

—Mechanical Homeowner’s Guide—

The following is an informational document only. It does not contain all code requirements and is only intended as a guide for typical homeowner projects.

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General Information

May I do my own mechanical (heating, ventilation, and air-conditioning or HVAC) work?

Yes, if it is a single-family dwelling that you both live in AND own. You may NOT do your own mechanical work in a rental property where you are either the owner or the tenant, or on a property that you have purchased to upgrade and resell.

A friend or family member may not obtain the Homeowner's Mechanical Permit.

When do I need to obtain a mechanical permit?

A mechanical permit is required before any alterations are made to an existing mechanical system or if a new system is installed. Common examples include a furnace, air conditioner, the duct system, fireplace, garage heater, exhaust fan, or chimney.

What work does my permit cover?

Your permit only pertains to the work described on the permit application. Any work that is done beyond what is described on the permit may require an additional permit. Any non-mechanical work you are doing (electrical wiring on a furnace, for example) associated with the mechanical work may require an additional permit for that portion of the project. A mechanical permit covers only the HVAC part of a project.

When and where do I get a permit?

Permits are issued at the Building Services department on ground floor of City Center. City Center is located at 231 North Dakota Avenue. Office hours are between 8 a.m. and 5 p.m., Monday through Friday, excluding holidays. The office personnel can issue homeowners permits and answer general questions. The phone number for the office is 605-367-8670. The Mechanical Inspectors are typically in the office to answer more technical questions from 8 a.m. to 9 a.m. The Mechanical Inspectors' phone number is 367-8252.

How long is my permit good for?

A required inspection by a division of Building Services (Building, Plumbing, Mechanical, or Electrical) shall be requested within 180 days of issuance and within each consecutive 180-day time period. It is the permit holder's responsibility to make all required corrections and call for reinspection within a 30-day time period. No permit shall be canceled, abandoned, or have occupancy granted with outstanding violations.

Do I have to do the work or may I hire a friend or family member to do it for me?

The only person a homeowner's permit allows to do the work is the actual homeowner. Any person who receives monetary compensation for doing any mechanical work in the city of Sioux Falls must be employed by a mechanical contractor licensed in the city of Sioux Falls and must be doing the work for said mechanical contractor. In simpler terms, the work must be run through the mechanical contractor's business and he may **not** do the work on the side.

What if I have already done my mechanical work without obtaining any permits or receiving any inspections?

A permit still needs to be obtained and the work inspected. Work done without permits is always a problem for both the homeowner and the inspectors. The inspector cannot inspect the work if it cannot be seen; therefore, you will be required to remove wall and/or ceiling coverings to the extent that a proper inspection may be obtained. If any code violations are noticed during the inspection process, those violations will be required to be corrected.

Requesting an Inspection.

It is the responsibility of the permit applicant to request inspections and provide accessibility to the work. One should always keep in mind, "If the inspector cannot see the work, the work cannot be inspected." The City of Sioux Falls is not liable for expenses entailed in the removal or replacement of any material required to allow inspection. **There are separate inspectors for the Electrical, Plumbing, Building, and Mechanical Divisions.** All of the applicable inspectors must approve the rough-in or framing of their specific division before anything is covered.

When to request inspections.

Rough-in. Before any work completed is covered up, a rough-in inspection is required. **This is before any insulation or wall/ceiling coverings are installed.** The inspector will either give you the "okay" to cover it up or if there are corrections, they will need to be fixed and the inspector will need to be called for a reinspection. **Make sure you have the go-ahead from all inspectors before covering anything.**

Final. After the project is complete, but before you move into the space that the permit is for, a final inspection is required. Any corrections noted will have to be fixed and reinspected before moving in.

The permit holder must notify the Mechanical Inspector when the work is ready for inspection. To request an inspection, call 367-8252 or 367-8670 a minimum of 24 hours prior to the day the inspection is requested for. Inspection requests after office hours can be logged in on the answering machine at 367-8670. When calling for inspection, be prepared to give the following information:

- Permit Number
- Street address.
- Owner's name.
- Type of inspection needed (rough-in, final).
- Date and time that the inspection will be requested for. Keep in mind that the inspectors may not enter an occupied dwelling unit unless an adult or contractor with authority over the dwelling is present and gives permission to enter.
- Daytime phone number that the permit holder may be reached at.

Reinspection Fee. A fee may be assessed and must be paid before any further inspection will be made for any of the following reasons:

- When work for which an inspection is called is not completed or ready for inspection.
- When corrections called for are not made.
- When access to the premises is not provided on the requested inspection date.
- For deviating from the approved plans.
- When work is concealed from access or sight before it has been inspected.
- When work is done in phases that requires additional inspections, a fee will be charged per inspection; additional fees must be paid prior to inspection.

Remodels, Lower Level Finishes, and New Construction

Appliances. An appliance is defined as a device that is manufactured and designed to utilize energy and for which the Mechanical Code has specific requirements. Common examples are a furnace, air conditioner, fireplace, or garage heater. All appliances are required to be listed and bear the label of an approved agency. An approved agency is generally accepted as being Underwriters Laboratory (UL). See the section below on “**Guidelines for Specific Appliances**” for more information on individual kinds of appliances. An example of an unlisted appliance would be the old wood stove out of grandpa’s workshop that has no label on it because it was built back in 1910.

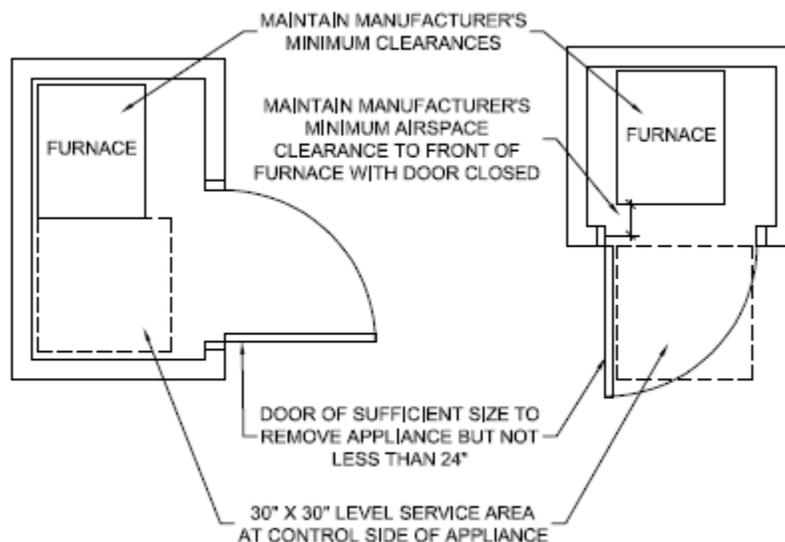
Initial Planning. There are a few things to consider with regard to mechanical work during the initial planning and wall framing stage of your project. Maintaining temperature and ensuring required clearances and access are the primary concerns.

Maintaining Temperature. The heating system must be able to maintain 68 degrees in all occupied spaces in your home. An average size bedroom in a basement will usually require one heat run to do this, with larger rooms requiring two or sometimes three depending on the size of the room and any doors/windows to the outside. Cold air returns are not required in every room, but air circulation will be much better in rooms provide with return air.

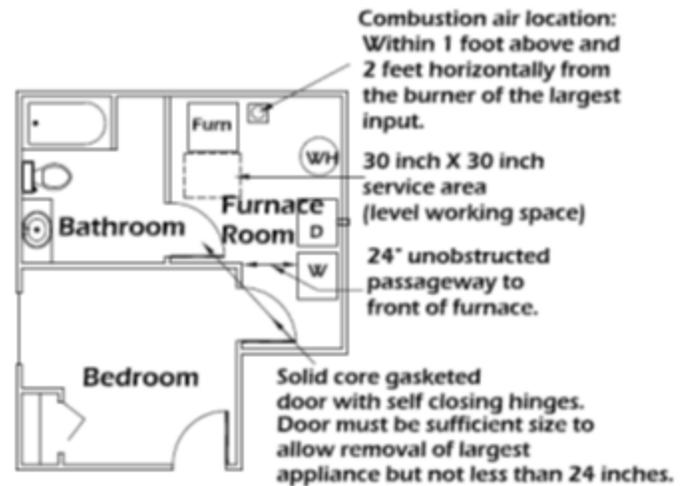
Clearance and Access.

Vent pipe (chimney) clearances. Metal gas appliance vents (chimney pipes) require 6" clearance to combustibles for single wall pipe and 1" for UL-listed double wall pipe. Single wall gas vent (chimney) pipe cannot pass through any interior wall or ceiling. This is something to watch for when framing new walls.

Appliance clearance and access. All appliances must maintain clearances required in the installation instructions. In addition, appliances must have a minimum 30" x 30" level workspace on the service side of the appliance with a minimum 24" wide path to that service space.



Appliances that require combustion air (see “**Combustion Air**” section on pp. 6–7) cannot be in bathrooms, toilet rooms, sleeping rooms, or storage closets. If rooms containing appliances that require combustion air are accessed through a bedroom or bathroom, the door between those rooms must be solid core, gasketed, and self-closing. All combustion air must come from the outdoors.



Duct Systems. Duct systems must be made of rigid metal or be factory-made UL-listed ducts. Return air can use stud cavities and floor joist plenums with some restrictions (see below) but supply (heated) air must be ducted. If lowering duct registers through a soffit, a metal extension through the drywall is required.

All new return ducts located in the mechanical room or within 10' of any gas appliance in an open basement and all new supply trunk ducts and takeoffs shall be sealed. Sealants must be listed in accordance with UL 181B. Approved tapes will typically have text including the UL listing right on the tape. **Standard duct tape and plain unmarked foil tape are usually not listed and not allowed.**

Flexible Ducts. Flexible ducts must be listed as a flexible air duct complying with UL181. This will typically be a flex duct that comes with insulation already on it. **The plastic or foil “duct” that is available is not considered a duct. It is listed as an air connector and is not allowed.** Insulated flex duct is required to be supported with a strap no less than 1" wide every 4'. It cannot have sags or sharp bends. The maximum length for flexible duct is 14'. **These requirements also apply to bath fan exhaust ducts.**

Metal Ducts. Round duct joints must overlap a minimum of 1" and have three screws per joint. Duct must be supported a minimum of every 10' with 1" wide 24-gauge, 1 1/2" wide 26-gauge strap, or 2 x 4s if between joists or trusses. Telescoping “Basset” brackets can be used on individual runs. Rectangular ducts over 12" wide must be minimum 26 gauge, and will require 1" standing “S” cleats or other reinforcement if over 18" wide.

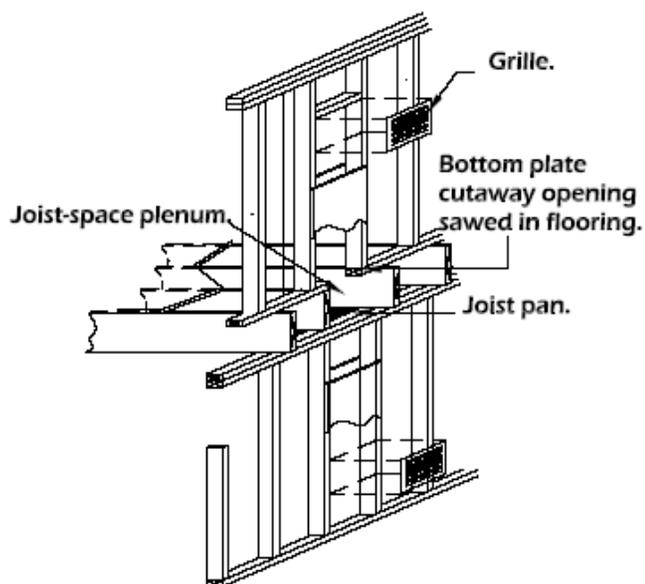
PVC Ducts. PVC pipe may be used for underground duct only. It may not be used in any above-ground applications, including bathroom exhaust fans or dryer vents.

Cardboard Panning. Cardboard panning (thermo-pan) may not be used in concealed locations such as soffits or above ceilings. Existing cardboard panning that will be concealed must be replaced with 1/2" drywall, 3/4" plywood, or 28-gauge metal.

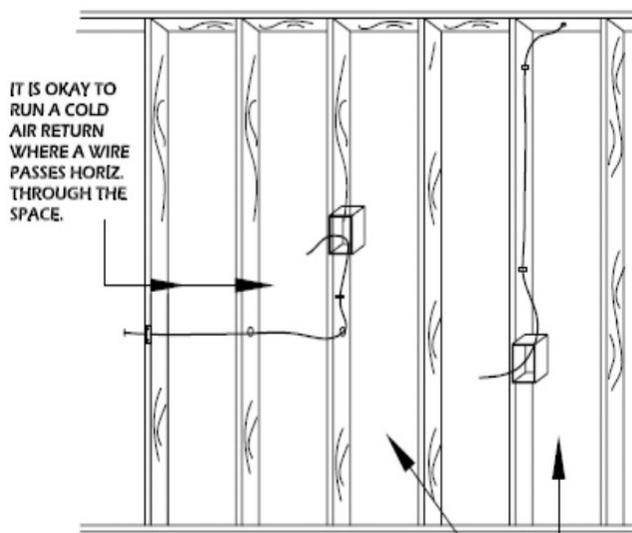
Return Air. Return air shall not be obtained from a closet, toilet room, bathroom, garage, or furnace room. Return air shall be located a minimum of 10' away from the open combustion chamber or draft diverter of any appliances or any kitchen cooking appliances.

Stud wall cavities shall not convey air from more than one floor. In simpler terms, if a joist space is used for return air, it can't have openings serving both levels in it. Ductwork must be run from both areas to a common return air plenum.

Electrical wire may pass through a return-air cavity provided it is installed such that it passes through the cavity in the shortest possible measurement, typically perpendicular to the direction of air travel.



Stacked stud cavity returns will accelerate the spread of smoke and fire and is not acceptable.



IT IS OKAY TO RUN A COLD AIR RETURN WHERE A WIRE PASSES HORIZ. THROUGH THE SPACE.

DO NOT RUN A RETURN IN THIS SPACE BECAUSE OF THE ELECTRICAL BOX OR THE WIRING RUNNING WITH THE STUDS.

Exhaust Systems. All exhaust fans are required to be ducted to the outdoors. Bath fan, kitchen, and dryer exhaust hoods must be 3' from openings back into the building and 3' above or 10' horizontal from any mechanical fresh air inlets. All exhaust ducts require a backdraft damper and, except for dryer exhaust, a screen with openings of minimum 1/4" and maximum 1/2" at the exterior termination.

Bathroom Exhaust. Every bathroom/toilet room must have exhaust. Any flexible duct used is limited to 14' in length and must be UL-listed as duct, not an air connector. This typically means it must be the kind that comes with insulation on it. More than one bath fan can't share the same duct unless that duct is upsized, typically to 6", depending on the CFM rating of the fans.

Dryer Exhaust Ducts. Dryer duct must be minimum 4" round 28-gauge metal, have the fewest number of bends possible, and cannot be flattened or ovaled. Flex duct is not allowed except for the exposed final short connection in the laundry room. That flex duct must be listed to UL2158A and can be no longer than 8'. Screws or fasteners that protrude into the duct are not allowed. Tape that is UL 181B listed for duct sealing can be used to connect dryer exhaust duct joints. Dryer duct must be supported and secured in place every 4'. **Dryer ducts must be completely independent, with no other exhaust connecting to them, including additional dryers.** Dryer exhaust termination caps cannot have a screen of any kind. Dryer ducts over 35' in length must have a label stating the length located at the dryer location and be attached to a dryer approved for that length.

Kitchen Range Exhaust. Ducts for kitchen range exhaust must be rigid metal with all joints screwed and sealed. Kitchen hoods that exhaust over 400 CFM of air will require makeup air if there are appliances in the house that rely on negative draft to vent products of combustion, such as a natural draft water heater. Kitchen range hoods listed and labeled for recirculation are allowed, and some hood manufacturers also have recirculating kits that can be installed on their hoods to eliminate the need for duct to the outdoors.

Combustion Air. All gas-fired appliances require combustion air supplied to them or they will not work well or efficiently and can even become carbon monoxide hazards. Unfinished basements usually have plenty of free area for combustion, but when a basement is finished, some means of providing combustion air will often be needed. The amount depends on the size and type of appliances.

Electric appliances require no combustion air, and most (not all) high efficiency furnaces already have combustion air piped directly to them. An electric water heater requires no combustion air, and a high efficiency furnace with TWO 2" or 3" PVC plastic pipes going to the outside requires no combustion air. If you have a gas water heater, a furnace with only one PVC pipe, or a furnace with a metal vent pipe, you will probably have to provide more combustion air.

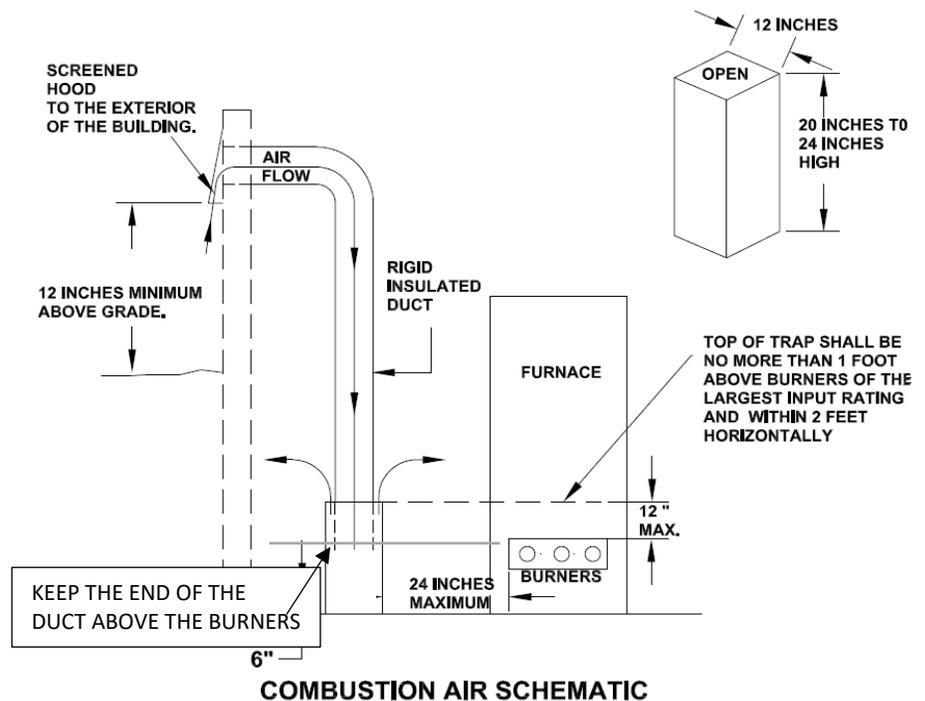
To determine combustion air size, find the BTU input of all appliances needing combustion air and add them together. This can be found on the appliance nameplate along with the model and serial number of the appliance. A standard 40-gallon water heater will be around 40,000 BTUs, and a typical furnace for an average sized home will be anywhere from 60,000 to 90,000 BTUs. Check the nameplates to be sure.

Combustion air can either be brought from the outside or from elsewhere in the house. There is no code requirement for which method to use, but in houses that are very tightly built, have large kitchen or other exhaust systems, or have higher BTU needs for combustion air, it is recommended to bring combustion air from the outside.

Combustion air from outside. All combustion air ducts are required to be rigid metal, and it is recommended that ducts bringing in air from the outside be insulated (required if going above finished ceilings). The exterior hood needs to be fixed open, have a screen with 1/4" to 1/2" openings, and be at least 12" above grade outside.

There are two methods for sizing outdoor combustion air. The first method requires an opening to the outside within 12" of the ceiling of the furnace room, with a size of 1 square inches for every 3000 BTUs of input.

The second method requires a little more work but may allow for a smaller opening size. On the inside, it needs to go to within 2' horizontally and 1' vertically of the burner of the largest appliance BTU-wise that needs combustion air. It is recommended but not required to drop it into a box. 4" pipe will handle up to 100,000 BTUs, 5" up to 150,000 BTUs, and 6" up to 225,000 BTUs. Pipe needs to be increased by one size if over 20' long and also if there is a dryer in the room. See the drawing to the right.

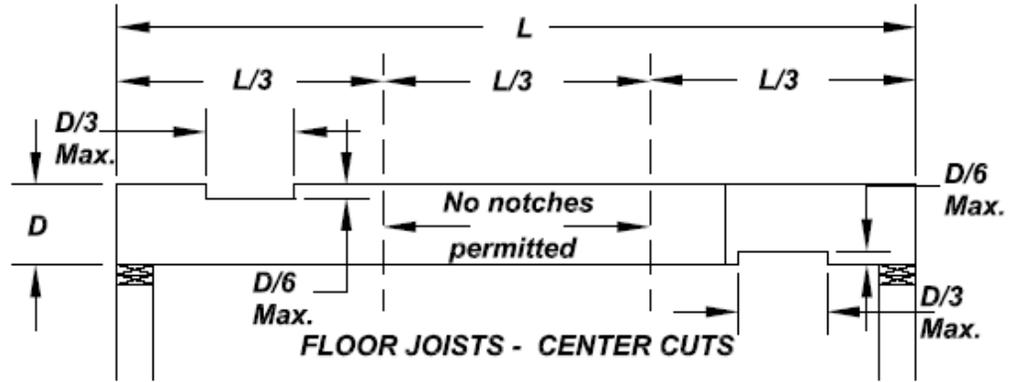


Combustion air from inside. Combustion air can be taken from inside by connecting spaces through permanent openings. To determine if a space is large enough for combustion air, multiply the volume of the space by 20. This will let you know how many BTUs of combustion air the space can provide. Spaces can be connected by two permanent openings: one within 12" of the ceiling and one within 12" of the floor. Size is 1 square inch of free area per 1000 BTUs with a minimum size of 100 square inches of free area for EACH opening. Registers and grills have about 75% free area, so to get 100 square inches of free area, a grill needs about 140 square inches of nominal area. A 14 x 10 or 12 x 12 grill works.

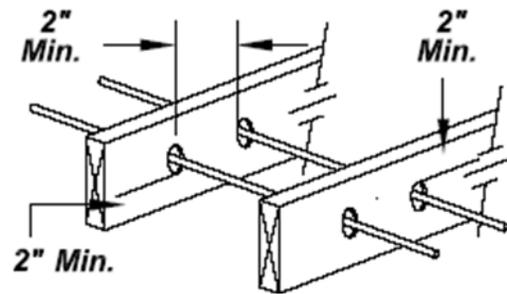
Whole House Ventilation. If you are doing the HVAC system on a new home, whole house ventilation will be required. This can be done with an air exchanger (HRV or ERV) or a combination of fans and outside air ducted into the house. Airflow rates required depend on the size of the house. Contact the mechanical inspector for more information if you have questions regarding whole house ventilation.

Drilling Holes and Notching in Framing. For the protection and structural stability of your home, there are limitations to any cutting of floor joists and wall framing. **Engineered truss systems (open webbed floor or attic trusses) are engineered systems and cannot be modified or cut without an analysis by a structural engineer.**

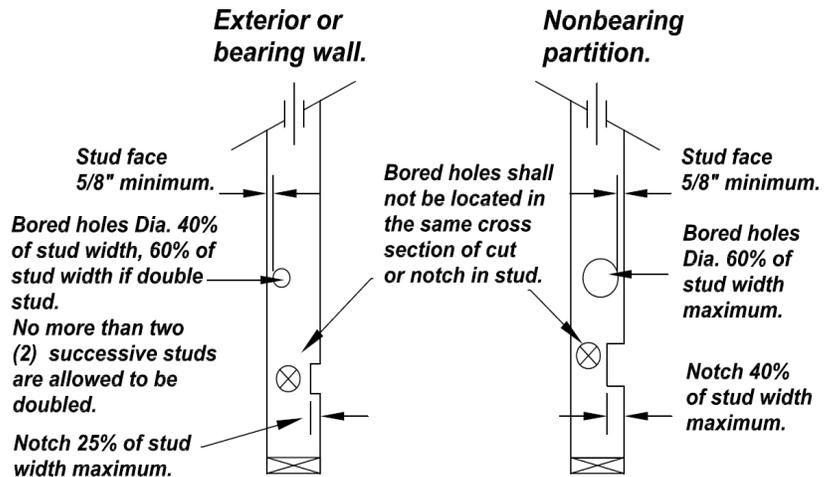
Notching Joists. Notches in sawn lumber (2x4, 2x6, 2x8, etc.) shall not exceed one-sixth of the depth of the member, shall not be longer than one-third of the depth of the member, and shall not be located in the middle one-third of the span.



Holes in Joists. Holes drilled in sawn lumber shall not be larger than one-third the depth of the member. The holes may not be closer than 2" to the bottom or top of the member. Any two holes may not be closer than 2" from each other and any hole may not be closer than 2" from a notch.

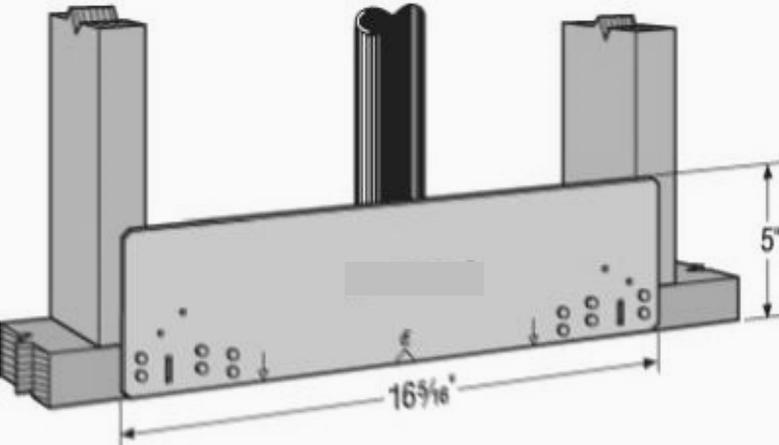


Drilling and Notching Studs. A maximum of 25% of the width of a stud may be cut or notched in an exterior wall or interior load-bearing wall. A maximum of 40% of the width of a stud may be cut or notched in a non-load-bearing wall. A bored or drilled hole in a stud may not exceed 40% of the width of the stud (exterior, load-bearing, or non-load-bearing), provided the hole is no closer than 5/8" to the edge of the stud and the hole is not located in the same section as a cut or notch.



Drilling and Notching of Top Plate. When the top plate of an exterior wall or interior load-bearing wall is drilled or notched by more than 50% of its width, a galvanized metal tie is required to be installed. The metal tie shall be a minimum of 16 gauge, 1 1/2" wide, and shall be fastened on each side of the notch or hole by a minimum of eight 16d nails.

Pipe and Vent Protection. Piping that is installed in holes or notches of studs, joists, rafters, or similar members that are less than 1 1/2" from the nearest edge shall be protected by a shield plate. The plate shall be a minimum of 16-gauge steel, cover the area of the member that is notched or bored, and shall extend a minimum of 2" above bottom plates and below top plates for pipe and dryer duct, 3 1/2" for vents (chimneys).



Guidelines for Specific Appliances

General Requirements for All Appliances. An appliance is defined as a device that is manufactured and designed to utilize energy and for which the Mechanical Code has specific requirements. Common examples are a furnace, air conditioner, fireplace, or garage heater. All appliances are required to be listed and bear the label of an approved agency. An example of an approved agency is Underwriters Laboratory (UL). Appliances covered by the mechanical code are typically required to meet either a UL standard or an ANSI standard and will indicate this on the appliance nameplate. Most newer manufactured appliances will meet these standards. An example of an unlisted appliance would be the old wood stove out of grandpa's workshop that has no label on it because it was built back in 1910. Appliances are required to be installed in accordance with the manufacturer's installation instructions. **Installation instructions must be available to the inspector at the time of the inspection.** Used appliances can be installed if they are in good working, safe condition.

All appliances require a 30" x 30" level working space on the service side of the appliance, and appliances in rooms require a 24" wide path to that service space. See the "**Clearance and Access**" on p. 4 for more details. If you are replacing an existing appliance, the working space and pathway requirements are waved, but clearances required by the manufacturer still need to be met.

Furnaces.

Standard efficiency furnaces (80% or less) have a metal flue connection and will require metal chimney pipe. Size of pipe is determined by sizing charts in the code book, depending on various factors such as height of chimney and any other appliances connecting to it. These furnaces will require combustion air as detailed on pp. 6–7.

High efficiency furnaces (90% or higher) are typically vented with plastic PVC pipe. The PVC vent system must be supported every 4' and must have a minimum slope down toward the furnace of 1/4" per foot. All joints must be primed with a contrasting color (typically purple) primer and glued. The vent system shall be sized and designed in accordance with the manufacturer's instructions. Make sure the termination on the outside is in accordance with the manufacturer's instructions, including requirements for distance to items like doors, windows, electric and gas meters, and restrictions to inside corners or under decks. If your neighbor's house is less than 10' away, there can be no doors or windows in that portion of the wall of your neighbor's home to prevent flue gases from your home from getting blown into their home. If your furnace has combustion air piped directly to it (two-pipe system or direct vent), no further combustion air is needed. If it takes combustion air from the surrounding space (single piped), combustion air will need to be provided as detailed on pp. 6–7.

Condensate drains must be minimum 3/4" and go to an approved location such as a floor drain or into a condensate pump that goes to an approved location. Condensate drains require an air gap, meaning they cannot tie directly into sewer pipes. Condensate from a furnace is acidic, so the drain line must be made of plastic or vinyl. The drain cannot be made of metal and cannot go into a sump pit because the acid in the water will destroy any metal parts.

Duct. All new duct connections are required to be sealed. Cooling coils must be on the positive side of the furnace, meaning the furnace must blow through the coil, not pull air through the coil.

Existing Chimneys. When disconnecting an appliance from a chimney system, that chimney system must be inspected and resized if necessary to ensure proper draft for any remaining appliances. The common flue size (area) can't be larger than seven times the smallest appliance vent connection area. This means that an appliance with a 3" vent connection can't go into any chimney over 7" round, and an appliance with a 4" connection can't go into a chimney over 10" round. Masonry chimneys must have a liner in them. An existing clay or metal liner is okay if it is in good condition and not too large.

Startup Data. To ensure a gas furnace is operating properly and safely, startup checks must be performed. The readings required are gas supply and manifold (burner) pressures, temperature rise, and duct static pressures. These readings must be written on the inside of the furnace service access panel, with a permanent marker is okay. **The inspector does NOT take these readings. They need to be completed and written down prior to the inspection.**

Electrical Wiring. All line voltage wiring must either be done by a licensed electrical contractor or you must also obtain a homeowner's electrical permit to perform the wiring yourself. A furnace is required to have its own independent circuit. When requesting your furnace inspection, be ready to state who is doing the wiring. Wiring must be complete at time of inspection.

Air Conditioners.

Outside unit. Air conditioners must be on a concrete or plastic pad that extends a minimum of 1 1/2" above grade or be suspended at least 6" above grade. Service access ports require tamper-resistant caps that need a special tool to remove. All manufacturer's clearances must be maintained, and a minimum 30"x30" level service space is required on the control side. All new refrigerant piping inside and out requires minimum R-4 insulation on the suction line. Seal the wall opening where piping exist the house. All piping must be supported every 6'.

Inside. Any ductwork modifications or openings must be sealed. Condensate drain must be minimum 3/4" and go to an approved location such as a floor drain or a condensate pump that goes to an approved location. Condensate drains require an air gap, meaning they cannot tie directly into sewer pipes.

Electrical Wiring. All line voltage wiring must either be done by a licensed electrical contractor or you must also obtain a homeowner's electrical permit to perform the wiring yourself. When requesting your inspection, be ready to state who is doing the wiring. Wiring must be complete at time of inspection.

Fireplaces and Free-standing Stoves, Gas or Solid Fuel.

Requirements for fireplaces and stoves vary widely between different models. Because of this, it is critical that you read and follow the installation instructions and have them available for the inspector. Clearance to combustibles, venting instructions, and mantel and hearth parameters are all in the installation manual.

All factory-built stoves and fireplaces must be listed. There are some new units on the market that are NOT listed, especially solid fuel/wood stoves. Unlisted units cannot be installed.

Rough-in inspection. Have all framing complete around the fireplace and vent system, but no coverings on. Make sure the vent system is visible from the unit to the exterior. Most solid fuel fireplaces and stoves require a hearth of a minimum thickness or insulation value. If a hearth is required, have any underlayment needed in place. If you are doing your own gas piping, have this complete as well (see instructions for "**Gas Piping**" on p. 11).

Final inspection. Have all finishes complete, including hearth and mantel. Have the manual available at inspection time. **Make sure all finishes around the fireplaces/stoves comply with manufacturer's instructions.** Gas fireplaces require a reading of the gas supply pressure to the fireplace. Write this inside the service area or on the manual cover. **The inspector does NOT take this reading;** have it done prior to inspection.

Garage Heaters

Location. All appliances in garages must be located a minimum of 18" above the floor. In addition, appliances must be located at least 6' above the floor or be protected from vehicle impact in some manner. Some manufacturers require even more clearance above the floor.

Unit Heaters. These are the most common types of garage heater. Read and follow all instructions. Make sure to meet all manufacturer's clearance requirements including on the service control side, with the ability to set up a ladder on that side. Generally, if the vent system has only a short horizontal distance and then turns up through the roof, you can use b-vent (standard double wall gas vent); but if the vent is horizontal through the wall or has a long horizontal run, a UL-listed positive-pressure Category III vent pipe must be used. Check the installation manual for details; there are some that require the Category III vent pipe in any circumstance. Unit heaters require startup readings of gas supply and manifold (burner) pressures. Write these on the back or side of the unit. **The inspector does NOT take this reading;** have it done prior to inspection.

Radiant Heaters. The most common form is commonly called "tube heat." Requirements are similar to those for unit heaters with one BIG exception. Radiant heaters have a required clearance to combustibles below the heater which can vary greatly depending on the size and brand of heater. **This clearance includes distance to vehicles that can park below the heater.** Surfaces below radiant heat can get warm, and if too close can get very hot, even damaging the paint on top of a vehicle. Installed with proper clearances, they are acceptable.

Furnaces Used to Heat Garages. Standard furnaces can be used to heat garages, but it can feed ONLY the garage. In addition, with the exception of direct-vent (two-pipe) furnaces, standard furnaces need the return air ducted to 10' away from the furnace. The inlet of that return duct must be at least 18" above the floor. All other requirements for furnaces listed on p. 9 above also apply.

Gas Piping. Any new gas piping going to garage heaters must be inspected. See p. 12 for details.

Boilers and Hydronic Piping (including in-floor heat)

Piping materials. Piping or tubing for in floor heat can be steel pipe, type K, L, or M copper, or one of several types of plastic tubing that are approved for the application.

Insulation. For tubing installed in concrete floors, a minimum of R-5 insulation is required below the tubing. A thermal break is required between the heated slab and the foundation wall or other nonheated slabs. Expansion joint material will work for the thermal break. Other piping and tubing must be insulated with minimum R-3 insulation if the fluids in them are below 55 degrees or above 105 degrees.

Inspection and Pressure Test. All new hydronic piping is required to be pressure tested. A minimum of 50 PSI is acceptable. Leave a tag or some other indicator what the test pressure started at. **The inspector does not perform this test. The air hold test needs to be in place at time of inspection so the inspector can verify there are no leaks. Make sure the inspection is complete and passed before pouring any concrete.**

Boilers. Boilers shall be installed in accordance with the manufacturer's instructions. Have the instructions available at time of inspection. Venting and combustion air requirements for gas boilers are similar to those for furnaces (see Furnace section on p. 9). All boilers require an expansion tank. All boilers require a pressure relief valve, which is usually supplied with the boiler. Discharge of the relief valve shall be piped to point at the floor and must not be reduced in size. At final inspection, startup readings consisting of gas supply and manifold pressure are required. Some new high efficiency boilers require CO readings of the flue gases instead of the manifold pressure reading. **The inspector does NOT take this reading;** have it done prior to inspection. Write the readings inside the service access panel of the boiler.

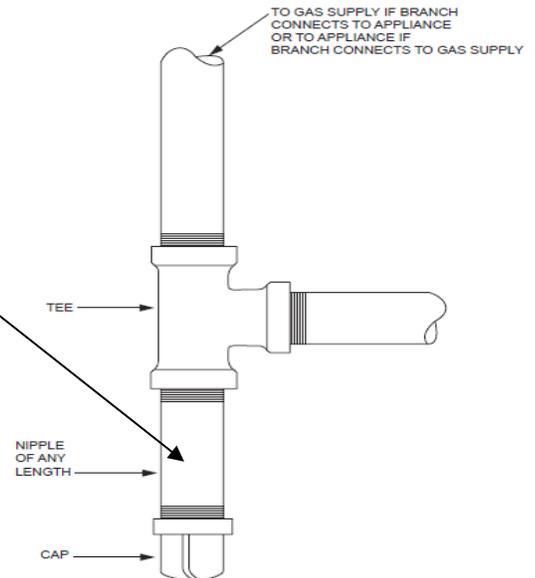
Gas Piping.

Black iron pipe must be Schedule 40 and listed. Threaded joints can be in concealed locations, but unions and shutoffs must be accessible.

Copper tubing must be Type K or L. All mechanical joints must be accessible. Any concealed joints must be brazed. 16-gauge steel nail plates that extend 4" beyond the framing are required where tubing goes through framing within 1 1/2" of the edge of the stud or joist.

CSST (flexible gas line). Joints are listed for concealed locations. Where going through holes in framing, CSST must be protected with manufacturer-provided hardened steel plates if within 2" of the edge of the framing. CSST with the yellow jacketing is required to be electrically bonded with a 6-gauge copper ground wire going from a rigid portion of the gas line before the first CSST branch to the building electrical ground. Clamps making those connections must be listed for that purpose. CSST with the black jacketing does not require this bonding if any appliance that the gas piping system is connected to has permanent (not plug-in) line voltage wiring to it.

Connections to Appliances. Every appliance requires its own dedicated shutoff with a union fitting or listed flexible appliance connector between the shutoff and appliance. A flexible connector can only go through the appliance cabinet wall if the opening is protected with a rubber or plastic grommet. A drip leg/sediment trap is required at each appliance. If one vertical riser supplies multiple nearby appliances, one drip leg at the bottom of that riser is acceptable.



Pressure Testing. All new gas piping is required to have an air pressure test to check for leaks. Reconnection of gas line for appliance replacements does not require an air pressure test. Check those joints for leaks with a gas detector or soap bubbles. If you are using a gas line that was previously roughed in but not used, that will also have to be tested for leaks. Minimum pressure for this test is 3 PSI, but not less than one-fifth the maximum reading of the gauge used. Regulators and appliance gas valves are not designed to withstand these higher pressures and need to be isolated from the pressure test. **The inspector does not perform this test. The air hold test needs to be in place at time of inspection so the inspector can verify there are no leaks.**

Two Pound Gas Systems. **WARNING!** Some homes have gas supplied to them at 2 PSI, which is about five times higher than the operating range of most appliance valves. There is an in-line regulator between the gas meter and the appliances to step gas pressure down to appliance operating range. If you connect to the 2 PSI portion of the gas line, a regulator will be required in that branch before the appliance.