

# Speaking

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# **Designed for Success: 310 HVAC Design Report and Rater Review**

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# Agenda

- Why a design review is important.
- What's required in a Std. 310-compliant design report.
- What's required for a Std. 310-compliant design review.
- When the design review should be completed.
- What other design tasks are needed for an ENERGY STAR certified home.



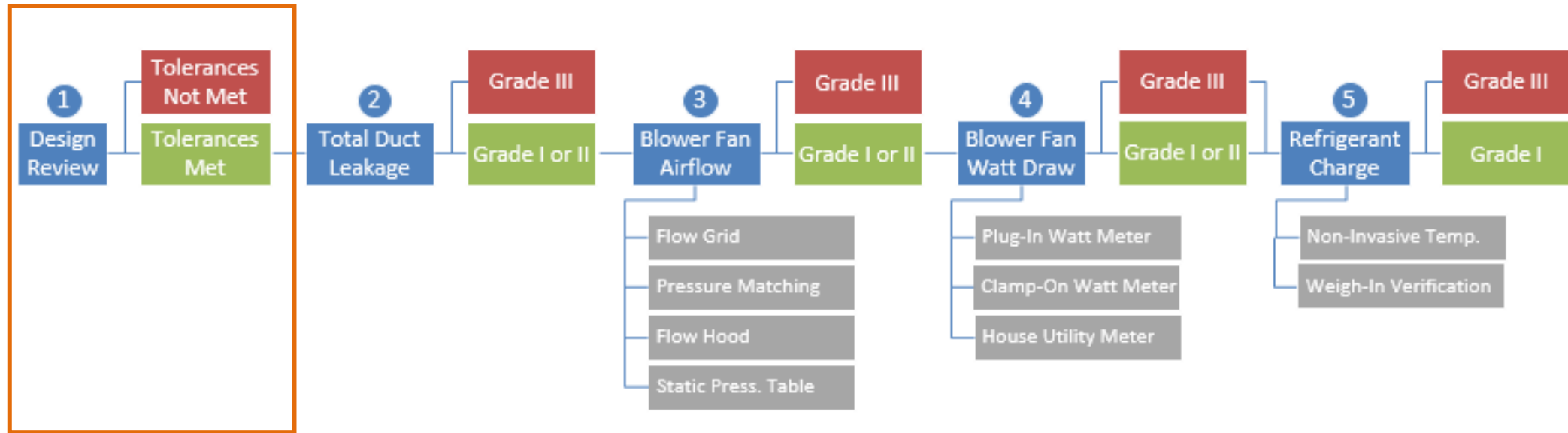
# Why a design review is important



*Ecce Homo de Elías García Martínez.*



# Std. 310: Standard for Grading the Installation of HVAC Systems



# Goals of Std. 310 Task 1 - Design Review

1. To ensure that the HVAC design reflects the home being rated.



HVAC design is for  
3,000 sq. ft. home




Actual home is  
1,200 sq. ft.

# Goals of Std. 310 Task 1 - Design Review

2. To know the design intent.







# What's required in a Std. 310 design report

# What's required in a Std. 310 design report

- Std. 310 defines exactly what design elements must be collected.

**4.2. Required Design Information.** The following design information shall be collected by the person completing the evaluation for the Dwelling.

4.2.1. Architectural design documentation, consisting of the following:

4.2.1.1. The Architectural Plan.

4.2.1.2. Any Architectural Options for the Plan.

4.2.2. HVAC design basis, consisting of the following:

4.2.2.1. The designer name.

4.2.2.2. The designer company.

4.2.2.3. The date of design.

# What's required in a Std. 310 design report

## A. The HVAC design basis, consisting of:

- Designer name and company
- Date of design
- For dwelling / sleeping units, a unique identifier for the building that they're in
- Name of the arch. plan used in the design, and any other plans the design can be used with
- Any arch. options used in the design, and other options the design can be used with
- Design software program name and version, if a program was used.

# What's required in a Std. 310 design report

- B.** The dwelling-unit mechanical vent. system design (if present), consisting of:
- Unique name or ID for each system
  - System type (e.g., supply, exhaust, ERV)
  - Control location (e.g., bathroom, utility room)
  - For some dwelling / sleeping units, the system manufacturer and model number
  - For some dwelling / sleeping units, the unit(s) served by the system
  - The ventilation zone served by the system
  - Design basis for the ventilation rate and runtime (e.g., 62.2-2010, 62.2-2013)
  - Number of bedrooms within, and floor area of, the ventilation zone
  - Design's ventilation airflow rate, runtime per cycle, and cycle time
  - Design's time-averaged ventilation airflow rate

# What's required in a Std. 310 design report

## C. The heat gain & heat loss loads for each heated / cooled zone, consisting of:

- Name of the heated and/or cooled zone
- For some dwelling / sleeping units, the unit's location in the building (i.e., top, mid-level, or bottom floor; corner or middle unit)
- Design basis for the load calculations (e.g., Manual J, ASHRAE Fundamentals, AHJ)
- Confirmation that loads were calculated room-by-room (with allowance for block loads for some dwelling / sleeping units)
- Indoor heating and cooling design temperatures
- Outdoor heating and cooling design temps; and weather location and data source
- Number of occupants
- Total occupant and non-occupant internal gains
- Conditioned floor area
- Window area
- SHGC used in greatest amount of window area
- Nom. R-value used in greatest amount of wall area
- Nom. R-value used in greatest amount of ceiling area
- Infiltration rate
- Time-average mechanical ventilation airflow rate
- Calculated sensible, latent, and total heat gain for one or more orientations
- Max. minus min. heat gain across orientations
- Calculated heat loss

# What's required in a Std. 310 design report

- D. The specifications for all HVAC systems, consisting of:
- Unique name or ID for each system
  - Name of the heated and/or cooled zone system serves
  - Equipment type (e.g., AC, boiler, furnace, heat pump), manufacturer, and model number
  - AHRI reference number, or OEM-documentation
  - Blower fan motor type (e.g., PSC, ECM)
  - Blower fan and compressor fan speed type (e.g., single-speed, two-speed, variable-speed)
  - If an AC or heat pump, whether it's a mini-split or multi-split AC or heat pump
  - If a heat pump, its ratio of maximum to minimum rated capacity
  - Metering device type (e.g., piston / capillary tube, TXV, EEV) and, if TXV / EEV, the OEM subcooling target
  - Rated cooling efficiency and rated heating efficiency
  - If a boiler or furnace, heating capacity type (e.g., single-stage, two-stage, modulating) and venting type (e.g., natural draft system, mechanical draft system, direct-vent appliance)

# What's required in a Std. 310 design report

- E. The specified performance rating & metric (e.g., MERV 7, FPR 9) of each filter
- F. Duct system design elements, consisting of:
  - Design blower fan airflow, expressed in Standard CFM, for cooling mode and heating mode
  - Design blower fan speed setting (e.g., low, medium, high) for cooling mode and heating mode
  - Design external static pressure, corresponding to the mode with the higher design airflow
  - Individual room-by-room names and design airflows
  - Sum of the design airflows across all rooms

# Std. 310 design report template

ANSI / RESNET / ACCA 310 HVAC Design Report <sup>1,2</sup>

<b>1. Design Basis &amp; Architectural Scope</b>											
1.1 Design description (optional):											
1.2 Designer company:				Designer name:				Date:			
1.3 Software name and version used to complete design: <span style="float: right;">N/A <input type="checkbox"/></span>											
For a Dwelling, Townhouse, or Dwelling / Sleeping Unit Within (i.e., duplex):											
1.4 Architectural plan name or address of the property:											
1.5 Architectural options used in the design: <sup>3</sup>											
1.6 Other architectural options that the design can be used with: <sup>4</sup>											
For a Dwelling / Sleeping Unit Not Within a Dwelling or Townhouse (e.g., condo, apartment):											
1.7 Unique ID for the bldg. that the dwelling / sleeping unit is in: <sup>5</sup>											
1.8 Architectural plan used in design (e.g., dwelling unit model):											
1.9 Other architectural plans that the design can be used with: <sup>6</sup>											
1.10 Architectural options used in the design: <sup>3</sup>											
1.11 Other architectural options that the design can be used with: <sup>4</sup>											
1.12 Dwelling / sleeping unit location used in design: <sup>7</sup>											
<b>2. Dwelling-Unit Mechanical Ventilation System Design</b>											
<b>Ventilation System Type &amp; Control Location:</b>											
System				System				System			
2.1 Unique name or ID for each system: <sup>8</sup>											
2.2 Vent. equipment manufacturer & model #: <sup>9</sup>											
2.3 Specified system type: <sup>10</sup>											
2.4 Specified control location: <sup>11</sup>											
2.5 Ventilation zone name(s) served by system: <sup>12</sup>											
<b>Ventilation Zone Served by Ventilation System:</b>											
Zone				Zone				Zone			
2.6 Ventilation zone name: <sup>12</sup>											
2.7 Design basis: <sup>13</sup>											
2.8 Floor area (sq. ft.) and # bedrooms in vent. zone:											
2.9 Ventilation design airflow rate (CFM): <sup>14</sup>											
2.10 Vent. runtime per cycle & cycle time (mins):											
2.11 Time-averaged mechanical vent. rate (CFM): <sup>15</sup>											
<b>3. Heat Gain &amp; Heat Loss Loads</b>											
3.1 Design basis for the loads: <sup>16</sup>											
3.2 Load methodology: <sup>17</sup>											
3.3 Indoor design temperatures used in loads (°F): Heating Season: Cooling Season:											
3.4 Outdoor design temperatures used in loads (°F): <sup>18</sup> Heating Season: Cooling Season:											
3.5 Outdoor design temperature location & data source: <sup>19</sup> Data Source:											
<b>Zone-Specific Inputs &amp; Loads at Design Conditions</b>											
Zone				Zone				Zone			
3.6 Name of heated or cooled zone: <sup>20</sup>											
3.7 Occupants & total occup. internal gains (kBtu/h): <sup>21</sup>											
3.8 Total non-occupant internal gains (kBtu/h):											
3.9 Conditioned floor area (sq. ft.): <sup>22</sup>											
3.10 Window area (sq. ft.): <sup>23</sup>											
3.11 Predominant window SHGC: <sup>24</sup>											
3.12 Predominant insulation nominal R-value: <sup>24,25</sup> Wall: Ceiling: Wall: Ceiling: Wall: Ceiling:											
3.13 Infiltration rate (Qualitative or ACH50): <sup>26</sup>											
3.14 Time-averaged mechanical vent. rate (CFM):											
3.15 Heat gain (kBtu/h): <sup>27</sup>											
Sensible				Latent				Total			
N											
NE											
E											
SE											
S											
SW											
W											
NW											
3.16 Maximum - minimum total heat gain (kBtu/h): <sup>28</sup>											
3.17 Total heat loss (kBtu/h):											

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ANSI / RESNET / ACCA 310 HVAC Design Report <sup>1,2</sup>

<b>4. Heating &amp; Cooling Equipment Selection</b>															
Equip. / System				Equip. / System				Equip. / System							
<b>Air Conditioners, Heat Pumps, &amp; Other Cooling Equipment</b> (If none of these will be installed, check "N/A")															
4.1 Unique name or ID for each system:															
4.2 Zone that system serves (See Item 3.6):															
4.3 Equipment type: <sup>29</sup>															
4.4 Evaporator / fan coil mfr. & model #: <sup>28</sup>															
4.5 Condenser mfr. & model #: <sup>28</sup>															
4.6 AHRI ref. #, or check box for alt. OEM doc.: <sup>31</sup>															
4.7 If AC / HP, rated cooling efficiency: <sup>32</sup>															
4.8 If HP, rated heating efficiency: <sup>33</sup>															
4.9 If HP, ratio of max. to min. rated capacity:															
4.10 If AC / HP, blower fan motor & speed type: <sup>34</sup>															
4.11 If AC / HP, compressor speed type: <sup>35</sup>															
4.12 If AC / HP, meter device type: <sup>36</sup>															
4.13 If TXV or EEV, OEM subcooling target (°F): <sup>37</sup>															
4.14 Filter performance metric and rating: <sup>38</sup>															
<b>Furnaces, Boilers, &amp; Other Heating Equipment</b> (If none of these will be installed, check "N/A")															
4.15 Unique name or ID for each system:															
4.16 Zone that system serves (See Item 3.6):															
4.17 Equipment type: <sup>39</sup>															
4.18 Equipment manufacturer & model #:															
4.19 AHRI ref. #, or check box for alt. OEM doc.: <sup>31</sup>															
4.20 If furnace or boiler, rated heating efficiency:															
4.21 If furnace, blower fan motor & speed type: <sup>34</sup>															
4.22 If furnace or boiler, heating capacity type: <sup>40</sup>															
4.23 If furnace or boiler, venting type: <sup>41</sup>															
4.24 Filter performance metric and rating: <sup>38</sup>															
<b>5. Duct Design</b> (Complete if duct system will be installed; otherwise check "N/A")															
5.1 Unique name or ID for each system:															
5.2 Zone that system serves (See Item 3.6):															
<b>Design Values for Cooling and Heating Mode:</b>															
Cooling				Heating				Cooling				Heating			
5.3 Design blower fan airflow (CFM): <sup>42</sup>															
5.4 Design blower fan speed setting: <sup>43</sup>															
5.5 Design external static pressure (fWC): <sup>44</sup>															
<b>5.6 Room-by-room design airflows (CFM):</b>															
Room Name				Airflow				Room Name				Airflow			
[All rooms]				[All rooms]				[All rooms]				[All rooms]			
Total Design Airflow:															
1.															
2.															
3.															
4.															
5.															
6.															
7.															
8.															
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# Std. 310 design report template

ANSI / RESNET / ACCA 310 HVAC Design Report <sup>1, 2</sup>	
<b>1. Design Basis &amp; Architectural Scope</b>	
1.1 Design description (optional):	Sunflower plan design for all options except sunroom
1.2 Designer company: Superior HVAC Design Incorporated	Designer name: Ms. Maximum Designer Date: 12-01-2020
1.3 Software name and version used to complete design:	Acme Design Software, v1.0 N/A <input type="checkbox"/>
For a Dwelling, Townhouse, or Dwelling / Sleeping Unit Within (i.e., duplex):	
1.4 Architectural plan name or address of the property:	Sunflower Plan
1.5 Architectural options used in the design: <sup>3</sup>	Patio with sliding glass door
1.6 Other architectural options that the design can be used with: <sup>4</sup>	
For a Dwelling / Sleeping Unit Not Within a Dwelling or Townhouse (e.g., condo, apartment):	
1.7 Unique ID for the bldg. that the dwelling / sleeping unit is in: <sup>5</sup>	
1.8 Architectural plan used in design (e.g., dwelling unit model):	
1.9 Other architectural plans that the design can be used with: <sup>6</sup>	
1.10 Architectural options used in the design: <sup>3</sup>	
1.11 Other architectural options that the design can be used with: <sup>4</sup>	
1.12 Dwelling / sleeping unit location used in design: <sup>7</sup>	

# Std. 310 design report template

2. Dwelling-Unit Mechanical Ventilation System Design			
Ventilation System Type & Control Location:	System 1	System	System
2.1 Unique name or ID for each system: <sup>8</sup>	Whole-House ERV		
2.2 Vent. equipment manufacturer & model #: <sup>9</sup>	Broan DEF782		
2.3 Specified system type: <sup>10</sup>	ERV		
2.4 Specified control location: <sup>11</sup>	Utility Rm.		
2.5 Ventilation zone name(s) served by system: <sup>12</sup>	Whole-House		
Ventilation Zone Served by Ventilation System:	Zone 1	Zone	Zone
2.6 Ventilation zone name: <sup>12</sup>	Whole-House		
2.7 Design basis: <sup>13</sup>	62.2-2010		
2.8 Floor area (sq. ft.) and # bedrooms in vent. zone:	3,300	4	
2.9 Ventilation design airflow rate (CFM): <sup>14</sup>	110		
2.10 Vent. runtime per cycle & cycle time (mins):	40 of every	60 of every	of every
2.11 Time-averaged mechanical vent. rate (CFM): <sup>15</sup>	73		

# Std. 310 design report template

3. Heat Gain & Heat Loss Loads										
3.1 Design basis for the loads: <sup>16</sup>	ACCA Manual J v8 2016			3.2 Load methodology: <sup>17</sup>	Room-by-Room					
3.3 Indoor design temperatures used in loads (°F):	Heating Season: 70			Cooling Season: 75						
3.4 Outdoor design temperatures used in loads (°F): <sup>18</sup>	Heating Season: 14			Cooling Season: 94						
3.5 Outdoor design temperature location & data source: <sup>19</sup>	Fairfax, VA			Data Source: ASHRAE						
Zone-Specific Inputs & Loads at Design Conditions	Zone 1			Zone 2			Zone			
3.6 Name of heated or cooled zone: <sup>20</sup>	Living Area			Basement						
3.7 Occupants & total occup. internal gains (Btuh): <sup>21</sup>	4	1,720		1	430					
3.8 Total non-occupant internal gains (Btuh):	6,000			400						
3.9 Conditioned floor area (sq. ft.): <sup>22</sup>	2,200			1,100						
3.10 Window area (sq. ft.): <sup>23</sup>	330			30						
3.11 Predominant window SHGC: <sup>24</sup>	0.30			0.30						
3.12 Predominant insulation nominal R-value: <sup>24, 25</sup>	Wall: 15	Ceiling: 38		Wall: 11	Ceiling:		Wall:	Ceiling:		
3.13 Infiltration rate (Qualitative or ACH50): <sup>26</sup>	3.0			3.0						
3.14 Time-averaged mechanical vent. rate (CFM):	49			24						
3.15 Heat gain (kBtuh): <sup>27</sup>	Sensible	Latent	Total	Sensible	Latent	Total	Sensible	Latent	Total	
	N	28.0	4.6	32.6	6.0	2.1	8.1			
	NE	28.5	4.6	33.1	6.5	2.1	8.6			
	E	29.0	4.6	33.6	7.0	2.1	9.1			
	SE	29.5	4.6	34.1	7.5	2.1	9.6			
	S	30.0	4.6	34.6	8.0	2.1	10.0			
	SW	29.5	4.6	34.1	7.5	2.1	9.6			
	W	29.0	4.6	33.6	7.0	2.1	9.1			
NW	28.5	4.6	33.1	6.5	2.1	8.6				
3.16 Maximum – minimum total heat gain (kBtuh): <sup>28</sup>	2.0			1.9						
3.17 Total heat loss (kBtuh):	36.8			14.2						

# Std. 310 design report template

4. Heating & Cooling Equipment Selection	Equip. / System 1	Equip. / System 2	Equip. / System			
<b>Air Conditioners, Heat Pumps, &amp; Other Cooling Equipment</b> (If none of these will be installed, check "N/A")				N/A <input type="checkbox"/>		
4.1 Unique name or ID for each system:	Attic AC		Basement HP			
4.2 Zone that system serves (See Item 3.6):	Living Area		Basement			
4.3 Equipment type: <sup>29</sup>	AC		HP			
4.4 Evaporator / fan coil mfr. & model #: <sup>30</sup>	Goodman AC16abc		Goodman HP15def			
4.5 Condenser mfr. & model #: <sup>30</sup>	Goodman Cdr16abc	N/A <input type="checkbox"/>	Goodman Cdr15def	N/A <input type="checkbox"/>		
4.6 AHRI ref. #, or check box for alt. OEM doc.: <sup>31</sup>	12345678	OEM <input type="checkbox"/>	46512345	OEM <input type="checkbox"/>		
4.7 If AC / HP, rated cooling efficiency: <sup>32</sup>	16 SEER	N/A <input type="checkbox"/>	15 SEER	N/A <input type="checkbox"/>		
4.8 If HP, rated heating efficiency: <sup>33</sup>		N/A <input checked="" type="checkbox"/>	9.5 HSPF	N/A <input type="checkbox"/>		
4.9 If HP, ratio of max. to min. rated capacity:		N/A <input checked="" type="checkbox"/>	3:1	N/A <input type="checkbox"/>		
4.10 If AC / HP, blower fan motor & speed type: <sup>34</sup>	PSC	Single	N/A <input type="checkbox"/>	ECM	Variable	N/A <input type="checkbox"/>
4.11 If AC / HP, compressor speed type: <sup>35</sup>	Single		Variable		N/A <input type="checkbox"/>	
4.12 If AC / HP, meter device type: <sup>36</sup>	Piston / Cap		TXV		N/A <input type="checkbox"/>	
4.13 If TXV or EEV, OEM subcooling target (°F): <sup>37</sup>			5		N/A <input type="checkbox"/>	
4.14 Filter performance metric and rating: <sup>38</sup>	MERV 7		MERV 7		N/A <input type="checkbox"/>	
<b>Furnaces, Boilers, &amp; Other Heating Equipment</b> (If none of these will be installed, check "N/A")				N/A <input type="checkbox"/>		
4.15 Unique name or ID for each system:	Attic Furnace					
4.16 Zone that system serves (See Item 3.6):	Living Area					
4.17 Equipment type: <sup>39</sup>	Furnace					
4.18 Equipment manufacturer & model #:	Goodman AC16abc					
4.19 AHRI ref. #, or check box for alt. OEM doc.: <sup>31</sup>	54648977	OEM <input type="checkbox"/>		OEM <input type="checkbox"/>		
4.20 If furnace or boiler, rated heating efficiency:	90 AFUE	N/A <input type="checkbox"/>		N/A <input type="checkbox"/>		
4.21 If furnace, blower fan motor & speed type: <sup>34</sup>	Other	Variable	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>		
4.22 If furnace or boiler, heating capacity type: <sup>40</sup>	Single-Stage		N/A <input type="checkbox"/>			
4.23 If furnace or boiler, venting type: <sup>41</sup>	Mech. Draft		N/A <input type="checkbox"/>			
4.24 Filter performance metric and rating: <sup>38</sup>	MERV 7		N/A <input type="checkbox"/>			

# Std. 310 design report template

5. Duct Design (Complete if duct system will be installed; otherwise check "N/A")							N/A <input type="checkbox"/>
5.1 Unique name or ID for each system:	Main Duct System		Basement Duct System				
5.2 Zone that system serves (See Item 3.6):	Living Area		Basement				
Design Values for Cooling and Heating Mode	Cooling	Heating	Cooling	Heating	Cooling	Heating	
5.3 Design blower fan airflow (CFM): <sup>42</sup>	1250	1000	600	800			
5.4 Design blower fan speed setting: <sup>43</sup>	Medium-High	Medium	Medium-High	Medium			
5.5 Design external static pressure (IWC): <sup>44</sup>	0.7		0.5				
5.6 Room-by-room design airflows (CFM):	Room Name	Airflow	Room Name	Airflow	Room Name	Airflow	
Total Design Airflow:	[All rooms]	1250	[All rooms]	800	[All rooms]		
	1. Living Room	120	Rec Room	250			
	2. Kitchen	200	Bathroom	60			
	3. Bedroom 1	100	Bedroom	120			
	4. Bedroom 2	100	Media Room	250			
	5. Bedroom 3	100	Home Office	120			
	6. Master Suite	150					
	7. Master Bath	100					
	8. Bathroom 1	90					
	9. Bathroom 2	90					
	10. Den	100					
	11. Mudroom	100					
	12.						
	13.						
	14.						
	15.						
	16.						
	17.						
	18.						
	19.						
	20.						



# Std. 310 versus ENERGY STAR HVAC design report

Zone-Specific Inputs & Loads at Design Conditions	Zone 1			Zone 2			Zone			
3.6 Name of heated or cooled zone: <sup>20</sup>	Living Area			Basement						
3.7 Occupants & total occup. internal gains (Btuh): <sup>21</sup>	4	1,720		1	430					
3.8 Total non-occupant internal gains (Btuh):	6,000			400						
3.9 Conditioned floor area (sq. ft.): <sup>22</sup>	2,200			1,100						
3.10 Window area (sq. ft.): <sup>23</sup>	330			30						
3.11 Predominant window SHGC: <sup>24</sup>	0.30			0.30						
3.12 Predominant insulation nominal R-value: <sup>24, 25</sup>	Wall:	15	Ceiling:	38	Wall:	11	Ceiling:	Wall:	Ceiling:	
3.13 Infiltration rate (Qualitative or ACH50): <sup>26</sup>	3.0			3.0						
3.14 Time-averaged mechanical vent. rate (CFM):	49			24						
3.15 Heat gain (kBtuh): <sup>27</sup>		Sensible	Latent	Total	Sensible	Latent	Total	Sensible	Latent	Total
	N	28.0	4.6	32.6	6.0	2.1	8.1			
	NE	28.5	4.6	33.1	6.5	2.1	8.6			
	E	29.0	4.6	33.6	7.0	2.1	9.1			
	SE	29.5	4.6	34.1	7.5	2.1	9.6			
	S	30.0	4.6	34.6	8.0	2.1	10.0			
	SW	29.5	4.6	34.1	7.5	2.1	9.6			
	W	29.0	4.6	33.6	7.0	2.1	9.1			
NW	28.5	4.6	33.1	6.5	2.1	8.6				
3.16 Maximum – minimum total heat gain (kBtuh): <sup>28</sup>	2.0			1.9						
3.17 Total heat loss (kBtuh):	36.8			14.2						

#1. Single report used for entire home, not just for one HVAC system

# Std. 310 versus ENERGY STAR HVAC design report

For a Dwelling, Townhouse, or Dwelling / Sleeping Unit Within (i.e., duplex):

1.4 Architectural plan name or address of the property:	Sunflower Plan
1.5 Architectural options used in the design: <sup>3</sup>	Patio with sliding glass door
1.6 Other architectural options that the design can be used with: <sup>4</sup>	

For a Dwelling / Sleeping Unit Not Within a Dwelling or Townhouse (e.g., condo, apartment):

1.7 Unique ID for the bldg. that the dwelling / sleeping unit is in: <sup>5</sup>	Success Lofts @ 135 Prosper Ave
1.8 Architectural plan used in design (e.g., dwelling unit model):	Unit A-3
1.9 Other architectural plans that the design can be used with: <sup>6</sup>	Unit A-1, Unit A-2, Unit B-1, Unit B-2, Unit B-3
1.10 Architectural options used in the design: <sup>3</sup>	Balcony with sliding glass door
1.11 Other architectural options that the design can be used with: <sup>4</sup>	Media Room
1.12 Dwelling / sleeping unit location used in design: <sup>7</sup>	Top-Floor Corner Unit

#2. Some field are just applicable to single-family homes and others to multi-family units



# Std. 310 versus ENERGY STAR HVAC design report

2. Dwelling-Unit Mechanical Ventilation System Design			
Ventilation System Type & Control Location:	System 1	System	System
2.1 Unique name or ID for each system: <sup>8</sup>	Whole-House ERV		
2.2 Vent. equipment manufacturer & model #: <sup>9</sup>	Broan DEF782		
2.3 Specified system type: <sup>10</sup>	ERV		
2.4 Specified control location: <sup>11</sup>	Utility Rm.		
2.5 Ventilation zone name(s) served by system: <sup>12</sup>	Whole-House		
Ventilation Zone Served by Ventilation System:	Zone 1	Zone	Zone
2.6 Ventilation zone name: <sup>12</sup>	Whole-House		
2.7 Design basis: <sup>13</sup>	62.2-2010		
2.8 Floor area (sq. ft.) and # bedrooms in vent. zone:	3,300	4	
2.9 Ventilation design airflow rate (CFM): <sup>14</sup>	110		
2.10 Vent. runtime per cycle & cycle time (mins):	40 of every 60	of every	of every
2.11 Time-averaged mechanical vent. rate (CFM): <sup>15</sup>	73		

#3. Fewer fields about ASHRAE 62.2 compliance (e.g., no fields about some ratings, inlet locations, etc.)



# Std. 310 versus ENERGY STAR HVAC design report

Zone-Specific Inputs & Loads at Design Conditions	Zone 1			Zone 2			Zone			
3.6 Name of heated or cooled zone: <sup>20</sup>	Living Area			Basement						
3.7 Occupants & total occup. internal gains (Btuh): <sup>21</sup>	4	1,720		1	430					
3.8 Total non-occupant internal gains (Btuh):	6,000			400						
3.9 Conditioned floor area (sq. ft.): <sup>22</sup>	2,200			1,100						
3.10 Window area (sq. ft.): <sup>23</sup>	330			30						
3.11 Predominant window SHGC: <sup>24</sup>	0.30			0.30						
3.12 Predominant insulation nominal R-value: <sup>24, 25</sup>	Wall:	15	Ceiling:	38	Wall:	11	Ceiling:	Wall:	Ceiling:	
3.13 Infiltration rate (Qualitative or ACH50): <sup>26</sup>	3.0			3.0						
3.14 Time-averaged mechanical vent. rate (CFM):	49			24						
3.15 Heat gain (kBtuh): <sup>27</sup>	Sensible	Latent	Total	Sensible	Latent	Total	Sensible	Latent	Total	
	N	28.0	4.6	32.6	6.0	2.1	8.1			
	NE	28.5	4.6	33.1	6.5	2.1	8.6			
	E	29.0	4.6	33.6	7.0	2.1	9.1			
	SE	29.5	4.6	34.1	7.5	2.1	9.6			
	S	30.0	4.6	34.6	8.0	2.1	10.0			
	SW	29.5	4.6	34.1	7.5	2.1	9.6			
	W	29.0	4.6	33.6	7.0	2.1	9.1			
NW	28.5	4.6	33.1	6.5	2.1	8.6				
3.16 Maximum – minimum total heat gain (kBtuh): <sup>28</sup>	2.0			1.9						
3.17 Total heat loss (kBtuh):	36.8			14.2						

#4. Several heating / cooling load inputs have been added

# Std. 310 versus ENERGY STAR HVAC design report

4. Heating & Cooling Equipment Selection	Equip. / System 1		Equip. / System 2		Equip. / System
<b>Air Conditioners, Heat Pumps, &amp; Other Cooling Equipment</b> (If none of these will be installed, check "N/A")					N/A <input type="checkbox"/>
4.1 Unique name or ID for each system:	Attic AC		Basement HP		
4.2 Zone that system serves (See Item 3.6):	Living Area		Basement		
4.3 Equipment type: <sup>29</sup>	AC		HP		
4.4 Evaporator / fan coil mfr. & model #: <sup>30</sup>	Goodman AC16abc		Goodman HP15def		
4.5 Condenser mfr. & model #: <sup>30</sup>	Goodman Cdr16abc	N/A <input type="checkbox"/>	Goodman Cdr15def	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.6 AHRI ref. #, or check box for alt. OEM doc.: <sup>31</sup>	12345678	OEM <input type="checkbox"/>	46512345	OEM <input type="checkbox"/>	OEM <input type="checkbox"/>
4.7 If AC / HP, rated cooling efficiency: <sup>32</sup>	16 SEER	N/A <input type="checkbox"/>	15 SEER	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.8 If HP, rated heating efficiency: <sup>33</sup>		N/A <input checked="" type="checkbox"/>	9.5 HSPF	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.9 If HP, ratio of max. to min. rated capacity:		N/A <input checked="" type="checkbox"/>	3:1	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.10 If AC / HP, blower fan motor & speed type: <sup>34</sup>	PSC	Single N/A <input type="checkbox"/>	ECM	Variable N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.11 If AC / HP, compressor speed type: <sup>35</sup>		Single N/A <input type="checkbox"/>		Variable N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.12 If AC / HP, meter device type: <sup>36</sup>		Piston / Cap N/A <input type="checkbox"/>		TXV N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.13 If TXV or EEV, OEM subcooling target (°F): <sup>37</sup>		N/A <input checked="" type="checkbox"/>		5 N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.14 Filter performance metric and rating: <sup>38</sup>		MERV 7 N/A <input type="checkbox"/>		MERV 7 N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
<b>Furnaces, Boilers, &amp; Other Heating Equipment</b> (If none of these will be installed, check "N/A")					N/A <input type="checkbox"/>
4.15 Unique name or ID for each system:	Attic Furnace				
4.16 Zone that system serves (See Item 3.6):	Living Area				
4.17 Equipment type: <sup>39</sup>	Furnace				
4.18 Equipment manufacturer & model #:	Goodman AC16abc				
4.19 AHRI ref. #, or check box for alt. OEM doc.: <sup>31</sup>	54648977	OEM <input type="checkbox"/>		OEM <input type="checkbox"/>	OEM <input type="checkbox"/>
4.20 If furnace or boiler, rated heating efficiency:	90 AFUE	N/A <input type="checkbox"/>		N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.21 If furnace, blower fan motor & speed type: <sup>34</sup>	Other	Variable N/A <input type="checkbox"/>		N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.22 If furnace or boiler, heating capacity type: <sup>40</sup>		Single-Stage N/A <input type="checkbox"/>		N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.23 If furnace or boiler, venting type: <sup>41</sup>		Mech. Draft N/A <input type="checkbox"/>		N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.24 Filter performance metric and rating: <sup>38</sup>		MERV 7 N/A <input type="checkbox"/>		N/A <input type="checkbox"/>	N/A <input type="checkbox"/>

#5. Equipment selection fields have been added, but capacity and sizing fields have been omitted

## Std. 310 versus ENERGY STAR HVAC design report

- Summary of top 5 differences between Std. 310 and ENERGY STAR report:
  1. Std. 310 uses single report for entire home, not one per HVAC system.
  2. Std. 310 contains some fields only applicable to SF or MF projects.
  3. Std. 310 contains fewer fields about ASHRAE 62.2-compliance.
  4. Std. 310 adds several heating / cooling load inputs to report.
  5. Std. 310 adds several fields about equipment selection, but omits capacity and sizing fields.

# Std. 310 design report coming to HVAC design programs

- Any documentation that contains all of the required Std. 310 design elements is acceptable.
- However, the template will likely be the easiest way to ensure compliance.
- HVAC design programs are planning to incorporate this template.



Rhvac





# What's required for a Std. 310 design review

# What's required for a Std. 310 design review

- Std. 310 defines exactly what design elements must be reviewed.

**4.3. Evaluation of Design Information.** The design documentation collected in Section 4.2 shall be reviewed to verify that all required information has been provided. In addition, the Dwelling<sup>22</sup> shall be compared to the design documentation to verify that the following criteria have been met.

4.3.1. If a Dwelling or Townhouse, or Dwelling Unit or Sleeping Unit within, is to be rated, then the following criteria shall be met in addition to the criteria in Section 4.3.4:

4.3.1.1. The name of the Architectural Plan or unique address of the Dwelling matches that used in the HVAC design, as documented in Section 4.2.2.4.1.1.

4.3.1.2. Any Architectural Option(s) used in the Dwelling match those used in the HVAC design or are in the list of option(s) that the design can be used with, as documented in Section 4.2.2.4.1.2.

4.3.1.3. The Conditioned Floor Area of each zone in the Dwelling is between 300 square feet smaller and 100 square feet larger than the area in the HVAC design, as documented in Section 4.2.4.10.

# What's required for a Std. 310 design review

1. Verify that design documentation contains all required elements.
  2. Review design documentation to verify that design criteria are met, according to project type:
    - a) A dwelling or townhouse, or dwelling / sleeping unit within (i.e., a duplex)
    - b) A regular-load dwelling / sleeping unit not within a dwelling or townhouse
    - c) A low-load dwelling / sleeping unit not within a dwelling or townhouse
- Some design criteria are specific to each project type; others apply to all project types.

# Design review criteria: Example #1

- For a dwelling, townhouse, or dwelling / sleeping unit within: Verify that the window area of each zone in the dwelling is between 60 sq. ft. smaller and 15 sq. ft. larger than the area in the HVAC Design. For zones with > 500 sq. ft. of window area, the tolerance is between 12% smaller and 3% larger.

..the HVAC design

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.7 Name of heated or cooled zone: <sup>15</sup>	Living Area
3.8 Number of occupants: <sup>16</sup>	4
3.9 Total occupant internal gains (Btuh):	1,720
3.10 Total non-occupant internal gains (Btuh):	6,000
3.11 Conditioned floor area (sq. ft.): <sup>17</sup>	2,200
3.12 Window area (sq. ft.): <sup>18</sup>	330

HVAC Design Report (Illustration-Only)



Plan Set

Actual dwelling has 45 ft<sup>2</sup> less window area than..

- 61 ft<sup>2</sup> smaller (269 ft<sup>2</sup>)
- 60 ft<sup>2</sup> smaller (270 ft<sup>2</sup>)
- 15 ft<sup>2</sup> larger (345 ft<sup>2</sup>)
- 16 ft<sup>2</sup> larger (346 ft<sup>2</sup>)



## Design review criteria: Example #2

- For a 'regular-load' dwelling / sleeping unit: Also verify that the window area of each zone in the dwelling is between 60 sq. ft. smaller and 15 sq. ft. larger than the area in the HVAC Design. For zones with > 500 sq. ft. of window area, the tolerance is between 12% smaller and 3% larger.

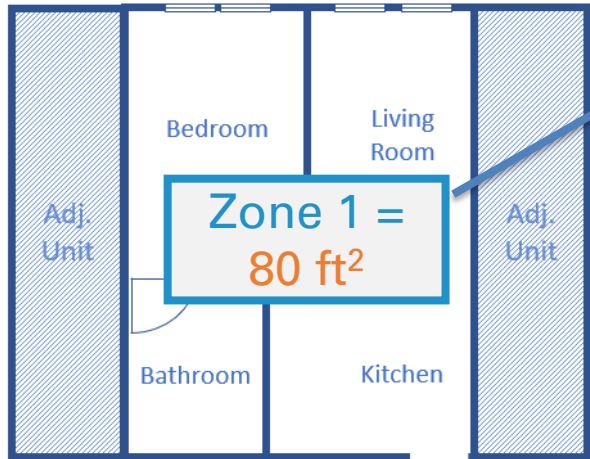
# Design review criteria: Example #3

- For a 'low-load' dwelling / sleeping unit: Verify that the window area of each zone in the unit is less than or equal to the area in the HVAC design.

..the HVAC design

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.7 Name of heated or cooled zone: <sup>16</sup>	Entire Unit
3.8 Number of occupants: <sup>17</sup>	2
3.9 Total occupant internal gains (Btuh):	860
3.10 Total non-occupant internal gains (Btuh):	500
3.11 Conditioned floor area (sq. ft.): <sup>18</sup>	950
3.12 Window area (sq. ft.): <sup>19</sup>	95

HVAC Design Report (Illustration-Only)



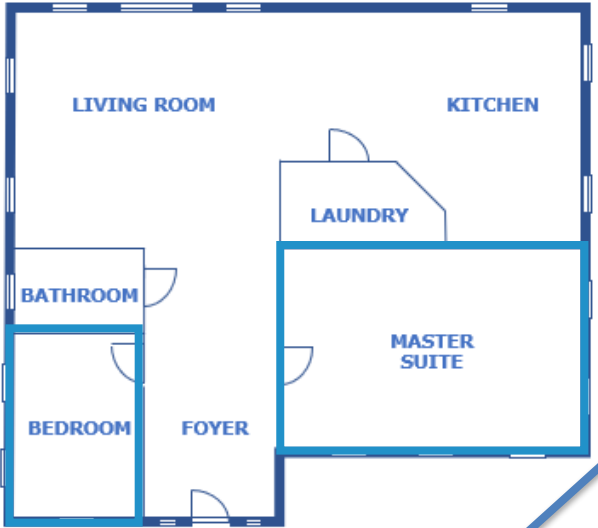
Plan Set

Actual unit has less window area than..

# Design review criteria: Example #4

- For all project types: Verify that the number of occupants, calculated using the following equation, are within  $\pm 2$  of the sum of occupants used in the loads across all zones.

*Occupants = Number of Bedrooms + 1*



Plan Set

Number of occupants based on bedrooms..

*Occupants = 2 bdrms + 1 = 3*

..is within  $\pm 2$  of the occupants used in the HVAC design

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.7 Name of heated or cooled zone: <sup>15</sup>	Living Area
3.8 Number of occupants: <sup>16</sup>	3
3.9 Total occupant internal gains (Btuh):	1,720
3.10 Total non-occupant internal gains (Btuh):	6,000
3.11 Conditioned floor area (sq. ft.): <sup>17</sup>	2,200
3.12 Window area (sq. ft.): <sup>18</sup>	330

HVAC Design Report (Illustration-Only)

- 3 (0 occupants)
- 2 (1 occupant)
- +2 (5 occupants)
- +3 (6 occupants)

# What's required for a Std. 310 design review

- Design review process is very similar to ENERGY STAR process:

## ENERGY STAR National Rater Design Review Checklist

<b>4b. Review of ENERGY STAR National HVAC Design Report</b> <sup>10</sup>		
4b.1 National HVAC Design Report collected for records, with no items left blank.	<input type="checkbox"/>	<input type="checkbox"/>
4b.2 National HVAC Design Report reviewed by Rater for the following parameters (National HVAC Design Report Item # in parenthesis):		
4b.2.1 Cooling season and heating season outdoor design temperatures used in loads (3.3) are within the limits defined for the State and County, or US Territory, where the home will be built, or the designer has provided an allowance from EPA to use alternative values. All limits are published at <a href="http://energystar.gov/hvacdesigntemps">energystar.gov/hvacdesigntemps</a> . Note that revised (i.e., 2019 Edition) limits are required to be used for all HVAC Design Reports generated after 10/01/2020. <sup>11</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.2 Number of occupants used in loads (3.4) is within $\pm 2$ of the home to be certified. <sup>12</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.3 Conditioned floor area used in loads (3.5) is between 100 sq. ft. smaller and 300 sq. ft. larger than the home to be certified. <sup>13</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.4 Window area used in loads (3.6) is between 15 sq. ft. smaller and 60 sq. ft. larger than the home to be certified, or, for homes to be certified with > 500 sq. ft. of window area, between 3% smaller and 12% larger. <sup>14</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.5 Predominant window SHGC used in loads (3.7) is within 0.1 of predominant value in the home to be certified. <sup>15</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.6 Sensible, latent, & total heat gain are documented (3.10 - 3.12) for the orientation of the home to be certified. <sup>16</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.7 The variation in total heat gain across orientations (3.13) is $\leq 6$ kBtuh. <sup>16</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.8 Cooling sizing % (4.13) is within the cooling sizing limit (4.15) selected by the HVAC designer.	<input type="checkbox"/>	<input type="checkbox"/>

# Std. 310 versus ENERGY STAR HVAC design review

- #1a. Wall insulation: Verify that the nominal R-value of the insulation used in the greatest amount of above-grade wall area for each zone is within  $\pm R-2$  of the value used in the loads.

Predominant above-grade wall R-value..

Wall Insulation of R-15 = 1,500 ft<sup>2</sup>





Wall Insulation of R-19 = 250 ft<sup>2</sup>

Plan Set & Specs

..is within  $\pm R-2$  of the value used in the HVAC design

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.13 Predominant window SHGC: <sup>19</sup>	0.30
3.14 Predominant wall insulation nom. R-value: <sup>19, 20</sup>	15
3.15 Predominant ceiling insulation nom. R-value: <sup>19</sup>	38
3.16 Infiltration rate (Qualitative or ACH50): <sup>21</sup>	3.0
3.17 Time-averaged mechanical vent rate (CFM):	50

HVAC Design Report (Illustration-Only)

-  -R-3 (R-12)
-  -R-2 (R-13)
-  +R-2 (R-17)
-  +R-3 (R-18)

# Std. 310 versus ENERGY STAR HVAC design review

- #1b. Ceiling insulation: Verify that the nominal R-value of the insulation used in the greatest amount of ceiling area for each zone is within  $\pm R-4$  of the value used in the loads.

Predominant ceiling R-value..

Ceiling Insulation of **R-38**  
= 2,050 ft<sup>2</sup>





Ceiling Insulation of **R-30**  
= 150 ft<sup>2</sup>

Plan Set & Specs

..is within  $\pm R-4$  of the value used in the HVAC design

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.13 Predominant window SHGC: <sup>19</sup>	0.30
3.14 Predominant wall insulation nom. R-value: <sup>19, 20</sup>	15
3.15 Predominant ceiling insulation nom. R-value: <sup>19</sup>	38
3.16 Infiltration rate (Qualitative or ACH50): <sup>21</sup>	3.0
3.17 Time-averaged mechanical vent rate (CFM):	50

HVAC Design Report  
(Illustration-Only)

-  -R-5 (R-33)
-  -R-4 (R-34)
-  +R-4 (R-42)
-  +R-5 (R-43)

# Std. 310 versus ENERGY STAR HVAC design review

- **#2a. Infiltration:** If the infiltration design value is quantitative, verify that the infiltration rate of the dwelling is within  $\pm 2.0$  ACH50 of the value used in the loads for each zone.

Proposed Infiltration =  
3.0 ACH50

Builder Specs

Infiltration rate..

..is within  $\pm 2.0$  ACH50 of the value used in the HVAC design

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.13 Predominant window SHGC: <sup>19</sup>	0.30
3.14 Predominant wall insulation nom. R-value: <sup>19, 20</sup>	15
3.15 Predominant ceiling insulation nom. R-value: <sup>19</sup>	38
3.16 Infiltration rate (Qualitative or ACH50): <sup>21</sup>	3.0
3.17 Time-averaged mechanical vent rate (CFM):	50

HVAC Design Report  
(Illustration-Only)

-  -2.1 (0.9 ACH50)
-  -2.0 (1.0 ACH50)
-  +2.0 (5.0 ACH50)
-  +2.1 (5.1 ACH50)

# Std. 310 versus ENERGY STAR HVAC design review

- **#2b. Infiltration:** If the infiltration design value is qualitative, verify that the infiltration rate of the dwelling is within the tolerances of the table below, for the given input used in the loads, for each zone.

Proposed Infiltration =  
3.0 ACH50

Builder Specs

Infiltration rate..

✓ ..is within the acceptable range for the quantitative input used in the HVAC design

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.13 Predominant window SHGC: <sup>19</sup>	0.30
3.14 Predominant wall insulation nom. R-value: <sup>19, 20</sup>	15
3.15 Predominant ceiling insulation nom. R-value: <sup>19</sup>	38
3.16 Infiltration rate (Qualitative or ACH50): <sup>21</sup>	Semi-Tight
3.17 Time-averaged mechanical vent rate (CFM):	50

HVAC Design Report (Illustration-Only)

Qualitative Cooling Infiltration Input Used in Design	Infiltration Tolerance of Dwelling (ACH50)
Tight	0 - 4.0
Semi-Tight	1.0 - 5.0
Average	3.0 - 7.0
Semi-Leaky	7.0 - 11.0
Leaky	>11.0

Infiltration Tolerance for Qualitative Design Input



# Std. 310 versus ENERGY STAR HVAC design review

- **#3. Ventilation rate:** Verify that the sum of the design's time-averaged mechanical ventilation airflow rate across all ventilation zones equals the sum used in the loads across all heated & cooled zones.

Ventilation Zone Served by Ventilation System:	Zone 1	Zone 2
2.5 Ventilation zone name: <sup>8</sup>	Living Area	Basement
2.6 Design basis: <sup>9</sup>	62.2-2010	62.2-2010
2.7 Number of bedrooms within ventilation zone:	3	1
2.8 Floor area of ventilation zone (sq. ft.):	2,200	1,100
2.9 Ventilation airflow rate (CFM): <sup>10</sup>	100	50
2.10 Vent. runtime per cycle & cycle time (mins):	40 of every 60	30 of every 60
2.11 Time-averaged mechanical vent rate (CFM): <sup>11</sup>	67	25

HVAC Design Report  
(Illustration-Only)

Zone-Specific Inputs & Loads at Design Conditions	Zone 1	Zone 2
3.7 Name of heated or cooled zone: <sup>15</sup>	Living Area	Basement
3.17 Time-averaged mechanical vent rate (CFM):	67	25

HVAC Design Report  
(Illustration-Only)

$$\text{Time - Averaged Rate} = 67 + 25 = 92 \text{ CFM}$$

Ventilation rate..

$$\text{Rates Used in Loads} = 67 + 25 = 92 \text{ CFM}$$

..equals that used in the loads

# Std. 310 versus ENERGY STAR HVAC design review

- #4. Tailored review for multifamily: For example, verify the name of the unique identifier for the building that the unit is within matches that used in the HVAC design.

Project name or address..

<b>SHEET NO.</b> <b>ARCH-4</b>	<b>PROJECT</b> <b>SUCCESS LOFTS</b> <b>135 PROSPER AVE</b>	<b>DRAWN BY</b> <b>DTG</b>
	<b>MODEL</b> <b>UNIT A-1</b>	<b>DATE</b> <b>2020-07-01</b>
	<b>OPTIONS</b> <b>NONE</b>	

Plan Set

1. Design Basis & Architectural Scope	
1.1 Designer company:	Superior HVAC Design Incorporated
Designer name:	Ms. Maximum Designer
Date:	07-01-2020
1.2 Unique ID for the bldg. that the dwelling/sleeping unit is in: <sup>3</sup>	Success Lofts @ 135 Prosper Ave
1.3 Architectural plan used in design:	Unit A-1
1.4 Other architectural plans that the design can be used with:	Unit A-2, Unit A-3, Unit B-1, Unit B-2, Unit B-3
1.5 Architectural options included in the design: <sup>4</sup>	None
1.6 Other architectural options that the design can be used with: <sup>5</sup>	Balcony with sliding glass door
1.7 Software name and version used to complete design:	Acme Design Software, v1.0
	N/A <input type="checkbox"/>

..matches that used in the HVAC design

HVAC Design Report (Illustration-Only)

# Std. 310 versus ENERGY STAR HVAC design review

- **#5. Cooling sizing limit:** While ENERGY STAR requires you to verify that the cooling sizing is within a specified limit, Std. 310 does not.

## ENERGY STAR National Rater Design Review Checklist

4b. Review of ENERGY STAR National HVAC Design Report <sup>10</sup>		
4b.1 National HVAC Design Report collected for records, with no items left blank.	<input type="checkbox"/>	<input type="checkbox"/>
4b.2 National HVAC Design Report reviewed by Rater for the following parameters (National HVAC Design Report Item # in parenthesis):		
4b.2.1 Cooling season and heating season outdoor design temperatures used in loads (3.3) are within the limits defined for the State and County, or US Territory, where the home will be built, or the designer has provided an allowance from EPA to use alternative values. All limits are published at <a href="http://energystar.gov/hvacdesigntemps">energystar.gov/hvacdesigntemps</a> . Note that revised (i.e., 2019 Edition) limits are required to be used for all HVAC Design Reports generated after 10/01/2020. <sup>11</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.2 Number of occupants used in loads (3.4) is within $\pm 2$ of the home to be certified. <sup>12</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.3 Conditioned floor area used in loads (3.5) is between 100 sq. ft. smaller and 300 sq. ft. larger than the home to be certified. <sup>13</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.4 Window area used in loads (3.6) is between 15 sq. ft. smaller and 60 sq. ft. larger than the home to be certified, or, for homes to be certified with > 500 sq. ft. of window area, between 3% smaller and 12% larger. <sup>14</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.5 Predominant window SHGC used in loads (3.7) is within 0.1 of predominant value in the home to be certified. <sup>15</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.6 Sensible, latent, & total heat gain are documented (3.10 - 3.12) for the orientation of the home to be certified. <sup>16</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.7 The variation in total heat gain across orientations (3.13) is $\leq 6$ kBtuh. <sup>16</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.8 Cooling sizing % (4.13) is within the cooling sizing limit (4.15) selected by the HVAC designer.	<input type="checkbox"/>	<input type="checkbox"/>

## Std. 310 versus ENERGY STAR HVAC design review

- Summary of top 5 differences between Std. 310 and ENERGY STAR review:
  1. Std. 310 adds review of ceiling / wall insulation in design vs actual home.
  2. Std. 310 adds review of infiltration in design vs actual home.
  3. Std. 310 adds review of vent. rate in vent. design vs heating/cooling loads.
  4. Std. 310 tailors the review a bit for multifamily projects.
  5. Std. 310 omits the review of cooling sizing.
- The current ENERGY STAR Rater Design Review Checklist plus these five changes is the bulk of what you need to complete for the design review in Std. 310!



# When to complete Std. 310 design review

# When to complete Std. 310 design review

- **End goal:** By the time you do the Std. 310 field tests, ensure that all the design review criteria have been met.
- Design review criteria fall into two categories:
  - a) Criteria that you can fully verify before construction.
  - b) Criteria that you can only fully verify during construction.

# When to complete Std. 310 design review

a) Criteria that you can fully verify before construction.

Indoor design temperatures must be 70 °F for the heating season and 75 °F for the cooling season.

3. Heat Gain & Heat Loss Loads				
3.1 Design basis for the loads: <sup>12</sup>	ACCA Manual J v8 2016		3.2 Loads were calculated room-by-room, not as a single block:	<input checked="" type="checkbox"/> Yes
3.3 Indoor design temperatures used in loads (°F):	Heating Season	70	Cooling Season	75
3.4 Outdoor design temperatures used in loads (°F): <sup>13</sup>	Heating Season	14	Cooling Season	94
3.5 Outdoor design temperature location & data source: <sup>14</sup>	Fairfax, VA		Data Source:	ASHRAE
3.6 (Optional) Counties that design is intended for use in:	Fairfax, Loudon, Alexandria			

For example, indoor design temperatures can be fully verified before construction, because no matter how the home is built, the design temps won't change.

# When to complete Std. 310 design review

- a) Criteria that you can fully verify before construction:
- Delta between max and min heat gain across orientations is within tolerance
  - Loads are room-by-room, not block (exceptions for some project types)
  - Indoor design temps are within tolerance
  - Outdoor design temps are within tolerance
  - Time-averaged vent. airflow rate used in vent. design matches rate used in loads
  - Sum of design airflows for all rooms equals blower fan mode with higher airflow



# When to complete Std. 310 design review

b) Criteria that you can only fully verify during construction.

Predominant SHGC at design stage..

Window Schedule				
Type	Qty	Dimensions	U-factor	SHGC
A	15	3'-0" x 5'-0"	0.30	0.30
B	2	2'-0" x 2'-0"	0.29	0.32
C	1	1'-0" x 3'-0"	0.30	0.30

Plan Set & Spec Sheets




..is within  $\pm 0.1$  of the value used in the HVAC design..

Zone-Specific Inputs & Loads at Design Conditions	Zone 1
3.13 Predominant window SHGC: <sup>19</sup>	0.30
3.14 Predominant wall insulation nom. R-value: <sup>19, 20</sup>	15
3.15 Predominant ceiling insulation nom. R-value: <sup>19</sup>	38
3.16 Infiltration rate (Qualitative or ACH50): <sup>21</sup>	3.0
3.17 Time-averaged mechanical vent rate (CFM):	50

HVAC Design Report (Illustration-Only)



..but predominant SHGC in actual home is not

 World's Best Window Co. Millennium 2000* Vinyl-Cad Window Frame Double Glazing - Argon Fill - Low E Product Type: Vertical Slider	
<b>ENERGY PERFORMANCE RATINGS</b> U-Factor (U.S./I-P)      Solar Heat Gain Coefficient	
<b>0.30</b>	<b>0.45</b>
<b>ADDITIONAL PERFORMANCE RATINGS</b> Visible Transmittance      Air Leakage (U.S./I-P)	
<b>0.51</b>	<b>0.2</b>
Condensation Resistance	<b>51</b>
	<b>—</b>

Actual Home

For example, window SHGC can only be fully verified during construction, because the actual home that's built might have different windows than the design.

# When to complete Std. 310 design review

- b) Criteria that you can only fully verify during construction:
- Arch. plan name or address of home matches that used in the design
  - Arch. options used in home are in list of options that design can be used with
  - For multifamily, building name or address matches that used in design
  - For multifamily, unit location (e.g., top-floor corner unit) of home matches criteria
  - Floor area of home is within tolerance of value used in design
  - Window area of home is within tolerance of value used in design
  - Front orientation of home matches one of the orientations used in the design
  - Occupants, per bedrooms in home, is within tolerance of value used in design
  - Window SHGC of home is within tolerance of value used in design
  - Wall & ceiling insulation of home is within tolerance of value used in design
  - Infiltration rate of home is within tolerance of value used in design
  - HVAC systems in home match equipment type(s) and serve zone(s) used in design

# When to complete Std. 310 design review

- Recommendation is to verify design criteria during a plan review and also in the field.
- RESNET has created an Excel-based data tool that will assist you with both. Visit <https://www.resnet.us/about/standards/resnet-ansi/>, under Spreadsheet Calculators.

Only For Dwelling or Townhouse, or Dwelling Unit or Sleeping Unit Within (e.g. Duplex)						
	Plan Review			Field Review		
Does name of the architectural plan or address match the HVAC design?	<input type="checkbox"/> Yes			<input type="checkbox"/> Yes		
Are arch. options used in the Home encompassed by the HVAC design?	<input type="checkbox"/> Yes			<input type="checkbox"/> Yes		
<b>Conditioned floor area of heating/cooling zones</b>	<b>Zone 1</b>	<b>Zone 2</b>	<b>Zone 3</b>	<b>Zone 1</b>	<b>Zone 2</b>	<b>Zone 3</b>
HVAC Design	1,850	900		1,850	900	0
Actual Home	1,850	875		1,810	880	
Actual is between 300 sq. ft. smaller & 100 sq. ft. larger than design?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<b>Window area of heating/cooling zones</b>	<b>Zone 1</b>	<b>Zone 2</b>	<b>Zone 3</b>	<b>Zone 1</b>	<b>Zone 2</b>	<b>Zone 3</b>
HVAC Design	250	30		250	30	0
Actual Home	250	30		265	30	
Actual is between 60 sq. ft. smaller & 15 sq. ft. larger than design, or for zones with > 500 sq. ft. of windows, between 12% smaller and 3%	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Front orientation of Home matches one of the orientations documented in the HVAC design?	<input type="checkbox"/> Yes			<input type="checkbox"/> Yes		
Is the difference between the maximum and minimum total heat gain for each zone is $\leq 6$ kBtuh?	<input type="checkbox"/> Yes					
Have the heating and cooling loads been calculated room-by-room?	<input type="checkbox"/> Yes					
All requirements met for Dwelling or Townhouse, or Dwelling Unit or Sleeping Unit Within (e.g. Duplex)?	<input type="checkbox"/> Yes					

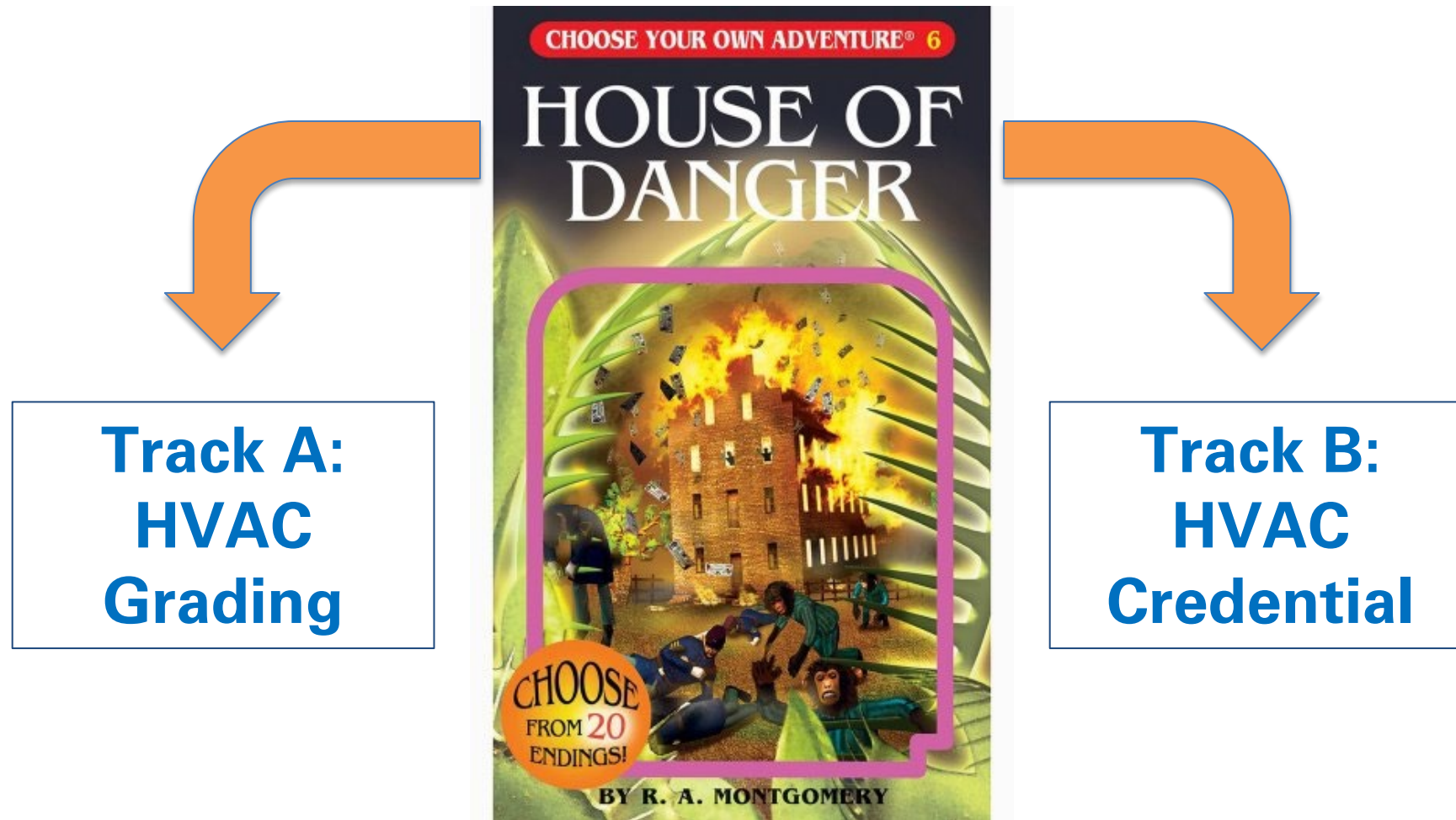
Design Review  
(Illustration-Only)





What other design tasks are needed for an ENERGY STAR certified home

# In ENERGY STAR: Two HVAC pathways to certification



# Required design documentation when using Track A

ANSI / RESNET / ACCA 310 HVAC Design Report 1,2

**1. Design Basis & Architectural Scope**

1.1 Design description (optional):

1.2 Designer company: \_\_\_\_\_ Designer name: \_\_\_\_\_ Date: \_\_\_\_\_

1.3 Software name and version used to complete design: \_\_\_\_\_ N/A

For a Dwelling, Townhouse, or Dwelling / Sleeping Unit Within (i.e., duplex):

1.4 Architectural plan name or address of the property:

1.5 Architectural options used in the design: \*

1.6 Other architectural options that the design can be used with: \*

For a Dwelling / Sleeping Unit Not Within a Dwelling or Townhouse (e.g., condo, apartment):

1.7 Unique ID for the bldg. that the dwelling / sleeping unit is in: \*

1.8 Architectural plan used in design (e.g., dwelling unit model):

1.9 Other architectural plans that the design can be used with: \*

1.10 Architectural options used in the design: \*

1.11 Other architectural options that the design can be used with: \*

1.12 Dwelling / sleeping unit location used in design: \*

**2. Dwelling-Unit Mechanical Ventilation System Design**

**Ventilation System Type & Control Location:**

System	System	System
2.1 Unique name or ID for each system: *		
2.2 Vent. equipment manufacturer & model #: *		
2.3 Specified system type: 14		
2.4 Specified control location: 11		
2.5 Ventilation zone name(s) served by system: 12		

**Ventilation Zone Served by Ventilation System:**

Zone	Zone	Zone
2.6 Ventilation zone name: 12		
2.7 Design basis: 14		
2.8 Floor area (sq. ft.) and # bedrooms in vent. zone:		
2.9 Ventilation design airflow rate (CFM): 14		
2.10 Vent. runtime per cycle & cycle time (mins):	of every	of every
2.11 Time-averaged mechanical vent. rate (CFM): 14	of every	of every

**3. Heat Gain & Heat Loss Loads**

3.1 Design basis for the loads: 14

3.2 Load methodology: 17

3.3 Indoor design temperatures used in loads (°F):

Heating Season:	Cooling Season:
3.4 Outdoor design temperatures used in loads (°F): 14	3.5 Outdoor design temperature location & data source: 14

**Zone-Specific Inputs & Loads at Design Conditions**

Zone	Zone	Zone
3.6 Name of heated or cooled zone: 14		
3.7 Occupants & total occup. internal gains (kBtu/h): 14		
3.8 Total non-occupant internal gains (kBtu/h):		
3.9 Conditioned floor area (sq. ft.): 14		
3.10 Window area (sq. ft.): 14		
3.11 Predominant window SHGC: 14		
3.12 Predominant insulation nominal R value: 14, 15	Wall: _____ Ceiling: _____	Wall: _____ Ceiling: _____
3.13 Infiltration rate (Qualitative or ACH50): 14		
3.14 Time-averaged mechanical vent. rate (CFM):	Sensible Latent Total	Sensible Latent Total
3.15 Heat gain (kBtu/h): 14		

3.16 Maximum - minimum total heat gain (kBtu/h): 14

3.17 Total heat loss (kBtu/h):

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ANSI / RESNET / ACCA 310 HVAC Design Report 1,2

**4. Heating & Cooling Equipment Selection**

Equip. / System	Equip. / System	Equip. / System
4.1 Unique name or ID for each system: *		
4.2 Zone that system serves (See Item 3.6):		
4.3 Equipment type: 18		
4.4 Evaporator / fan coil mfr. & model #: 18	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.5 Condenser mfr. & model #: 18	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.6 AHRI ref. #, or check box for alt. OEM doc.: 18	OEM <input type="checkbox"/>	OEM <input type="checkbox"/>
4.7 If AC / HP, rated cooling efficiency: 22	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.8 If HP, rated heating efficiency: 22	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.9 If HP, ratio of max. to min. rated capacity:	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.10 If AC / HP, blower fan motor & speed type: 24	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.11 If AC / HP, compressor speed type: 26	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.12 If AC / HP, meter device type: 28	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.13 If TXV or EEV, OEM subcooling target (°F): 22	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>
4.14 Filter performance metric and rating: 28	N/A <input type="checkbox"/>	N/A <input type="checkbox"/>

**Furnaces, Boilers, & Other Heating Equipment (if none of these will be installed, check "N/A")**

4.15 Unique name or ID for each system:	
4.16 Zone that system serves (See Item 3.6):	
4.17 Equipment type: 28	
4.18 Equipment manufacturer & model #: *	
4.19 AHRI ref. #, or check box for alt. OEM doc.: 11	OEM <input type="checkbox"/>
4.20 If furnace or boiler, rated heating efficiency:	N/A <input type="checkbox"/>
4.21 If furnace, blower fan motor & speed type: 14	N/A <input type="checkbox"/>
4.22 If furnace or boiler, heating capacity type: 40	N/A <input type="checkbox"/>
4.23 If furnace or boiler, venting type: 40	N/A <input type="checkbox"/>
4.24 Filter performance metric and rating: 28	N/A <input type="checkbox"/>

**5. Duct Design (Complete if duct system will be installed, otherwise check "N/A")**

5.1 Unique name or ID for each system:

5.2 Zone that system serves (See Item 3.6):

**Design Values for Cooling and Heating Mode**

Cooling	Heating	Cooling	Heating	Cooling	Heating
5.3 Design blower fan airflow (CFM): 42					
5.4 Design blower fan speed setting: 42					
5.5 Design external static pressure (inWC): 44					
5.6 Room-by-room design airflows (CFM):	Room Name	Airflow	Room Name	Airflow	Room Name
Total Design Airflow:	(All rooms)		(All rooms)		(All rooms)
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

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ENERGY STAR Single-Family New Homes  
National HVAC Design Report Supplement, Version 3 / 3.1 (Rev. 11)

**ES 1. Dwelling-Unit Mechanical Ventilation System Design ("Vent System")**

– Affirm items have been met for all Vent Systems 1,2,3

	Yes	N/A	
<b>Airflow:</b>			
1.1 Ventilation airflow design rate & run-time for each Vent System meets the reqs. of ASHRAE 62.2-2010 or later edition. 4	<input type="checkbox"/>		
<b>System Controls:</b>			
1.2 Specified controls for each Vent System allow it to operate automatically, without occupant intervention.	<input type="checkbox"/>		
1.3 Specified controls for each Vent System include a readily-accessible ventilation override and a label has also been specified if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment).	<input type="checkbox"/>		
1.4 For any outdoor air inlet designed to connect to a ducted return of the HVAC system, specified controls automatically restrict airflow using a motorized damper during ventilation off-cycle and occupant override. 4	<input type="checkbox"/>		
<b>Sound:</b>			
1.5 The fan of each specified Vent System is rated ≤ 3 zones if intermittent and ≤ 1 zone if continuous, or exempted. 4	<input type="checkbox"/>		
<b>Efficiency:</b>			
1.6 If Vent System controller operates the HVAC fan, then HVAC fan operation is intermittent and either the fan type in ANSI / RESNET / ACCA 310 HVAC Design Report Item 4.10 is ECM or the controls will reduce the run-time by accounting for HVAC system heating or cooling hours.	<input type="checkbox"/>		
1.7 If bathroom fans are specified as part of any Vent System, then they are ENERGY STAR certified. 7	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Air Inlet Location:</b> (Complete this section if system has a specified air inlet location; otherwise check "N/A"). 14	<input type="checkbox"/>	N/A	
1.8 Inlets pull ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit. 8	<input type="checkbox"/>		
1.9 Inlets are ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from known sources exiting the roof. 8	<input type="checkbox"/>	<input type="checkbox"/>	
<b>ES 2. Heating &amp; Cooling Equipment Selection</b>	1	2	3
2.1 Equipment selected per ACCA Manual S (see Footnote 9 & 10). 9, 10	<input type="checkbox"/>		
<b>Air Conditioners &amp; Heat Pumps</b> (if none of these will be installed, check "N/A")			N/A <input type="checkbox"/>
2.2 Unique name or ID for each system:	AC #1	Heat Pump 2	
2.3 Latent cooling capacity at design conditions (kBtu/h): 11	6.1	5.2	
2.4 Sensible cooling capacity at design conditions (kBtu/h): 11	18.1	16.2	
2.5 Total cooling capacity at design conditions (kBtu/h): 11	24.2	21.4	
2.6 If HP, heating capacity at 17°F and at 47°F (kBtu/h):			
2.8 Cooling sizing %: 11	115%		
2.9 Applicable cooling sizing limit key from Table 1: 5, 10	A		
2.10 If B was selected in Item 2.9, load sensible heat ratio: 15, 19	N		
2.11 If B was selected in Item 2.9, HDD / CDD ratio: 15, 14	N		
<b>Furnace</b> (if no furnaces will be installed, check "N/A")			
2.12 Equipment selected per ACCA Manual S (see Footnote 9 & 10). 9, 10	<input type="checkbox"/>	Yes	
2.13 Unique name or ID for each system:	Furnace		
2.14 Total heating capacity (kBtu/h):	36.5		
2.15 Heating sizing %: 14	140%		
2.16 Applicable heating sizing limit key from Table 2:	A		
<b>ES 3. Duct Design</b> (Complete if heating or cooling equipment will be installed with duct system designed for the equipment selected in Section 4, per ACCA Manual D.			

Single page with fields for:

- ASHRAE 62.2 compliance
- Equipment capacity
- Equipment sizing limits

Std. 310 Design Report

ENERGY STAR Design Report Supplement



# Required design review when using Track A

- Requires verification that:
- Std. 310 report and ENERGY STAR supplement have been completed
  - Std. 310 design review has been completed
  - ENERGY STAR sizing limit has been met

## Plan Review Section

## Field Review Section

**Standard 310 Field Data Tool: Evaluation of the Design - Field Verification**  
 1) This review only encompasses the design elements that must be confirmed on-site. Std 310 requires a broader HVAC design review, much of which can be completed before arriving on site. Those elements that can be reviewed beforehand are not included here.  
 2) The term "Home" is shorthand for the Dwelling, Dwelling Unit, or Sleeping Unit being rated.

Home Type:

**Only For Dwelling or Townhouse, or Dwelling Unit or Sleeping Unit Within (e.g. Duplex)**  
 Does name of the architectural plan or address match the HVAC design?

Are arch. options used in the Home encompassed by the HVAC design?

Conditioned floor area of heating/cooling zones	Zone 1	Zone 2	Zone 3	Sq. Ft.
HVAC Design				
Actual Home				
Actual is between 300 ft <sup>2</sup> smaller & 100 ft <sup>2</sup> larger than design?	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	

Window area of heating/cooling zones	Zone 1	Zone 2	Zone 3	Sq. Ft.
HVAC Design				
Actual Home				
Actual is between 60 ft <sup>2</sup> smaller & 15 ft <sup>2</sup> larger than design, or for zones with > 500 ft <sup>2</sup> of windows, between 12% smaller and 3% larger?	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	

**Standard 310 Field Data Tool: Evaluation of the Design - Field Verification**  
 1) This review only encompasses the design elements that must be confirmed on-site. Std 310 requires a broader HVAC design review, much of which can be completed before arriving on site. Those elements that can be reviewed beforehand are not included here.  
 2) The term "Home" is shorthand for the Dwelling, Dwelling Unit, or Sleeping Unit being rated.

Home Type:

**Only For Dwelling or Townhouse, or Dwelling Unit or Sleeping Unit Within (e.g. Duplex)**  
 Does name of the architectural plan or address match the HVAC design?

Are arch. options used in the Home encompassed by the HVAC design?

Conditioned floor area of heating/cooling zones	Zone 1	Zone 2	Zone 3	Sq. Ft.
HVAC Design				
Actual Home				
Actual is between 300 ft <sup>2</sup> smaller & 100 ft <sup>2</sup> larger than design?	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	

Window area of heating/cooling zones	Zone 1	Zone 2	Zone 3	Sq. Ft.
HVAC Design				
Actual Home				
Actual is between 60 ft <sup>2</sup> smaller & 15 ft <sup>2</sup> larger than design, or for zones with > 500 ft <sup>2</sup> of windows, between 12% smaller and 3% larger?	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	



## Std. 310 Design Review

If pursuing Track A - HVAC Grading, complete this page. <sup>1</sup>		
Home Address: _____ City: _____ State: _____ Permit Date: _____		
<b>1. Partnership Status</b>	<b>Must Correct</b>	<b>Rater <sup>2</sup> Verified</b>
1.1 Rater has verified and documented that builder has an ENERGY STAR partnership agreement using <a href="http://energystar.gov/partnerlocator">energystar.gov/partnerlocator</a> . <sup>3</sup>	<input type="checkbox"/>	<input type="checkbox"/>
<b>2. High-Performance Fenestration</b>		
2.1 Specified fenestration meets or exceeds 2009 IECC requirements. <sup>4</sup>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3. High-Performance Insulation</b>		
3.1 Specified ceiling, wall, floor, and slab insulation levels comply with one of the following options:		
3.1.1 Meets or exceeds 2009 IECC levels <sup>5, 6, 7</sup> OR;	<input type="checkbox"/>	<input type="checkbox"/>
3.1.2 Achieves ≤ 133% of the total UA resulting from the U-factors in 2009 IECC Table 402.1.3, per guidance in Footnote 5d, AND specified home infiltration does not exceed the following: <sup>6, 7</sup>	<input type="checkbox"/>	<input type="checkbox"/>
3 ACH50 in CZs 1, 2    2.5 ACH50 in CZs 3, 4    2 ACH50 in CZs 5, 6, 7    1.5 ACH50 in CZ 8		
<b>4a. Review of ANSI / RESNET / ACCA Std. 310 HVAC Design Report with ENERGY STAR Supplement</b>		
4a.1 HVAC design report compliant with ANSI / RESNET / ACCA Std. 310, with the ENERGY STAR supplement, collected for records, with no items left blank.	<input type="checkbox"/>	<input type="checkbox"/>
4a.2 ANSI / RESNET / ACCA Std. 310 Rater Design Review Checklist completed for applicable housing type, with all items marked, "Rater Verified".	<input type="checkbox"/>	<input type="checkbox"/>
4a.3 Cooling sizing % is within the cooling sizing limit selected by the HVAC designer.	<input type="checkbox"/>	<input type="checkbox"/>

## ENERGY STAR Rater Design Review Checklist



# Conclusion





# Review

- A design review is important.
- A Std. 310-compliant design report documents key elements of a design
- A Std. 310-compliant design review helps ensure the design is ok and that the installation aligns with the design intent
- The design review should be done during a plan review and in the field
- Just a handful of added tasks are needed for ENERGY STAR design review

# How HVAC grading improves ENERGY STAR

Efficiency Feature

- Good energy rating with features locked in

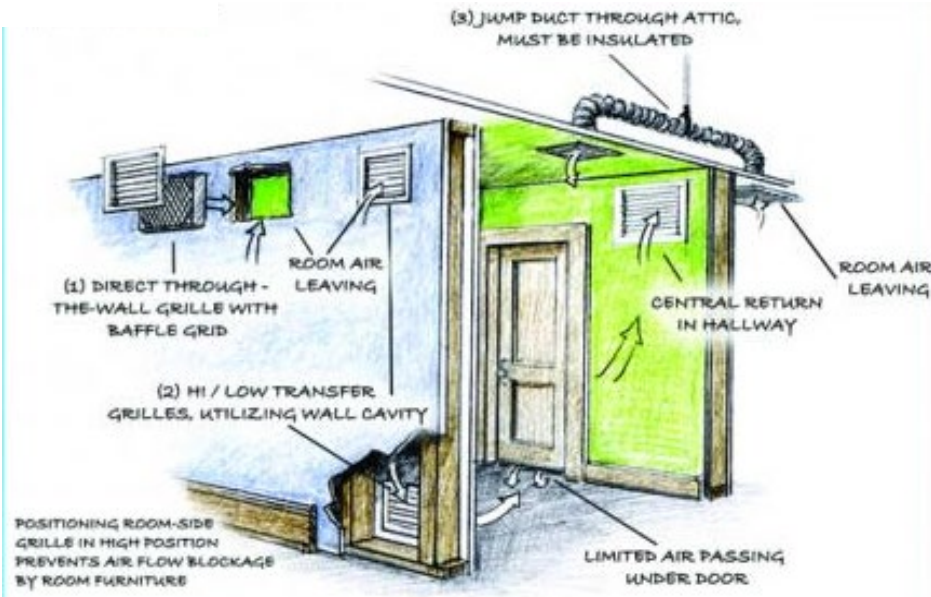
# How HVAC grading improves ENERGY STAR

Comfort: Complete Thermal Enclosure System



# How HVAC grading improves ENERGY STAR

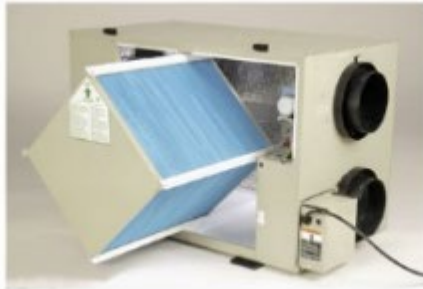
## Comfort: Bedroom Comfort Vents



**PASSIVE AIR-RETURN PATHWAY - 3 OPTIONS**  
ADEQUATE VOLUME OF RETURN AIR CANNOT PASS UNDER CLOSED DOOR. PASSIVE PATHWAYS FROM ROOMS TO HALLWAY (AND CENTRAL RETURN DUCT) PROVIDES EFFICIENT ROUTE FOR REMOVING STALE AIR, AND BALANCING VOLUMES OF AIR SUPPLIED AND AIR REMOVED FROM ROOM (HELPING BALANCE THE HVAC SYSTEM).

# How HVAC grading improves ENERGY STAR

Air Quality: Whole-House Fresh Air System



# How HVAC grading improves ENERGY STAR

Air Quality: Kitchen & Bath Fans That Work Well



# How HVAC grading improves ENERGY STAR

Air Quality: MERV 6+ Filter, Properly Installed



# How HVAC grading improves ENERGY STAR

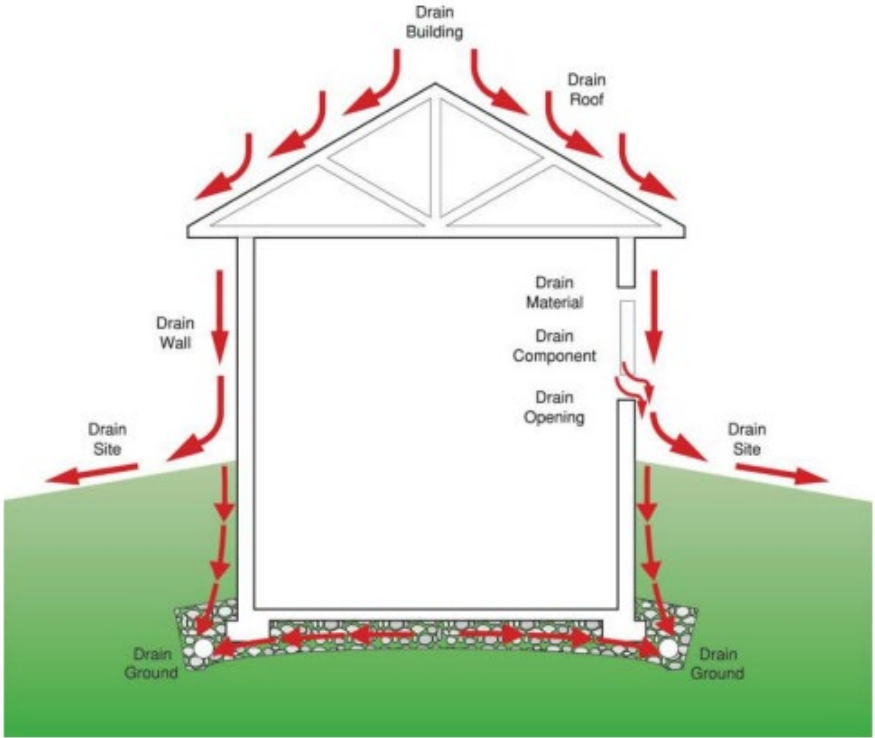
Air Quality: Combustion Safety



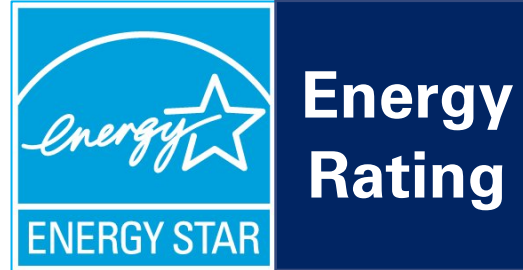


# How HVAC grading improves ENERGY STAR

Durability: Water Management System



# How HVAC grading improves ENERGY STAR



Efficiency Feature	<ul style="list-style-type: none"><li>• Good energy rating with features locked in</li></ul>
Comfort Features	<ul style="list-style-type: none"><li>• Complete thermal enclosure system</li><li>• Bedroom comfort vents</li></ul>
Air Quality Features	<ul style="list-style-type: none"><li>• Whole-house fresh air system</li><li>• Kitchen and bath fans that work well</li><li>• MERV 6+ filter, properly installed</li><li>• Combustion safety</li></ul>
Durability Feature	<ul style="list-style-type: none"><li>• Complete water management system</li></ul>

# ENERGY STAR Residential New Construction

## Web & Email:

Single Family: [www.energystar.gov/newhomesrequirements](http://www.energystar.gov/newhomesrequirements)

Multifamily: [www.energystar.gov/mfnc](http://www.energystar.gov/mfnc)

Email: [energystarhomes@energystar.gov](mailto:energystarhomes@energystar.gov)

### **Dean Gamble**

Technical Manager

ENERGY STAR Single-Family New Construction

[gamble.dean@epa.gov](mailto:gamble.dean@epa.gov)