

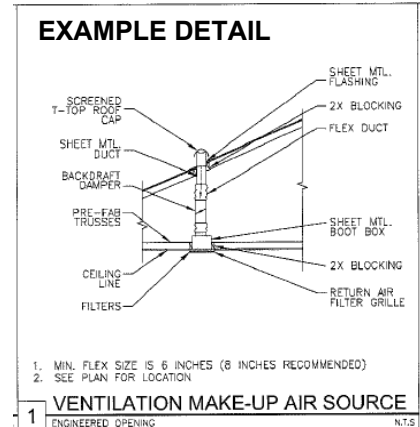


Whole-House Mechanical Ventilation Options

2021 IRC/IECC – Residential (IRC M1505)

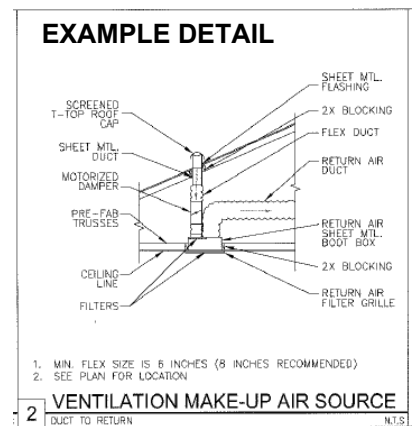
Option 1 - Bathroom Exhaust Fan

1. To minimize energy consumption and reduce run times on bathroom fans, it is recommended that the bathroom fan run intermittently rather than continuously to meet IRC minimum airflow requirements per Section M1505.4.
2. Fan Controller
 - a. Shall be sized to run continuously or controlled to run intermittently by a stand-alone controller or built-in controls by fan manufacturer.
 - b. The air conditioning contractor shall ensure the start-up technicians program the controllers and verify the required ventilation rates.
 - c. A readily accessible ventilation override control shall be provided with an identifying label if its function is not obvious.
 - d. By sizing the fan to enable intermittent operation, intelligent controls can be used to time-shift ventilation to off-peak heating and cooling hours of the day.



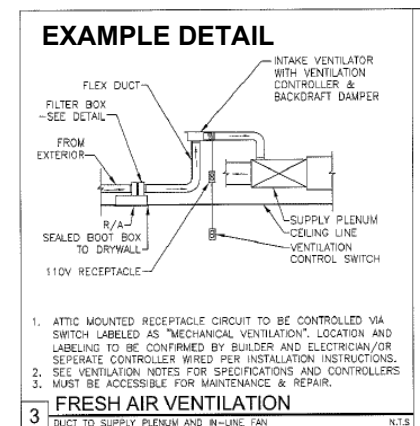
Option 2 - Make-up air inlet in return air box

1. Make-up air duct runs directly to the return air filter box with a motorized damper and filtered intake.
2. The make-up air duct shall be a minimum 6 inches.
3. The make-up air duct shall include a motorized damper. Outdoor air intakes shall restrict outdoor air intake when not in use. The motorized damper shall be controlled automatically and operate in sequence with the exhaust bathroom fan to allow sufficient make-up air to meet IRC/IMC minimum ventilation rates.



Option 3 - Air Intake Duct to supply plenum with inline fan

1. Inline supply fan shall meet IRC airflow rates - Section M1505.4.
2. System shall be controlled by a stand-alone controller or built-in controls by the fan manufacturer. To minimize energy consumption and reduce run times, controls are recommended to enable time-shifting ventilation away from peak heating and cooling hours.
3. The builder shall ensure the electricians properly wire the inline fan that is installed by the air conditioning contractor.
4. The air conditioning contractor shall ensure the start-up technicians program the controllers and verify the required ventilation rates per IRC Section M1505.4.



Option 4 – Energy or Heat Recovery Ventilation (ERV/HRV)

1. Builders and their trade contractors are responsible for sizing and installing ERV or HRV systems in accordance with IRC Section M1505.4 whole-house ventilation requirements.

2021 IRC SECTION M1505 - MECHANICAL VENTILATION

M1505.1 General. Where local exhaust or whole-house mechanical *ventilation* is provided, the ventilation system shall be designed in accordance with this section.

M1505.2 Recirculation of air. Exhaust air from bathrooms, toilet rooms and kitchens shall be exhausted directly to the outdoors and not recirculated indoors. Exhaust air from bathrooms, toilet rooms and kitchens shall not discharge into an attic, crawl space or other areas inside the building. (Scottsdale amendment)

M1505.3 Exhaust equipment. Exhaust fans and whole-house mechanical ventilation fans shall be *listed and labeled* as providing the minimum required airflow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

M1505.4 Whole-house mechanical ventilation system. Whole-house mechanical ventilation systems shall be designed in accordance with Sections M1505.4.1 through M1505.4.4.

M1505.4.1 System design. The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to the return side of an air handler shall be considered as providing supply ventilation.

M1505.4.2 System controls. The whole-house mechanical ventilation system shall be provided with controls that enable manual override. Controls shall include text or a symbol indicating their function.

M1505.4.3 Mechanical ventilation rate. The whole-house mechanical ventilation system shall provide outdoor air at a continuous rate not less than that determined in accordance with Table M1505.4.3(1) or not less than that determined by Equation 15-1.

(Equation 15-1) Ventilation rate in cfm = $(0.01 \times \text{total sq. ft. area of house}) + [7.5 \times (\text{number of bedrooms} + 1)]$

Exceptions:

1. Ventilation rate credit. The minimum mechanical ventilation rate determined in accordance with Table M1505.4.3(1) or Equation 15-1 shall be reduced by 30 percent, provided that both of the following conditions apply:
 - 1.1. A ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms: 1.1.1. Living room. 1.1.2. Dining room. 1.1.3. Kitchen.
 - 1.2. The whole-house ventilation system is a balanced ventilation system.
2. Programmed intermittent operation. The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1505.4.3(1), by Equation 15-1 or by Exception 1 is multiplied by the factor determined in accordance with Table M1505.4.3(2).

TABLE M1505.4.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

| DWELLING UNIT FLOOR AREA (square feet) | NUMBER OF BEDROOMS | | | | |
|---|--------------------|-----|-----|-----|-----|
| | 0-1 | 2-3 | 4-5 | 6-7 | > 7 |
| | Airflow in CFM | | | | |
| < 1,500 | 30 | 45 | 60 | 75 | 90 |
| 1,501-3,000 | 45 | 60 | 75 | 90 | 105 |
| 3,001-4,500 | 60 | 75 | 90 | 105 | 120 |
| 4,501-6,000 | 75 | 90 | 105 | 120 | 135 |
| 6,001-7,500 | 90 | 105 | 120 | 135 | 150 |
| > 7,500 | 105 | 120 | 135 | 150 | 165 |

For SI: 1 square foot = 0.0929 m², 1 cubic foot per minute = 0.0004719 m³/s.

TABLE M1505.4.3(2)
INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS^{a, b}

| RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT | 25% | 33% | 50% | 66% | 75% | 100% |
|--|-----|-----|-----|-----|-----|------|
| Factor ^a | 4 | 3 | 2 | 1.5 | 1.3 | 1.0 |

- a. For ventilation system run-time values between those given, the factors are permitted to be determined by interpolation.
- b. Extrapolation beyond the table is prohibited.

M1505.4.4 Local exhaust rates. *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table M1505.4.4.

TABLE M1505.4.4
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR ONE- AND TWO-FAMILY DWELLINGS

| AREA TO BE EXHAUSTED | EXHAUST RATES ^a |
|------------------------|---|
| Kitchens | 100 cfm intermittent or 25 cfm continuous |
| Bathrooms-Toilet Rooms | Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous |