

These design examples and code regulations will assist you to install ductwork for additions, remodels or new furnaces.

When building a new home or addition, changing from a gravity-style furnace or converting from hydronic (water) to forced air, you must submit a *Heat Loss Calculation Sheet* with your permit application.

When running trunk ductwork, volume dampers need to be installed in each branch supply. Support the ducts every five to six feet. In attics, unconditioned crawl spaces, additions on posts or spaces where there is no insulation and the temperature is significantly lower than the inhabited space, ducting must be insulated to a minimum R-8 and have a moisture/vapor barrier around it.

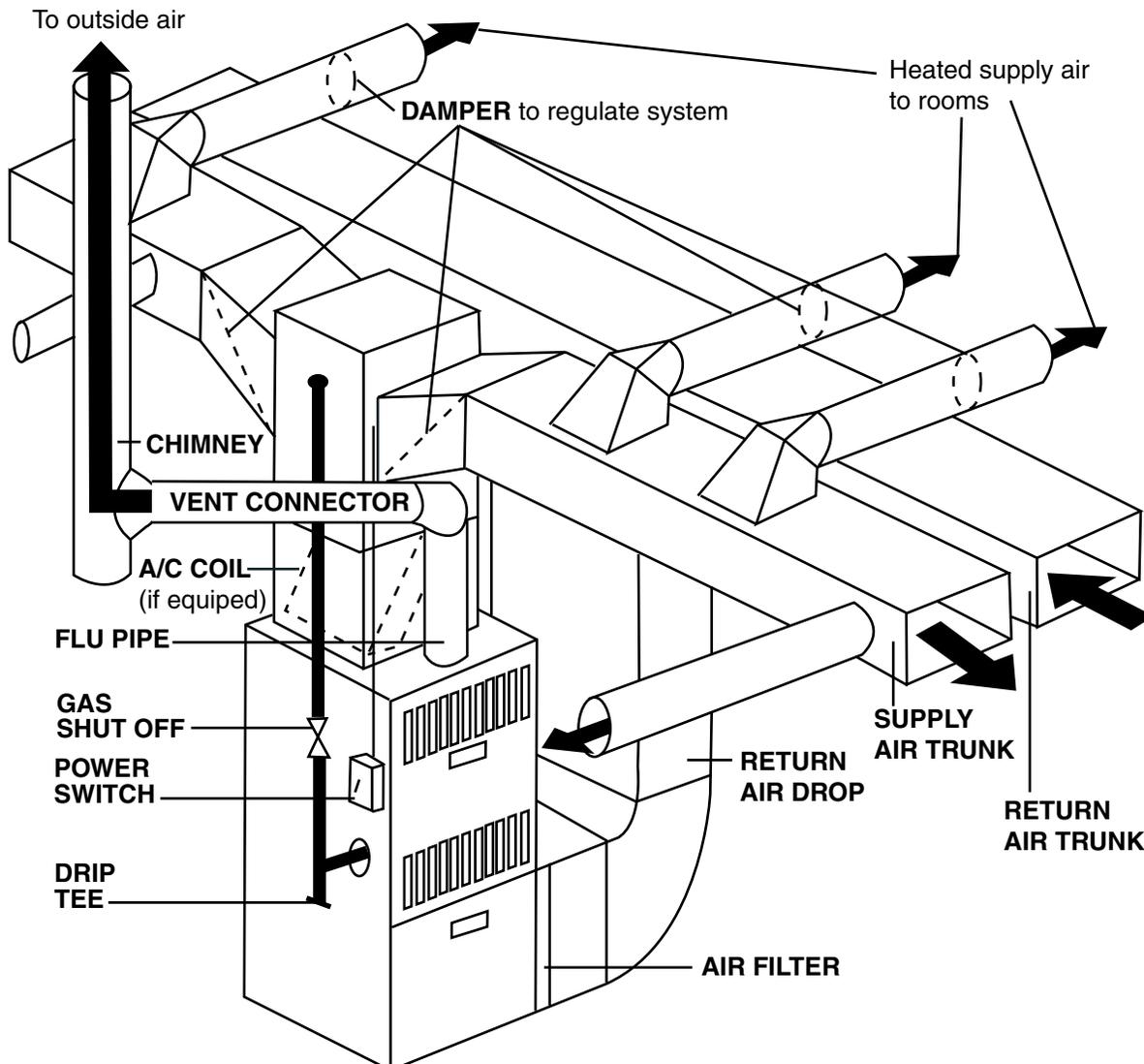
Ductwork must be substantially airtight. It shall be sealed on all connecting joints with an approved duct sealer, duct tape or aluminum foil tape. The sealant installed must be certified as complying with UL 181.

## Flexible ducts

Flexible ducts may be used with certain limitations. (A flexible *duct connector* shall not be used for any application.) Flexible ducts may not pass through walls. Vertically, one story is the maximum height for this ductwork to be installed. Flexible ducts need to be kept away from high heat sources.

When installing for bathroom venting, insulate the duct a minimum of 3 feet from the outside edge of the house. If going through an attic, insulate the duct from the fan unit

## Forced warm air



to the roof connector. In this application, the duct must be insulated to a minimum of R8 and have a vapor barrier on the outside of the duct. Tape or repair any breaches in the vapor barrier.

Stretch the flexible duct out to it is full length. There should be less than 1/2 inch sag per foot once supports are in place. Supports must be a minimum of 1-1/2 inches wide.

Note: Never exhaust a bath fan duct into an attic. Moist air must exhaust directly to the outside.

## Venting of appliances

A properly sized flue is critical for the venting of combustion by-products. The following are some basic rules for installing appliance vents:

- When placing a new vent through a roof, you will need flashing, a storm collar and a listed termination cap for the specific flue product you are using.
- A vent connector is the portion starting at the appliance and extending to the main flue stack. This connector must provide an up-hill slope of 1/4 inch per foot toward the main flue and may not be over 75 percent of the total height of the main flue. Example: The main flue is 30 feet tall, the vent connector could be a maximum of 22.5 feet horizontally.
- Follow the manufacturer's installation instructions with any venting product that you use.

### There are three types of vertical vents:

**Class C Vent** - is used as a vent connector. Six inches is the minimum distance required from the vent connector to any combustible materials, including sheetrock.

**Class B Vent** - is used for extending through floors, in wall chases, or through roofs where clearance to combustibles is tight. A one-inch clearance to combustibles is the minimum for Class B vents.

**Class A Vent** - is generally used for solid burning appliances, such as wood-burning fireplaces. Clearances can be anywhere from 6 to 18 inches or larger.

There are newer appliances that use PVC plastic pipe for venting the appliance. This type of venting system carries flue gases that have been cooled to the condensing temperature in the appliance. The vent may go out a sidewall or through the roof. There are also kits that can be installed on a furnace or water heater that will allow venting through the sidewall. Distance to windows, doors or any air intake vents are critical.

When using these types of products always follow the manufacturer's installation instructions.

## Combustion or make-up air

*Combustion air* (outside air) is for the combustion process of furnace and water heaters. The appliance BTU's being exhausted will dictate how large the combustion air duct must be. When a 90% or higher, efficient furnace, with a sealed combustion unit is installed, there may not be a need for additional combustion air.

*Note: Contact a Bloomington Mechanical Inspector for verification.*

*Make up air* replaces air being exhausted; e.g. bath fans, kitchen hoods, fireplaces, water heaters, dryers and furnaces. The standard rule of thumb is: make-up air shall equal the air amount being exhausted.

## Safety first

For the safety of you, your family, future homeowners or even neighbors, do not attempt work that is beyond your skill level. If you have any questions contact an inspector or licensed contractor.

## Gas piping

Black or galvanized steel pipe, Type L or K hard or soft copper, PVC or PE, may be used for installing a gas-line. Copper or approved plastic pipe, tubing and fittings may be used for underground installations only. If burying "plastic" piping, a #18 copper tracer wire must be attached to the pipe. All piping and fittings must have the manufacturer's I.D. on material

All piping conveying gas that is outside the building must be a minimum of 3-1/2 inches above grade or buried a minimum of 12 inches below grade. Any trench housing the pipe shall be back-filled with clean fill only. Chunks of dirt, rock, ice and snow are not permitted.

All gas lines shall be pressure tested at 25psi for a minimum of 12 hours. When checking for leaks on a pressurized gas line, a soap and water solution is recommended.

Unions and shutoffs shall be accessible and may not be buried underground. A shutoff must be a maximum of 6 feet from the appliance and within the same room.

If using copper pipe and fittings, all joints will need to be brazed with solder that has over a 1000 degrees F melting point. Flare fittings are acceptable but may not be located in non-accessible locations.

## Sizing of gas lines

Load = Diameter of pipe + Length + Pressure = Proper volume

Minimum size of a gas supply pipe is 1/2".

## Gas regulators

A drip tee and an approved manual shutoff shall be installed in front of all pound-to-inches regulators and automatic gas valves. The drip or sediment tee must have the gas enter and exit at 90-degree angles. The regulator must have an accessible, long-handled shut-off valve, approved for high-pressure gas and a union for servicing purposes. When a vent limiter is part of the regulator, the regulator must be installed in a horizontal position. If the regulator vents to the exterior it may be placed in any position. Vent piping must terminate a minimum of 3 feet away from any combustion or air inlet to the building. Regulators must be in an accessible, well-ventilated location. If there is any gas leakage, the smell is then easily detected. (A limiter is a device that will stop any leakage of gas into the home if the regulator does vent. *See below.*)

## Transite flues (non-metallic)

The Building and Inspection Division has observed a large percentage of transite flues in various stages of deterioration. Transite flues containing asbestos deteriorate and become a potential life-safety hazard for the occupants. The Heating Code will not allow continued use of a deteriorated flue. Unless specifically approved by a City inspector, all existing transite flues shall be replaced when a new furnace is installed.

## Furnace replacement

All furnaces must bear a label from an approved testing laboratory and be installed per the Manufacturers' published installation instructions. The furnace must be sized per the MN Residential Energy Code and Heat Loss Calculations. The BTU input may not be greater than 40% over heat loss.

**For technical information visit the following Web sites:**

<http://www.warmair.com>

<http://www.eere.energy.gov>

<http://mrhvac.com>

All new furnace installations must have a start up test. When calling for your final inspection, a copy of the test must be available for the Heating Inspector.

When installing a new furnace and/or flue components, clearance to combustibles must be maintained per the manufacturer's designation on their products. If your furnace is being installed in a small space, proper ventilation must be supplied. This can be accomplished through grills and/or other openings to adjoining rooms.

Furnaces that are below 90% efficient will need air brought into the mechanical room for the furnace and water heaters. The air shall be brought in through a hood on the outside of the house through generally insulated flexible piping and terminating in the mechanical room so that the furnace and other fueled fired appliances may draw from this air. The hood shall be screened no smaller the 1/4" no larger than 1/2" with no backdraft damper.

