



Thank you for using NYBTG.

The 2020 NYS energy code includes some requirements that are likely not familiar to many builders and contractors. It is our goal to make your project run smoothly and without issue. To insure this, please see that these documents are distributed to the associated contractor in order to provide some guidance with meeting the new code requirements.

#### REQUIRED ITEMS FOR 2020 CODE:

- 1) Rough inspection: We **must** inspect the insulation before walls are closed. To keep your project running smoothly, please call us a week or two in advance so we can schedule your inspection directly after insulation install. At this time, we will be inspecting insulation and air sealing and also testing any ductwork that is not within conditioned space (duct blaster test). We recommend that you have a representative from your HVAC contractor available to handle any potential problems while the test is running so that the project isn't held up with repairs and re-inspections.
- 2) Final inspection: At final inspection, we will be pressure testing the building for air infiltration. (blower door test). In addition, we will also be testing fossil fuel appliances (oven, boiler, HW heater) for potential Carbon Monoxide issues. For new construction, we will be testing mechanical ventilation rates. (see attached document).

It is very important that builders familiarize themselves with the new requirements. We are here to answer any questions you might have and walk you through any potential problems. Feel free to have each contractor contact us for specifics.



## HVAC DUCT REQUIREMENTS UNDER 2020 NYS CODE

*The new residential code includes some very difficult to attain limits on duct leakage and specific requirements for duct insulation. To ensure that our builders can complete their projects with the least amount of hardship or lost time, we ask that you take note of these new regulations:*

Because of the severe leakage limits of the new code, we are strongly recommending that ductwork be tested at the time of rough inspection so that any issues can be addressed before walls are closed in. We also recommend that the HVAC contractor has someone available at the time of inspection to make any needed repairs. We will work with them to find and diagnose problems and if possible, get the systems to pass the tests before we leave. This way there are no project delays or call-backs.

These are the insulation requirements for all residential ductwork:

- 1) **VENTED ATTICS:** All ducts must be insulated to **R8**.
- 2) **UNCONDITIONED BASEMENTS:** All ducts must be insulated to **R6**.
- 3) **UNCONDITIONED CRAWLSPACES:** All ducts must be insulated to **R6**

**PLEASE NOTE:** R4.2 Duct insulation and flex duct is not acceptable in any uninsulated spaces in the home. Ductwork within the thermal envelope of the building does not have code requirements for insulation and should be insulated as the installer feels appropriate to control condensation. In other words, If all of the ductwork is on the “conditioned” side of the building insulation, it does not need to be insulated.

**USING FRAMING CAVITIES FOR DUCTWORK (panning joists)** is no longer allowed for any ductwork. In cases where it is necessary to use a joist cavity to get around obstructions (like over main beams in a basement) all wood surfaces must be completely covered with metal panning to form a duct on all 6 sides. In testing, we have been finding that these connections are very often points of serious leakage which lead to failure of the duct test. Take extreme care to seal all connections, especially where the duct transitions to vertical inside of walls.

**SEALING REGISTER BOXES:** The connection between ductwork and drywall or floor must be air tight. If we test ductwork at rough (before drywall) we will be inspecting for this seal at final. Please keep in mind that we need access to all registers to seal them for testing. Any unconventional register situation (like under counter grills or hidden slot returns) should be left accessible until after the rough-in test.

**DUCT TAKEOFFS:** It has been a practice with many installers to wrap their ducts before installing takeoffs. Sandwiching insulation between sheet metal and takeoff leads to some leakage into the insulation. We are finding that the cumulative leakage from these joints is often enough to cause failure on the test. We recommend that insulation be pulled away and takeoffs be attached directly to the metal ductwork.

## Range Hood Make-Up Air

### 2020 IRC requires range hoods over 400cfm have make up air

*Since most large kitchens have hoods much larger than 400cfm, it's important that builders allow for this requirement early in the project to avoid costly retrofits later on. I've included a few options for compliance, but any method that meets the code listed below is acceptable. - Tom*

**M1503.6** Makeup air required. Where one or more gas, liquid or solid fuel-burning appliance that is neither direct-vent nor uses a mechanical draft venting system is located within a dwelling unit's air barrier, each exhaust system capable of exhausting in excess of 400 cubic feet per minute (0.19 m<sup>3</sup>/s) shall be mechanically or passively provided with makeup air at a rate approximately equal to the exhaust air rate. (If you have anything with an open chimney, you need make-up air)

**M1503.4.1 Location.** Kitchen exhaust makeup air shall be discharged into the same room in which the exhaust system is located or into rooms or duct systems that communicate through one or more permanent openings with the room in which such exhaust system is located. Such permanent openings shall have a net cross-sectional area not less than the required area of the makeup air supply openings.

There are several methods of compliance. A few of the most common options are listed below

- 1) **Make-up air kit for hood:** Many hoods are available with a make-up air fan assembly as an option. If the kit is available for the hood you are using, this is usually the simplest option.
- 2) **Motorized damper on HVAC system:** A fresh air damper can be installed on the HVAC system that supplies the kitchen to draw air into the room whenever the range fan is on. These can be wired directly to the fan controls, or with a duct sensor that installs inline in the exhaust flow. (see figure 1 below). Having the incoming air spread across the entire system makes the temperature change of the outside air less noticeable. The sensors are available with wireless transmitters if the walls are already closed up.
- 3) **A gravity damper ducted into the kitchen:** This tends to dump a lot of unconditioned air directly into the kitchen and if not set up properly can be drafty and uncomfortable for occupants. The rush of cold outside air can also affect cooking temperatures if too close to the range.
- 4) **A tempered make-up air system:** ( These are commonly used in commercial applications but might be overkill for a typical home and can include heating or cooling. However, they might be appropriate in homes that have commercial style hood set-ups. (see figure 2 below)



Figure 1

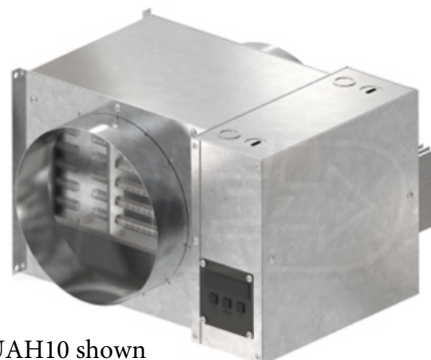


Figure 2

Fantech MUAH10 shown

## MECHANICAL VENTILATION OPTIONS SHEET

The NYS building code (R303.4) requires mechanical ventilation in all new homes but leaves many options for meeting these requirements. We have included the more typical applications along with fan and timer types.

### Applicable code - M1507.3

- 1) System can be exhaust, supply, or balanced.
- 2) System can draw from any room in the house. We recommend that they be exhausted from the bathroom.

**1) USING BATH FANS:** A bath fan connected to a 24 hour run-timer can be used for compliance. (see examples on page 2) In our opinion, this is the least desirable option, but it does meet code requirements.

- a) The fan must exhaust to the outside
- b) The fan must run without homeowner intervention. It can run continuously, or be connected to a 24 hour clock timer.
- c) The fan must actually move enough air when tested to meet the CFM output needed for the home. (see the calculation below). The "builders special" fan probably won't meet the requirements.
- d) For larger homes we recommend using several large fans with timers in more than one bathroom. Each fan can be run for a shorter period of time to avoid noise issues when people are nearby.

**2) USING THE HVAC SYSTEM:** Systems can be set up to draw outside air into the return duct. This is commonly done in commercial buildings.

- a) The system must have a fan cyclor to automatically run the air handler long enough to meet the minimum ventilation requirements for the home.
- b) The fan must operate regardless of the need for heating or cooling.

**3) USING A REMOTE INLINE EXHAUST FAN:** This is our recommended method for compliance. An inline fan can be installed remotely either running continuously or on a timer. These should be ducted with 6" insulated flex duct. Insulated duct absorbs much of the fan noise and reduces occupant complaints. (see examples on page 2). We recommend you use a fan double the size required and then reduce the runtime with a clock timer.

**4) USING AN ERV, HRV or BALANCED VENTILATOR:** This is a premium option. These units transfer heat from the exhausting air back into the fresh intake air. These are practical for people who want maximum ventilation without having cold drafts or humidity issues from outside air.

### HOW MUCH VENTILATION DO YOU NEED?

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

**FAN MUST RUN FOR AT LEAST 25% OF EACH 4 HOURS.** i.e. if 45 cfm were required, you could supply 45cfm continuously, or 90cfm for 50% of the time, 180 for 1/4 of the time, etc.

**RECOMMENDED BATH FANS:**

Any Energy Star rated fan will work fine. Avoid low budget "builder special" fans. Many times, they do not move even half the air they are listed to deliver. Larger fans (120-150 cfm) allow for less run time. If possible, use 6" ductwork to exhaust the fan. The actual output of bath fans drops considerably with long or restricted ductwork.



Panasonic makes several models that run at low speed continuously and then spin up with the switch. Make sure that the continuous low speed moves enough air to meet the minimum requirement.

**TIMERS:** These must be 24-hour clock timers similar to those used for outdoor lighting. Most lighting companies make several versions. "Stay on" 10-20-30 minute timers do not meet code requirements.

**TYPICAL MODELS:**

Honeywell RPLS730B1000/U

Leviton Model # VPT24-1PZ



**INLINE FANS:** We recommend 6" insulated ductwork be used to reduce noise and maximize airflow. For code, these can draw air from anywhere in conditioned space. We recommend they draw from the most used bathrooms for best moisture and odor control.

**NOTE:** To reduce noise, use insulated flexible HVAC duct between the fan and the intake grill. Use a few extra feet of duct to allow for some curves which will help absorb the sound of the fan.

MODELS: Fantech FR series, Panasonic Whisperline Inline Ventilation Fans

## Air Sealing Issues with Fiberglass Batt

The 2020 RBC requires that new homes meet an infiltration rate of 3ach50

*In general, NYBTG recommends the use of spray foam as insulation because of its superior airsealing capability. However, because of its cost, it is not practical for every application. If you are using batt insulation alone, there are several areas that require extreme attention to detail when airsealing, and a few situations where fiberglass can never be used alone.*

*NOTE: It is very important that we inspect the airseal before the walls are closed up. This gives us the opportunity to find and address any specific issues while the walls are open. It is very difficult to make repairs if the house does not pass the blower door test which is run at final, long after the walls have been closed up.*

- 1) ATTICS: It is becoming common to create a “sealed attic” using sprayfoam insulation in the rafters rather than in the ceiling. This has two benefits; it moves attic HVAC equipment into the thermal envelope which eliminates losses from the equipment. It also adds additional conditioned volume to the house which makes blower door compliance easier.
- 2) FIBERGLASS BATTS ALONE CANNOT BE USED FOR A SEALED ATTIC: The IECC requires that fiberglass batts in a roof rafter have a ventilation space but also requires that the insulation and airseal be aligned. Without drywall on the assembly (as with a vaulted ceiling) there is no airseal keeping air from the home from escaping out through the ridge and soffit vents. We have run into situations where builders have insulated both the ceiling and the rafters in an effort to keep HVAC equipment “inside conditioned space”. Again, unless the roof assembly is insulated, properly vented, and air-sealed, it will not meet NYS code and will likely have serious moisture and mold issues.





*Airsealing wall cavities with Caulking*



*ZIPsystem—Sheathing has waterproof coating, seams are sealed with permanent adhesive tape*

3) EXTERIOR WALLS: Walls are typically airsealed from the inside using caulking, “great-stuff” canned foam, or spray on adhesive airseal. Most insulation contractors will include this as an “airseal package” in the scope of work. It is important that any seam that might connect to the outside is sealed, especially the plates and around windows. It is also possible to airseal from the exterior using an adhesive air/water control layer such as “Blueskin” or using a “Zipsystem” type sheathing. If you are sealing from the exterior, it is very important that the connection where the sheathing meets the rim joist and top plates be sealed when the sheathing is installed.

4) FLOOR AND CEILING PENETRATIONS: As a general rule, penetrations between floors are sealed with an intumescent firestop caulking or rockwool in order to meet fire codes. In places where the floor connects to either an unconditioned basement or attic, it’s critical that these holes be completely air-tight. The picture to the right shows a situation we run into regularly where ductwork is not properly sealed to the floor (or drywall for ceiling installations). A home will not pass NYS code without these connections being sealed air-tight. We cannot even run the tests until corrections have been made.



*Please be sure to have all ductwork properly sealed before we come to test. A re-inspect fee will be charged for return trips caused by unfinished work. Please use our pre-inspection checklists and verify that all work is complete before you schedule an inspection.*

- 5) ATTIC CEILING TO WALL CONNECTIONS: This is the most critical connection and the one most often overlooked. Any ceiling that connects to an attic will require an additional seal where the drywall connects to the wall top-plates. Since drywall never presses perfectly to the framing (it's held out by nails, protector plates, mis-aligned studs, etc), there is a small gap between the framing and the drywall. This space allows for attic air to flow into the walls and out through outlets and under the base moldings.



*The gap behind this drywall is about 3/16". This gap, multiplied by the length of second floor walls equaled an open hole to the attic of about 90 square inches. The image on the right shows drywall dust being blown out from behind the wall during our test.*



The gasket foam is installed along all top wall plates that meet the attic. This keeps cold attic air from leaking in behind the drywall and out from under the base moldings. (see picture above right). The foam bead can be installed by a laborer in a few hours a day or two before the drywall begins. It cleans up with water and the gun cleans with a garden hose.



*This is one of the available gasket foams available for drywall sealing. It's available at most supply houses or on Amazon. It's shown installed in the photo on the left.*