



# ENERGY STAR Certified Homes, Version 3

## Local Mechanical Exhaust Airflow Requirements for Kitchens

### Guidance on Item 8.1 of the HVAC System QI Rater Checklist

Item 8.1 of the HVAC System QI Rater Checklist (HVAC-R) requires that a local mechanical exhaust system be installed in each kitchen that exhausts directly to the outdoors and meets one of the Rater-measured airflow standards in Exhibit 1.

#### Exhibit 1: Requirements for Item 8.1 of the HVAC-R

| Location | Continuous Rate                  | Intermittent Rate   |
|----------|----------------------------------|---|
| Kitchen  | ≥ 5 ACH, based on kitchen volume | ≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume |

This document provides further guidance on this Item to ensure that its intent is more consistently met, given the three compliance options available.

#### Compliance Option 1: Field-measured fan airflow rate

Per the original intent of the checklist requirement, the Home Energy Rater measures the airflow of the local mechanical exhaust system and ensures that it meets or exceeds the airflow requirements contained in Item 8.1 of the HVAC-R.

#### Compliance Option 2: Prescriptive duct sizing for fans *with* a rated airflow rate

The prescriptive duct sizing requirements in Section 5.4 and Table 5.3 of ASHRAE 62.2-2010 are permitted to be used to comply with Item 8.1 of the HVAC-R. Additional guidance has been incorporated for fans rated above 125 CFM, which are not addressed by ASHRAE 62.2-2010. All options are provided in Exhibit 2.

#### Exhibit 2: Maximum Allowable Duct Length (ft.)<sup>1</sup>

| Duct Diameter (inches) | Flex Duct                  |    |     |     |      | Smooth Duct                |     |     |     |      |
|------------------------|----------------------------|----|-----|-----|------|----------------------------|-----|-----|-----|------|
|                        | Fan Rating (CFM @0.25 IWC) |    |     |     |      | Fan Rating (CFM @0.25 IWC) |     |     |     |      |
|                        | 50                         | 80 | 100 | 125 | >125 | 50                         | 80  | 100 | 125 | >125 |
| 3                      | X <sup>2</sup>             | X  | X   | X   | X    | 5                          | X   | X   | X   | X    |
| 4                      | 70                         | 3  | X   | X   | X    | 105                        | 35  | 5   | X   | X    |
| 5                      | NL <sup>3</sup>            | 70 | 35  | 20  | X    | NL                         | 135 | 85  | 55  | X    |
| 6                      | NL                         | NL | 135 | 95  | X    | NL                         | NL  | NL  | 145 | 145  |
| 7                      | NL                         | NL | NL  | NL  | X    | NL                         | NL  | NL  | NL  | NL   |

1. The maximum allowable duct length assumes no elbows. Deduct 15 ft. of max. allowable duct length for each elbow.
2. X = This indicates that the duct diameter is not permitted to be used with the associated rated fan airflow.
3. NL = This indicates 'No Limit' on the duct length for ducts of this diameter.

For this compliance option, the field measurement of airflow is not required. Instead, the Home Energy Rater verifies that the prescriptive duct sizing requirements from Exhibit 2 have been met, as determined by the rated fan airflow, duct type (i.e., flex or smooth), duct diameter, and maximum allowable duct length. As stated in the table above, 15 ft. should be subtracted from the maximum allowable duct length for each elbow to arrive at the final allowable duct length.

Example: A contractor selects a kitchen exhaust fan with a rated airflow rate of 62 CFM @ 0.25 IWC and plans to install it using flex duct. Referring to Exhibit 2, no match is found in the Fan Rating header for 62 CFM, so the contractor finds the next *largest* value – 80 CFM. Five rows are included in this column, each one corresponding with a duct diameter between 3 and 7 in.:

- An “X” is listed for the 3 in. diameter; therefore this fan is not permitted to be installed with a 3 in. flex duct.
- A value of 3 ft. is listed for a 4 in. diameter; therefore this fan is permitted to be installed with a 4 in. flex duct if it does not exceed 3 ft.
- A value of 70 ft. is listed for a 5 in. diameter; therefore this fan is permitted to be installed with a 5 in. flex duct if it does not exceed 70 ft.
- A value of “NL” is listed for a 6 and 7 in. diameter; therefore this fan is permitted to be installed with a 6 or 7 in. flex duct with no restrictions on duct length.

The contractor selects a 5 in. duct diameter, so the maximum allowable duct length is 70 ft. The contractor plans to install the fan and ducts according to the diagram in Exhibit 3. The contractor subtracts 30 ft. from the 70 ft. maximum allowable duct length to account for the two elbows, resulting in a remaining allowable duct length of 40 ft. The straight portions of



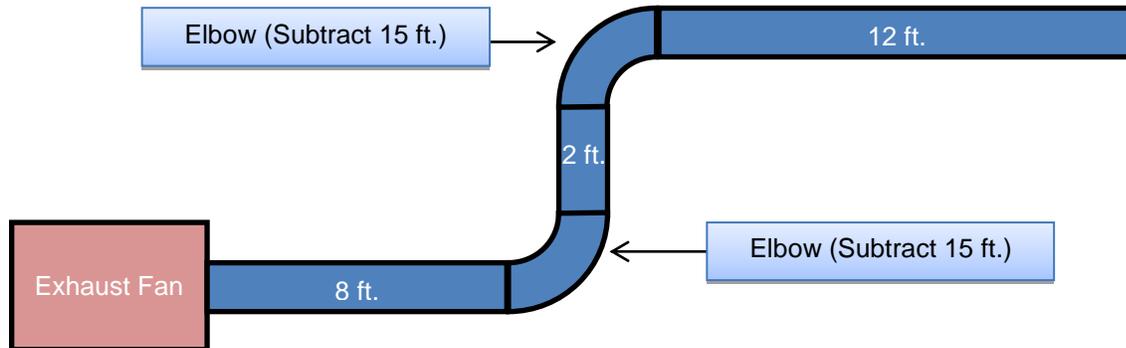
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the duct design add up 22 ft., which is less than the 40 ft. limit. The Home Energy Rater verifies that fan and ducts have been installed according to the plan, so the design meets the intent of Item 8.1.

Exhibit 3: Sample Duct Layout



#### Compliance Option 3: Prescriptive duct sizing for fans *without* a rated airflow rate

Similar to Option 2, a prescriptive duct sizing requirement is permitted to be used to comply with Item 8.1 of the HVAC-R for fans without a rated airflow rate. However, because the airflow of the fan is not rated, and therefore unknown, more restrictive requirements are imposed - smooth round duct with a diameter of 6 in. or greater shall be used, coupled with a rectangular to round duct transition as needed. The field measurement of airflow is not required. Instead, the Home Energy Rater verifies that a smooth round duct with a diameter  $\geq 6$  in. has been used, with rectangular to round transitions as needed.

Example: A contractor selects a kitchen exhaust fan that does not have a rated airflow rate. No table needs to be consulted. This fan must be installed using a smooth round duct of any length with a 6 in. or larger diameter. A rectangular to round transition can be used if needed, for example if the outlet from the fan is a rectangle.