A-2.1.1.1, A-2.1.2.1, or A-2.1.3.
4. When side stapled, compression is permitted only along edges to the depth of the stapling tab.
5. Insulation shall be closely fitted around obstructions including, but not limited to, framing, blocking, wiring, pipes, etc. to avoid substantial gaps, voids or compression.

A-1.3.4 Open-Cell Spray Polyurethane Foam (SPF) Insulation:

1. Installers shall meet the manufacturer's recommended training requirements and shall complete the online health and safety training for SPF provided by the Center for Polyurethanes Industry.
2. Spray foam shall be well-bonded to the substrate, including framing and sheathing.
3. Insulation, installed at a minimum thickness to be air impermeable per ASTM E2178 (air permeance less than 0.004 cfm/ft²) and in-contact with the substrate shall be permitted to serve as the air barrier.
4. When insulation extends beyond the wall cavity it shall be trimmed to allow installation and contact with interior sheathing or finish material.
5. Insulation shall fill the cavity to within at least ½ inch of the face of the studs.

Exception: The cavity fill requirement is met when the required R-Value is achieved using a thickness that is less than the cavity depth.

A-1.3.6 1.3.5 Closed-Cell Spray Polyurethane Foam (SPF) Insulation:

1. Installers shall meet the manufacturer's recommended training requirements and shall complete the online health and safety training for SPF provided by the Center for Polyurethanes Industry.
2. Spray foam shall be well-bonded to the substrate, including framing and sheathing.
3. Closed-cell insulation, installed at a minimum thickness of 1.5 inches and in contact with the substrate, shall be permitted to serve as a component of the continuous air barrier.

Exception: Thicknesses less than 1.5 inches considered air-impermeable with appropriate ASTM E2178 data (air permeance less than 0.004 cfm/ft²) from manufacturer data sheet or code evaluation report prepared by an organization accredited for product certification per ISO-17065 or other source approved by an authority having jurisdiction.

A-2.1.1.3 Open-Cell Polyurethane Spray Foam Insulation (cavity filled and trimmed)

When installing open-cell polyurethane spray foam, no more than 2 percent of the total insulated area (cavity) shall be below the thickness required to attain the specified ~~thickness~~ R-value or contain gaps or voids in the insulation. The minimum installed thickness shall not be less than 1/2 inch below the specified thickness at any point. Voids extending from the interior to exterior of the intended insulation areas shall not be permitted.

A-2.3.2.1 Grade I (Minor Defects)

Shall meet the minimum installation requirements in ASTM C1743 and shall also meet the following area coverage requirements:

1. Two percent or less of the attic facing roof decking is bare wood or does not include low-emittance.
2. Two percent or less of the surface has contaminates, particles or ink on the surface (e.g. dirt, printing of product identification, etc.).
3. Radiant barrier is installed to cover the face of the rafter (Method 3 only).

A-2.3.2.2 Grade II (Moderate to Frequent Defects)

Shall meet the minimum installation requirements in ASTM C1743 and shall also meet the following area coverage requirements:

1. An area greater than two percent and less than or equal to ten percent ~~Three percent or greater and 10 percent or less of the attic facing roof decking~~ is bare or does not include low-emittance ~~the radiant surface~~.
2. An area greater than two percent and less than or equal to ten percent ~~Three percent or greater and 10 percent or less of the surface~~ has contaminates, particles or printed information on the surface.
3. Radiant barrier is inset stapled (Method 3 only).

Revise ANSI/RESNET/ICC 301-2019, Appendix B Inspection Procedures for Minimum Rated Features, as follows:

Building Element: Doors		
Rated Feature	Task	On-Site Inspection Protocol
Area	Determine <u>and record the</u> area of doors.	Measure the <u>width and height linear perimeter</u> of the door and round to the nearest inch. Use these measurements to calculate the area of the door(s) <u>by multiplying the rounded width times the rounded height</u> and round <u>that result</u> to the nearest tenth of a square foot. Each unique door type and R-Value combination shall be calculated separately.

Building Element: Service Hot Water Distribution		
Rated Feature	Task	On-Site Inspection Protocol
Flow rates of <u>Bathroom sink</u> faucets and showerheads	Determine gpm of Bathroom sink faucets and showerheads	Record the rated gpm printed on all showerheads and <u>Bathroom sink</u> faucets. When the gpm rate is not visible, collect documentation showing the model number of the plumbing fixtures and use manufacturer’s data sheet to determine and record the rated gpm. <u>If all Bathroom sink faucets and showerheads in the Rated Home are < 2.0 gpm, record that the Rated Home has low-flow faucets and showerheads and model it accordingly. A shower with multiple showerheads that operate simultaneously meets the low-flow criteria if the sum of the flow rate of all showerheads sums to < 2.0 gpm. If any or all Bathroom sink faucets and showerheads in the Rated Home are > 2.0 gpm, record that the Rated Home has standard faucets and showerheads and model it accordingly.</u>

Building Element: Dwelling Unit Mechanical Ventilation System(s)		
Rated Feature	Task	On-Site Inspection Protocol
Centralized system equipment type	Data collection for centralized Dwelling Unit Mechanical Ventilation systems that serve more than one Dwelling Unit	<i>Centralized exhaust fans</i> – Record the model number from the nameplate data of each fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine the fan cfm and wattage or horsepower from the manufacturer’s data sheet.

Building Element: Dwelling Unit Mechanical Ventilation System(s)		
Rated Feature	Task	On-Site Inspection Protocol
		<p><i>Centralized supply or balanced system fans</i> – Record the model number from the nameplate data of each fan being utilized to provide ventilation air, directly or indirectly, to the Dwelling Unit. Record the percent of outdoor air in the supply air and whether the supply air is heated or cooled. If conditioned, record capacity and efficiency ratings of heating and cooling systems. Use the fan model number to determine the fan cfm and wattage or horsepower from the manufacturer’s data sheet. For balanced systems, also record the sensible recovery efficiency and total recovery efficiency.</p>
Individual system equipment type	Data collection for individual Dwelling Unit Mechanical Ventilation systems that serve a single Dwelling Unit	<p><i>Individual exhaust fans</i> – Record the fan wattage and model number from the nameplate data of the exhaust fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine the fan wattage from the manufacturer’s data sheet or HVI Directory. Where the fan is operated using a programmed schedule, document the daily run hours <u>time</u> for the fan, <u>using the ventilation controller run time setting</u> as observed on-site. If the fan is set to run continuously, then document the daily run hours<u>time</u> as 24 hours. In Attached Dwelling Units, it shall be determined whether there is supply air provided to the Dwelling Unit, directly or indirectly from adjacent corridor. See Corridor Ventilation section for guidance.</p> <p><i>Individual supply fans</i> - Record the fan wattage and model number from the nameplate data of the supply fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine the fan wattage from the manufacturer’s data sheet or HVI Directory. Where the fan is operated using a programmed schedule, document the daily run time for the fan, using the ventilation controller run time setting as observed on-site. If the fan is set to run continuously, then document the daily run time as 24 hours.If the fan is equipped with a timer, document the run time for the fan. If the fan is set to run continuously then document the run time as 24 hours. Record whether the supply fan is separate or integrated with the space conditioning system.</p>

Building Element: Dwelling Unit Mechanical Ventilation System(s)		
Rated Feature	Task	On-Site Inspection Protocol
		<p><i>Individual Balanced Ventilation Fans</i> – These are commonly known as energy recovery ventilators (ERV) or heat recovery ventilators (HRV). Record model number from the nameplate data of the ERV/HRV. Use the model number to determine the fan wattage, sensible recovery efficiency and total recovery efficiency from the manufacturer’s data sheet or HVI Directory. Where the fan is operated using a programmed schedule, document the daily run time for the fan, using the ventilation controller run time setting as observed on-site. If the fan is set to run continuously, then document the daily run time as 24 hours.If the fan is equipped with a timer, document the run time for the fan. If the fan is set to run continuously, then document the run time as 24 hours.</p> <p><i>Central Fan Integrated Supply (CFIS) Ventilation System</i> – A central fan integrated Supply Ventilation System is a specific type of supply-only ventilation that includes a duct running from the outside into the return plenum of the heating/cooling system, a mechanical damper, and controls that ensure the system provides ventilation air even when there is no demand for heating or cooling. For these systems, record the central fan model number from the nameplate data of the air handler fan and whether it is equipped with an ECM motor. Use the fan model number to determine the fan cfm and either horsepower or wattage from the manufacturer’s data sheet. Where fan wattage is not provided, use $(HP \times 746)/0.90$ to calculate fan wattage. Where the fan has multiple speeds, use values associated with the high-speed setting to select or calculate the fan wattage.</p> <p><i>Unit ventilator</i> – Similar to the CFIS system, a fan coil unit can be designed to provide both space conditioning and mechanical ventilation to the space that it is serving. Classify as a ventilation system only if the unit operates continuously with the outside air damper open or if the damper is controlled to allow the supply of ventilation air when there is no call for heating or cooling.</p>

*Revise ANSI/RESNET/ACCA 310-2020 by adding the following definitions. The term **Deviation** is needed to clarify its intent; note that the same definition will be added to 301. The term **Single Packaged System** is needed so that it can be clarified when such systems are considered to be in CSV and to exempt such systems from the refrigerant charge test. The term **Water Loop Heat Pump** is needed so that such systems can be excluded from evaluation using the current standard.*

Deviation - The measured percent change from a design condition, whereby the measured value minus the design value is divided by the design value and expressed as percent change.

Single Packaged System - A Forced-Air HVAC System in which all components are integrated into one cabinet⁶.

6. (Informative Note) For example, a packaged terminal air conditioner (PTAC), packaged terminal heat pump (PTHP), or room AC.

Water Loop Heat Pump – Vapor-compression heating and cooling equipment that uses water as its heat source and heat sink (see also Heat Pump).

Revise ANSI/RESNET/ACCA 310-2020 Section 5.2 by excluding Water Loop Heat Pumps from evaluation using the current standard:

5.2 Prerequisites. The HVAC design of the Dwelling shall have been evaluated in accordance with Section 4: all the required design documentation defined in Section 4.2 shall have been collected, and shall have been reviewed and verified to be in accordance with Section 4.3, or an Independent Verification Report obtained. If the design has not been evaluated, then the Forced-air HVAC System shall not be further evaluated using this standard, and Grade III shall be designated for total duct leakage, Blower Fan volumetric airflow, Blower Fan watt draw, and refrigerant charge.

Furthermore, it shall be verified that the Forced-Air HVAC System under test does not contain a Water Loop Heat Pump. If the Forced-Air HVAC System under test contains a Water Loop Heat Pump then it shall not be further evaluated using this standard, and no grade shall be designated²⁷.

27. (Informative Note) Some procedures in this standard are not currently suitable for Water Loop Heat Pumps; therefore, this system type is not able to be assessed using the standard at this time.

Revise ANSI/RESNET/ACCA 310-2020 Section 5.3 as follows to clarify when a Single Packaged System is considered to be in CSV and to clarify the intent of the Exception:

5.3 Procedure to Measure Total Duct Leakage. The total duct leakage of the Forced-Air HVAC system under test shall be measured in accordance with ANSI/RESNET/ICC 380. The total duct leakage; time of test, either rough-in or final; and number of returns shall be recorded.

Exception: If the Forced-Air HVAC System is entirely in Conditioned Space Volume²⁷ and has a total amount of supply-side distribution system ductwork or distribution building cavities with a total length that does not exceed 10 ft. in length, inclusive of both ductwork and distribution building cavities and is entirely in Conditioned Space Volume, then measurement of total duct leakage is not required.

Revise ANSI/RESNET/ACCA 310-2020 Section 5.4.1 as follows to clarify when a Single Packaged System is considered to be in CSV and to clarify the intent of the Exception:

5.4.1 Grade I shall be designated and recorded for total duct leakage if the Forced-Air HVAC System is entirely in Conditioned Space Volume²⁷ and has a total amount of supply-side distribution system ductwork or distribution building cavities with a total length that does not exceed 10 ft. in length, inclusive of both ductwork and distribution building cavities and is entirely in Conditioned Space Volume, or if the total leakage does not exceed the limits in Table 2a or Table 2b.

27. (Normative Note) A Single Packaged System is considered to be in Conditioned Space Volume if the interior side of the package and the distribution system, if any, is in Conditioned Space Volume.

Revise ANSI/RESNET/ACCA 310-2020 Section 6.3.1.1 as follows to clarify when a Single Packaged System is considered to be in CSV and to clarify the intent of the Exception:

6.3.1.1 If the Forced-Air HVAC System is entirely in Conditioned Space Volume³² and has a total amount of supply-side distribution system with a total length ductwork or distribution building cavities that does not exceed 10 ft. in length, inclusive of both ductwork and distribution building cavities and is entirely in Conditioned Space Volume, then measurement of the airflow shall be exempted and the volumetric airflow grade shall be designated in accordance with Section 6.9.

32. (Normative Note) A Single Packaged System is considered to be in Conditioned Space Volume if the interior side of the package and the distribution system, if any, is in Conditioned Space Volume.

Revise ANSI/RESNET/ACCA 310-2020 Section 6.4.5 as follows to accommodate the setup for a Forced-Air HVAC System with a Furnace:

6.4.5 Settings for HVAC System. ~~If the Forced-Air HVAC System contains an Air Conditioner, then the test shall be conducted according to Section 6.4.5.1. If the Forced-Air HVAC System contains a Heat Pump, then the shall be tested shall be conducted according to Section 6.4.5.1 if it is designed to operate only in cooling mode or cooling mode is the higher design airflow as reported in Section 4.2.5.5.1. It shall be tested, or the test shall be conducted according to Section 6.4.5.2 if it is designed to operate only in~~

heating mode or heating mode is the higher design airflow as reported in Section 4.2.5.5.1.

6.4.5.1 Cooling Mode.

6.4.5.1.1 If the outdoor temperature is < 55 °F (13 °C), then power to the compressor shall be disconnected for the duration of the test. If the Forced-Air HVAC System is capable of operating in heating mode and power to the compressor is not able to be disconnected then the test shall be conducted according to Section 6.4.5.2.

6.4.5.1.2 The thermostat shall be set to cooling mode and the setpoint temperature adjusted as low as possible.

6.4.5.1.3 If the Forced-Air HVAC System serves multiple zones, as reported in Section 4.2.5.2, then manufacturer instructions shall be followed to ensure that all zones in the Forced-Air HVAC System are set to cooling mode, set to the set point required for testing, and are simultaneously calling for cooling.

6.4.5.2 Heating Mode.

6.4.5.2.1 If the Forced-Air HVAC System contains a Heat Pump and the outdoor temperature is > 60 °F (16 °C), then power to the compressor shall be disconnected for the duration of the test. If the Forced-Air HVAC System is capable of operating in cooling mode and power to the compressor is not able to be disconnected then the test shall be conducted according to Section 6.4.5.1.

6.4.5.2.2 The thermostat shall be set to heating mode and the setpoint temperature adjusted as high as possible.

6.4.5.2.3 If the Forced-Air HVAC System serves multiple zones, as reported in Section 4.2.5.2, then manufacturer instructions shall be followed to ensure that all zones in the Forced-Air HVAC System are set to heating mode, set to the set point required for testing, and are simultaneously calling for heating.

Revise ANSI/RESNET/ACCA 310-2020 Section 6.9.1 as follows. This is a minor clarification to reinforce that F_{AF} is a %, to clarify when a Single Packaged System is considered to be in CSV, and to clarify the intent of the Exception:

6.9.1 F_{AF} , the ~~deviation~~-Deviation between the design-specified and field-measured Blower Fan volumetric airflow shall be calculated using Equation 1.

$$F_{AF} = \frac{(Q_{op} - Q_{design})}{Q_{design}} \quad (1)$$

Where:

F_{AF} = The ~~percent deviation~~-Deviation between the design-specified and field-measured Blower Fan volumetric airflow.

Q_{op} = The Blower Fan volumetric airflow at operating conditions, as field-measured per Section 6.5, 6.6, 6.7, or 6.8.

Q_{design} = The design-specified Blower Fan volumetric airflow, per Section 4.2.5.5.1, for the test mode, heating or cooling, determined in Section 6.4.5.

Exception: For a Forced-Air HVAC System that is entirely in Conditioned Space Volume⁵⁵ and has a total amount of supply-side distribution system with a total length that ~~ductwork or distribution building cavities~~ does not exceed ≤ 10 ft., inclusive of both ductwork and distribution building cavities ~~in length and is entirely in Conditioned Space Volume~~, F_{AF} shall equal zero.

^{55.} (Normative Note) A Single Packaged System is considered to be in Conditioned Space Volume if the interior side of the package and the distribution system, if any, is in Conditioned Space Volume.

Add ANSI/RESNET/ACCA 310-2020 Section 7.3 as follows to exempt systems that are in CSV and with little to no ductwork from the fan watt draw test. This also clarifies when a Single Packaged System is considered to be in CSV and clarifies the intent of the Exception:

7.3 Determination of Applicable Test Method. The test procedure used to evaluate the airflow shall be selected according to Sections 7.3.1.1 and 7.3.1.2.

7.3.1.1 If the Forced-Air HVAC System is entirely in Conditioned Space Volume⁵⁷ and has a supply-side distribution system with a total length that does not exceed 10 ft., inclusive of both ductwork and distribution building cavities, then measurement of the Blower Fan watt draw shall be exempted and the Blower Fan watt draw grade shall be designated in accordance with Section 7.9.

7.3.1.2 If the Forced-Air HVAC System does not meet the conditions in Section 7.3.1.1, the Blower Fan watt draw is permitted to be measured using either a Portable Plug-In Watt Meter (Section 7.5), a Clamp-On Watt Meter (Section 7.6), an Analog Utility Revenue Meter (Section 7.7), or a Digital Utility Revenue Meter (Section 7.8).

^{57.} (Normative Note) A Single Packaged System is considered to be in Conditioned Space Volume if the interior side of the package and the distribution system, if any, is in Conditioned Space Volume.

Revise ANSI/RESNET/ACCA 310-2020 Section 7.4.2 as follows to accommodate the setup for a Forced-Air HVAC System with a Furnace:

7.4.2 Settings for HVAC System. The Forced-Air HVAC System shall be tested according to Section 7.4.2.1 if it is designed to operate only in cooling mode or cooling mode is the higher design airflow as reported in Section 4.2.5.5.1. It shall be tested according to Section 7.4.2.2 if it is designed to operate only in heating mode or heating mode is the higher design airflow as reported in Section 4.2.5.5.1. ~~If the Forced-Air HVAC System contains an Air Conditioner, then the test shall be conducted according to Section 0. If the Forced-Air HVAC System contains a~~

~~Heat Pump, then the test shall be conducted according to Section 0 if cooling mode is the higher design airflow as reported in Section **Error! Reference source not found.**, or the test shall be conducted according to Section 0 if heating mode is the higher design airflow as reported in Section **Error! Reference source not found.**~~

7.4.2.1 Cooling Mode.

7.4.2.1.1 If the outdoor temperature is < 55 °F (13 °C), then power to the compressor shall be disconnected¹¹ for the duration of the test. If the Forced-Air HVAC System is capable of operating in heating mode and power to the compressor is not able to be disconnected then the test shall be conducted according to Section 7.4.2.2.

7.4.2.1.2 The thermostat shall be set to cooling mode and the setpoint temperature adjusted as low as possible¹¹.

7.4.1.2.3 If the Forced-Air HVAC System serves multiple zones, as reported in Section 4.2.5.2, then manufacturer instructions shall be followed to ensure that all zones in the Forced-Air HVAC System are set to cooling mode, set to the set point required for testing, and are simultaneously calling for cooling.

7.4.2.2 Heating Mode.

7.4.2.2.1 If the Forced-Air HVAC System contains a Heat Pump and the outdoor temperature is > 60 °F (16 °C), then power to the compressor shall be disconnected⁵⁹ for the duration of the test. If the Forced-Air HVAC System is capable of operating in cooling mode and power to the compressor is not able to be disconnected then the test shall be conducted according to Section 7.4.2.1.

7.4.2.2.2 The thermostat shall be set to heating mode and the setpoint temperature adjusted as high as possible⁶⁰.

7.4.2.2.3 If the Forced-Air HVAC System serves multiple zones, as reported in Section 4.2.5.2, then manufacturer instructions shall be followed to ensure that all zones in the Forced-Air HVAC System are set to heating mode, set to the set point required for testing, and are simultaneously calling for heating.

Revise ANSI/RESNET/ACCA 310-2020 Section 7.9.1 and 7.9.2 as follows to exempt Blower Fan Efficiency from being calculated and to designate Grade I for a Forced-Air HVAC System that is entirely in Conditioned Space Volume and has a supply-side distribution system with a total length that does not exceed 10 ft., inclusive of both ductwork and distribution building cavities:

7.9.1 Blower Fan Efficiency shall be calculated using Equation 2:

$$\text{Blower Fan Efficiency} = \frac{W_{fan}}{Q_{op}} \quad (2)$$

Where:

Blower Fan Efficiency = The ratio of field-measured Blower Fan watt draw and field-measured Blower Fan volumetric airflow.

Wfan = The Blower Fan watt draw at operating conditions, as field-measured per Section 7.5, 7.6, 7.7, or 7.8.

Qop = The Blower Fan volumetric airflow at operating conditions, as field-measured per Section 6.5, 6.6, 6.7, or 6.8.

Exception: For a Forced-Air HVAC System that is entirely in Conditioned Space Volume⁶⁷ and has a supply-side distribution system with a total length that does not exceed 10 ft., inclusive of both ductwork and distribution building cavities, Blower Fan Efficiency need not be calculated⁶⁸.

7.9.2 The Blower Fan watt draw grade shall be designated according to the ranges in Table 3, and recorded.

Table 3 – Grade Designations for Blower Fan Watt Draw

Grade Designation	Blower Fan Efficiency (Watts/CFM)
I	≤ 0.45
II	> 0.45 and ≤ 0.58
III	> 0.58

Exception: For a Forced-Air HVAC System that is entirely in Conditioned Space Volume⁶⁷ and has a supply-side distribution system with a total length that does not exceed 10 ft., inclusive of both ductwork and distribution building cavities, the Blower Fan watt draw grade shall be designated Grade I⁶⁸.

67. (Normative Note) A Single Packaged System is considered to be in Conditioned Space Volume if the interior side of the package and the distribution system, if any, is in Conditioned Space Volume.

68. (Informative Note) In such cases, the Blower Fan efficiency need not be calculated as it should not affect the energy consumption of the home. This is based on the assumption that, in the absence of significant ductwork, the operating fan efficiency will equal the rated fan efficiency and thus is already captured by the Manufacturer’s Equipment Performance Rating. For example, the EER rating of a room AC will reflect the efficiency of the Blower Fan it contains, and the installation will not degrade the performance of the Blower Fan.

Revise ANSI/RESNET/ACCA 310-2020 Section 8.3.2 as follows to exempt Single Packaged Systems from the refrigerant charge test:

8.3.2 Procedure to Determine Applicable Test Methods. The test procedure used to evaluate the refrigerant charge shall be selected according to Sections 8.3.2.1 and 8.3.2.2.

8.3.2.1 If the Forced-Air HVAC System is a Single Packaged System, then evaluation of the refrigerant charge shall be exempted and the refrigerant charge grade shall be designated in accordance with Section 8.6. If it is not a Single Packaged System, then the test procedure shall be selected according to Section 8.3.2.2.

Revise ANSI/RESNET/ACCA 310-2020 Section 8.5.3.7 as follows. This is a minor clarification to reinforce that W_{dev} is a %:

8.5.3.7 The ~~deviation~~-Deviation between the total anticipated and total reported refrigerant weight shall be calculated using Equation 3 and recorded.

$$W_{dev} = \frac{W_{tot_rep} - W_{tot_ant}}{W_{tot_ant}} \quad (3)$$

Where:

W_{dev} = The ~~percent deviation~~-Deviation between the total anticipated and total reported refrigerant weight.

W_{tot_rep} = The total reported weight of refrigerant, from Section 8.5.3.6.

W_{tot_ant} = The total anticipated weight of refrigerant, from Section 8.5.3.5

Revise ANSI/RESNET/ACCA 310-2020 Section 8.6.1 as follows. This is a minor clarification to avoid the use of the word ‘deviation’ now that it is a defined term meaning a percentage.

8.6.1 If the superheat or subcooling of the Forced-Air HVAC System under test was reported using an on-board diagnostic system or through an Independent Verification Report, then Grade I shall be designated if the difference between the measured and OEM-specified superheat or subcooling deviation is within the limits specified within ANSI/ACCA 5 QI Section 4.3.1, which are ± 3 °F (2 °C) for subcooling and ± 5 °F (3 °C) for superheat.

Add ANSI/RESNET/ACCA 310-2020 Section 8.6.2 as follows to assign Single Packaged Systems a refrigerant charge grade of Grade I:

8.6.2 If the Forced-Air HVAC System is a Single Packaged System and the refrigerant charge was not evaluated, then then the refrigerant charge shall be designated Grade I.

Revise ANSI/RESNET/ACCA 310-2020 Table 8 & 9 as follows to specify that the Grade III designation is Grade III Undercharge and revise Section 8.6.4.2 to differentiate between an Undercharge and Overcharge designation:

**Table 4 – Piston or Capillary Tube Metering Device
Grade Designations for Refrigerant Charge**

Grade Designation	Difference DTD Range
I	> -8 °F (4 °C)
III Undercharge	≤ -8 °F (4 °C)

Table 5 – TXV or EEV Metering Device Grade Designations for Refrigerant Charge

Grade Designation	Difference CTOA Range
I	> -6 °F (3 °C)
III Undercharge	≤ -6 °F (3 °C)

8.6.4.2 ~~Grade III shall be designated w~~When the criteria in Section **Error! Reference source not found.** are not met, Grade III Overcharge shall be designated if the Deviation between the total anticipated and total reported refrigerant weight, per Equation 3, is > +5% and the criteria in Section **Error! Reference source not found.** has been met; otherwise, Grade III Undercharge shall be designated.

ANSI/RESNET/ACCA 310-2020 Section 8.6.4.1.1 as follows. This is a minor clarification now that ‘deviation’ is a defined term.

8.6.4.1.1 The absolute value of the ~~percent d~~Deviation between the total anticipated and total reported refrigerant weight, per Equation 3, is ≤ 5%.

Revise Sections 105.3 and 502.3.2 as follows

105.3 Rating Software Changes

When a new version of an Approved Software Rating Tool is released, the new version shall be used for Ratings on Dwelling Units or Sleeping Units with a Building Permit Date on and after the following timelines:

- i. The 6-month anniversary of the software release date,
- ii. If the software version was released in response to an amendment, the Mandatory Compliance Date determined pursuant to section 502.5,
- iii. A date specified by the RESNET Board of Directors.

Alternatively, the date of the HERS Rater or RFI's first site visit, the date of the application of the permit, ~~or~~ the date of the contract on the home, or the date of an application for low-income tax credits or government administered competitive financing for a project meeting the State or local government definition for low income or affordable housing are is-permitted to be used as the Building Permit Date.

502.3.2 Each amendment shall be posted online following approval for publication by the Standards Management Board with the following dates established:

Publication Date – The date on which an amendment is officially approved for publication with a title and/or reference number. This date indicates that an amendment is final, but it shall not be used until the Voluntary Compliance Date.

Voluntary Compliance Date² – The date on which an amendment approved for publication shall be first allowed, but not required, to be used on any Dwelling Unit or Sleeping Unit.

Mandatory Compliance Date² – The date on which compliance with an amendment approved for publication shall be required for any Dwelling Unit or Sleeping Unit with a Building Permit Date on or after that date. Alternatively, the date of the HERS Rater or RFI's first site visit, the date of the application of the permit, ~~or~~ the date of the contract on the home, or the date of an application for low-income tax credits or government administered competitive financing for a project meeting the State or local government definition for low income or affordable housing are is-permitted to be used as the Building Permit Date.