

2012 NC Fuel Gas Code

The changes below are to the 2009 International Fuel Gas Code. These mark-ups will be adopted for the 2012 NC Fuel Gas Code.

Chapter 1 – ADMINISTRATION

101.1 Title. These regulations shall be known as the North Carolina Fuel Gas Code as adopted by the North Carolina Building Code Council on September 14, 2010, to be effective September 1, 2011. References to the International Codes shall mean the North Carolina Codes. The North Carolina amendments to the International Codes are underlined.

101.3 Appendices. Provisions in the appendices shall not apply unless specifically adopted or referenced in this code.

101.6 Requirements of other State agencies, occupational licensing board or commissions. The North Carolina State Building Codes do not include all additional requirements for buildings and structures that may be imposed by other State agencies, occupational licensing boards and commissions. It shall be the responsibility of a permit holder, design professional, contractor or occupational license holder to determine whether any additional requirements exist.

SECTION 103 (IFGC) DEPARTMENT OF INSPECTION

Deleted. See the North Carolina Administrative Code and Policies.

SECTION 104 (IFGC) DUTIES AND POWERS OF THE CODE OFFICIAL

Deleted. See the North Carolina Administrative Code and Policies.

106.2 Permits not required. Permits shall not be required for the following:

1. Any portable heating appliance.
2. Replacement of any minor component of equipment that does not alter approval of such equipment or make such equipment unsafe.

Exemption from the permit requirements of this code shall not be deemed to grant authorization for work to be done in violation of the provisions of this code or of other laws or ordinances of this jurisdiction.

Remainder of Section 106 deleted. See the North Carolina Administrative Code and Policies.

SECTION 107 (IFGC) INSPECTIONS AND TESTING

Deleted. See the North Carolina Administrative Code and Policies.

SECTION 108 (IFGC) VIOLATIONS

Deleted. See the North Carolina Administrative Code and Policies.

SECTION 109 (IFGC) MEANS OF APPEAL

Deleted. See the North Carolina Administrative Code and Policies.

Chapter 2 – DEFINITIONS

APPROVED. Acceptable to the code official or other authority having jurisdiction for compliance with the provisions of the applicable code or referenced standard.

CLOSET. An enclosed or recessed area used to store clothing, linens or other household items.

CONCEALED LOCATION. A location that cannot be accessed without damaging permanent parts of the building structure or finish surface. Spaces above, below or behind readily removable panels or doors shall not be considered as concealed. Buried underground piping shall not be considered as concealed.

LABELED. *Appliances, equipment,* materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the *appliance, equipment,* material or product meets identified standards or has been tested and found suitable for a specified purpose.

LISTED. *Appliances, equipment,* materials, products or services included in a list published by an organization acceptable to the code official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the *appliance, equipment,* material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

POINT OF DELIVERY. For natural gas systems, the *point of delivery* is the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where a meter is not provided. Where a valve is provided at the outlet of the service meter assembly, such valve shall be considered to be downstream of the *point of delivery*. For undiluted liquefied petroleum gas systems, the *point of delivery* shall be considered to be the outlet of the first regulator that reduces pressure.

REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice his respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed. Design by a registered design professional is not required where exempt under the registration or licensure laws.

Chapter 3 – GENERAL REGULATIONS

301.14.1 Foundation and exterior wall sealing. Annular spaces around pipes, electric cables, conduits or other openings in the walls shall be protected against the passage of rodents by closing such opening with cement mortar, concrete masonry, silicone caulking or noncorrosive metal.

303.3 Prohibited locations. Appliances shall not be located in sleeping rooms, bathrooms, toilet rooms, closets used for storage or surgical rooms, or in a space

that opens only into such rooms or spaces, except where the installation complies with one of the following:

1. The appliance is a direct-vent appliance installed in accordance with the conditions of the listing and the manufacturer's instructions.
2. Vented room heaters, wall furnaces, vented decorative appliances, vented gas fireplaces, vented gas fireplace heaters and decorative appliances for installation in vented solid fuel-burning fireplaces are installed in rooms that meet the required volume criteria of Section 304.5.
3. A single wall-mounted unvented room heater is installed in a bathroom and such unvented room heater is equipped as specified in Section 621.6 and has an input rating not greater than 6,000 Btu/h (1.76 kW). The bathroom shall meet the required volume criteria of Section 304.5.
4. Deleted.
5. The appliance is installed in a room or space that opens only into a bedroom or bathroom, and such room or space is used for no other purpose and is provided with a solid weather-stripped door equipped with an approved self-closing device. All combustion air shall be taken directly from the outdoors in accordance with Section 304.6.

303.4 Protection from vehicle impact damage. Appliances shall not be installed in a location subject to vehicle impact damage except where protected by an approved means. Protection is not required for appliances located out of the vehicle's normal travel path.

303.7 Pit locations. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil. The sides of the pit or excavation shall be held back a minimum of 12 inches (305 mm) from the *appliance*. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry, such concrete or masonry shall extend a minimum of 4 inches (102 mm) above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse.

303.8 Drainage. Below-grade installations shall be provided with a natural drain or an automatic lift or sump pump.

304.4 Makeup air provisions. Where exhaust fans, clothes dryers and kitchen ventilation systems interfere with the operation of appliances and fireplaces, makeup air shall be provided.

305.7 Under-floor and exterior grade installations.

305.7.1 Exterior-grade installations. Equipment and appliances installed above grade level shall be supported on a solid base or approved material a minimum of 2 inches (51 mm) thick.

305.7.2 Under-floor installation. Suspended equipment shall be a minimum of 6 inches (152 mm) above the adjoining grade.

305.7.3 Crawl space supports. A support shall be provided at each corner of the unit not less than 8 x 8 inches. The unit shall be supported a minimum of 2 inches above grade. When constructed of brick, the bricks shall be mortared together. All units stacked shall be mortared together. Fabricated units, formed concrete, or other approved materials shall be permitted.

305.7.4 Drainage. Below-grade installations shall be provided with a natural drain or an automatic lift or sump pump. For pit requirements see Section 303.7.

[M] 306.3 Appliances in attics. Attics containing appliances requiring access shall be provided with an opening and unobstructed passageway large enough to allow removal of the largest component of the appliance. The passageway shall not be less than 30 inches (762 mm) high and 22 inches (559 mm) wide and not more than 20 feet (6096 mm) in length when measured along the centerline of the passageway from the opening to the equipment. The passageway shall have continuous solid flooring not less than 24 inches (610 mm) wide. A level service space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present at the front or service side of the equipment. The clear access opening dimensions shall be a minimum of 20 inches by 30 inches (508 mm by 762 mm), where such dimensions are large enough to allow removal of the largest component of the appliance.

Exceptions:

1. The passageway and level service space are not required where the appliance is capable of being serviced and removed through the required opening.
2. Where the passageway is not less than 6 feet (1829 mm) high for its entire length, the passageway shall not be limited in length.

[M] 306.3.1 Electrical requirements. Deleted.

[M] 306.4 Appliances under floors. Underfloor spaces containing appliances shall be provided with an access opening and unobstructed passageway large enough to remove the largest appliance. The passageway shall not be less than 22 inches (559 mm) high and 36 inches (914 mm) wide, nor more than 20 feet (6096 mm) in length measured along the centerline of the passageway from the opening to the appliance. A level service space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present at the front or service side of the appliance. If the depth of the passageway or the service space exceeds 12 inches (305 mm) below the adjoining grade, the walls of the passageway shall be lined with concrete or masonry. Such concrete or masonry shall extend a minimum of 4 inches (102 mm) above the adjoining grade and shall have sufficient lateral-bearing capacity to resist collapse. The clear access opening dimensions shall be a minimum of 22 inches high by 30 inches wide (559 mm by 762 mm), and large enough to allow removal of the largest appliance.

Exceptions:

1. The passageway is not required where the level service space is present when the access is open and the appliance is capable of being serviced and removed through the required opening.
2. Where the passageway is not less than 6 feet (1829 mm) high for its entire length, the passageway shall not be limited in length.

[M] 306.4.1 Electrical requirements. Deleted.

[M] 306.5 Appliances on roofs or elevated structures. Where equipment and appliances requiring periodic maintenance are installed on roofs or elevated structures at a height exceeding 16 feet (4877 mm), such access shall be provided by a permanent *approved* means of access, the extent of which shall be from grade or floor level to the *equipment* and appliances' level service space. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) high or walking

on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Where access involves climbing over parapet walls, the height shall be measured to the top of the parapet wall.

Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge not less than 30 inches (762 mm).
2. Ladders shall have rung spacing not to exceed 14 inches (356 mm) on center.
3. Ladders shall have a toe spacing not less than 6 inches (152 mm) deep.
4. There shall be a minimum of 18 inches (457 mm) between rails.
5. Rungs shall have a minimum 0.75-inch (19 mm) diameter and be capable of withstanding a 300-pound (136.1 kg) load.
6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds per square foot (488.2 kg/m²). Landing dimensions shall be not less than 18 inches (457 mm) and not less than the width of the ladder served. A guard rail shall be provided on all open sides of the landing.
7. Ladders shall be protected against corrosion by approved means.

Catwalks installed to provide the required access shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

Exception: This section shall not apply to Group R-3 occupancies.

[M] 306.5.1 Sloped roofs. Where appliances, *equipment*, fans or other components that require periodic maintenance are installed on a roof having a slope of three units vertical in 12 units horizontal (25-percent slope) or greater and having an edge more than 30 inches (762 mm) above grade at such edge, a level platform shall be provided on each side of the *appliance* or *equipment* to which access is required for service, repair or maintenance. The platform shall be not less than 30 inches (762 mm) in any dimension and shall be provided with guards. The guards shall extend not less than 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage of a 21 -inch diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*. Access shall not require walking on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Where access involves obstructions greater than 30 inches (762 mm) in height, such obstructions shall be provided with ladders installed in accordance with Section 306.5 or stairs installed in accordance with the requirements specified in the *International Building Code* in the path of travel to and from appliances, fans or *equipment* requiring service.

[M] 306.5.2 Electrical requirements. Deleted.

[M] 306.6 Guards. Guards shall be provided where appliances or other components that require service and roof hatch openings are located within 6 feet (1829 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such appliances, components and roof hatch openings and the top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533

mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*.

307.3 Drain pipe materials and sizes. Bring forward from the 2009 NC Fuel Gas Code.

SECTION 308 (IFGS) CLEARANCE REDUCTION FOR UNLISTED EQUIPMENT

308.2 Reduction table. The allowable clearance reduction shall be based on one of the methods specified in Table 308.2 or shall utilize an assembly listed for such application. Where required clearances are not listed in Table 308.2, the reduced clearances shall be determined by linear interpolation between the distances listed in the table. Reduced clearances shall not be derived by extrapolation below the range of the table. The reduction of the required clearances to combustibles for listed and labeled appliances and equipment shall be in accordance with the manufacturer's equipment listing and installation instructions.

TABLE 308.2^a through k – REDUCTION OF CLEARANCES WITH SPECIFIED FORMS OF PROTECTION – In Item number 5, under the far right **Sides and rear Col. 2**, change the number 2 to number 3.

308.3.3 Clearance reduction. Deleted.

308.4.3 Clearance reduction. Deleted.

Chapter 4 – GAS PIPING INSTALLATIONS

401.1 Scope. This chapter and Appendix A shall govern the design, installation, modification and maintenance of piping systems. The applicability of this code to piping systems extends from the point of delivery to the connections with the equipment and includes the design, materials, components, fabrication, assembly, installation, testing, inspection, operation and maintenance of such piping systems.

401.2 Liquefied petroleum gas storage. The enforcement of the location of undiluted liquefied petroleum gas containers shall be the responsibility of the North Carolina Department of Agriculture and Consumer Services in accordance with Article 5 of Chapter 119 of the General Statutes.

401.5 Identification. Exposed piping shall be identified by a yellow label marked "Gas" in black letters. The marking shall be spaced at intervals not exceeding 5 feet (1524 mm). All piping and tubing systems, greater than 0.5-psi service pressure, shall be identified by a yellow label with black letters indicating the piping system pressure. The system shall be marked at the beginning, all ends and at intervals not exceeding 5 feet (1524 mm) along its exposed length.

Exceptions:

1. Gas lines extending from the undiluted liquefied petroleum gas storage tanks to the building are not required to be labeled.
2. Black steel piping, .5 psi or less, located at dwelling units shall not be required to be labeled.

401.9 Meter location. When required, a meter shall be provided for the building or residence to be served. The location shall be such that the meter can be read, serviced or changed. The location, space requirements, dimensions and proper clearances shall be acceptable to the local gas company.

TABLE 402.4(36) POLYETHYLENE PLASTIC PIPE SIZING BETWEEN FIRST STAGE AND SECOND STAGE REGULATOR

(Bring forward from the 2009 NC Fuel Gas Code.)

TABLE 402.4(37) POLYETHYLENE PLASTIC TUBE SIZING

(Bring forward from the 2009 NC Fuel Gas Code.)

Sizing between first stage and second stage regulator maximum undiluted propane capacities listed are based on 10 psi first stage setting and 1 psi pressure drop Capacities in 1000 Btu/hr

404.4 Piping through foundation wall. Underground piping, where installed below grade through the outer foundation or basement wall of a building, shall be encased in a protective pipe sleeve or shall be protected by an approved device or method. The annular space between the gas piping and the sleeve and between the sleeve and the wall shall be sealed.

404.7 Above-ground outdoor piping. All piping installed outdoors shall be elevated not less than 31/2 inches (152 mm) above ground and where installed across roof surfaces, shall be elevated not less than 31/2 inches (152 mm) above the roof surface. Piping installed above ground, outdoors, and installed across the surface of roofs shall be securely supported and located where it will be protected from physical damage. Where passing through an outside wall, the piping shall also be protected against corrosion by coating or wrapping with an inert material. Where piping is encased in a protective pipe sleeve, the annular space between the piping and the sleeve shall be sealed. Ferrous metal exposed in exterior locations shall be protected from corrosion with one coat of exterior paint. Zinc coatings (galvanized) shall be deemed adequate protection for gas piping above-ground.

404.9 Protection against corrosion underground. Metallic pipe or tubing exposed to corrosive action, such as soil condition or moisture, shall be protected in an approved manner. Zinc coatings (galvanizing) shall not be deemed adequate protection for gas piping underground. Where dissimilar metals are joined underground, an insulating coupling or fitting shall be used. Piping shall not be laid in contact with cinders.

404.9.2 Protective coatings and wrapping. Pipe protective coatings and wrappings shall be approved for the application and shall be factory applied.

Exception: Where installed in accordance with the manufacturer's installation instructions, field application of coatings and wrappings shall be permitted.

408.1 Slopes. Deleted.

408.2 Drips. Deleted.

408.3 Location of drips. Deleted.

408.4 Sediment trap. Where a sediment trap is not incorporated as part of the *appliance*, a sediment trap shall be installed downstream of the *appliance* shutoff valve as close to the inlet of the *appliance* as practical. The sediment trap shall be either a tee fitting having a capped nipple of any length installed vertically in the bottommost opening of the tee or other device *approved* as an effective sediment trap. Illuminating appliances, ranges, clothes dryers, gas logs, log lighters and outdoor grills need not be so equipped.

409.2 Meter valve. Deleted.

409.5.1 Located within same room. The shutoff valve shall be located in the same room as the *appliance*. The shutoff valve shall be within 6 feet (1829 mm) of the *appliance*, and shall be installed upstream of the union, connector or quick disconnect device it serves. Such shutoff valves shall be provided with *access*. *Appliance* shutoff valves located in the firebox of a *fireplace* shall be installed in accordance with the *appliance* manufacturer's instructions. This section shall not prohibit the use or the installation of gas shutoff valves in the firebox of fireplaces serving listed gas appliances.

409.5.3 Located at manifold. Deleted.

409.6 Shutoff valve for laboratories. Where provided with two or more fuel gas outlets, including table-, bench- and hood-mounted outlets, each laboratory space in educational, research, commercial and industrial occupancies shall be provided with a single dedicated shutoff valve through which all such gas outlets shall be supplied. The dedicated shutoff valve shall be readily accessible, located within the laboratory space served, located adjacent to an egress door from the space and shall be identified by approved signage stating "Gas Shutoff."

410.2 MP regulators. MP pressure regulators shall comply with the following:

1. The MP regulator shall be approved and shall be suitable for the inlet and outlet gas pressures for the application.
2. The MP regulator shall maintain a reduced outlet pressure under lockup (no-flow) conditions.
3. The capacity of the MP regulator, determined by published ratings of its manufacturer, shall be adequate to supply the appliances served.
4. The MP pressure regulator shall be provided with access . Where located indoors, the regulator shall be vented to the outdoors or shall be equipped with a leak-limiting device, in either case complying with Section 410.3.
5. A tee fitting with one opening capped or plugged shall be installed between the MP regulator and its upstream shutoff valve. Such tee fitting shall be positioned to allow connection of a pressure-measuring instrument and to serve as a sediment trap.
6. A means to test pressure shall be installed not less than 10 pipe diameters downstream of the MP regulator outlet. Such fitting shall be positioned to allow connection of a pressure-measuring instrument.

411.1.1 Commercial cooking appliances. Commercial cooking appliances installed on casters and appliances that are moved for cleaning and sanitation purposes shall be connected to the *piping* system with an *appliance* connector *listed* as complying with ANSI Z21.69 or in accordance with Item 1, 3 or 5 of Section 411.1.

411.1.3.3 Prohibited locations and penetrations. Connectors shall not be concealed within, or extended through, walls, floors, partitions, ceilings or appliance housings.

Exceptions:

1. Connectors constructed of materials allowed for piping systems in accordance with Section 403 shall be permitted to pass through walls, floors, partitions and ceilings where installed in accordance with Section 409.5.2.
2. Rigid steel pipe connectors shall be permitted to extend through openings in appliance housings.
3. Fireplace inserts that are factory equipped with grommets, sleeves or other means of protection in accordance with the listing of the appliance .
4. Semirigid tubing and listed connectors shall be permitted to extend through an opening in an appliance housing, cabinet or casing where the tubing or connector is protected against damage.

SECTION 412 (IFGC) – LIQUEFIED PETROLEUM GAS MOTOR VEHICLE FUEL-DISPENSING FACILITIES

[F] 412.1 General. Motor fuel-dispensing facilities for LP-gas fuel shall be as regulated by the North Carolina Department of Agriculture and Consumer Services.

[F] 412.2 Storage and dispensing. Deleted.

[F] 412.3 Approved equipment. Deleted.

[F] 412.4 Listed equipment. Deleted.

[F] 412.5 Attendants. Deleted.

[F] 412.6 Location. Deleted.

[F] 412.7 Installation of dispensing devices and equipment. Deleted.

[F] 412.7.1 Valves. Deleted.

[F] 412.7.2 Hoses. Deleted.

[F] 412.7.3 Vehicle impact protection. Deleted.

[F] 412.8 Private fueling of motor vehicles. Deleted.

TABLE 402.4(1) SCHEDULE 40 METALLIC PIPE Deleted

TABLE 402.4(4) SCHEDULE 40 METALLIC PIPE Deleted

TABLE 402.4(6) SEMIRIGID COPPER TUBING Deleted

TABLE 402.4(9) SEMIRIGID COPPER TUBING Deleted

TABLE 402.4(11) SEMIRIGID COPPER TUBING Deleted

TABLE 402.4(14) CORRUGATED STAINLESS STEEL TUBING (CSST) Deleted

TABLE 402.4(15) CORRUGATED STAINLESS STEEL TUBING (CSST) Deleted

TABLE 402.4(18) POLYETHYLENE PLASTIC PIPE Deleted

TABLE 402.4(21) POLYETHYLENE PLASTIC TUBING Deleted

CHAPTER 5 – CHIMNEYS AND VENTS

501.1 Scope. This chapter, Appendix B and Appendix C shall govern the installation, maintenance, repair and approval of factory-built chimneys, chimney liners, vents and connectors and the utilization of masonry chimneys serving gas-fired appliances. The requirements for the installation, maintenance, repair and approval of factory-built chimneys, chimney liners, vents and connectors serving appliances burning fuels other than fuel gas shall be regulated by the *International Mechanical Code*. The construction, repair, maintenance and approval of masonry chimneys shall be regulated by the *International Building Code*.

504.2.9 Chimney and vent locations. Tables 504.2(1), 504.2(2), 504.2(3), 504.2(4) and 504.2(5) shall be used only for chimneys and vents not exposed to the outdoors below the roof line. A Type B vent or listed chimney lining system passing through an unused masonry chimney flue shall not be considered to be exposed to the outdoors. A Type B vent shall not be considered to be exposed to the outdoors where it passes through an unventilated enclosure or chase insulated to a value of not less than R8.

Table 504.2(3) in combination with Table 504.2(6) shall be used for clay-tile-lined exterior masonry chimneys, provided that all of the following are met:

1. Vent connector is a Type B double wall.
2. Vent connector length is limited to 1 1/2 feet for each inch (18 mm per mm) of vent connector diameter.
3. The appliance is draft hood equipped.
4. The input rating is less than the maximum capacity given by Table 504.2(3).
5. For a water heater, the outdoor design temperature is not less than 5°F (-15°C).
6. For a space-heating appliance, the input rating is greater than the minimum capacity given by Table 504.2(6).

Exception: The installation of vents serving listed appliances shall be permitted to be in accordance with the appliance manufacturer's installation instructions.

504.3.20 Chimney and vent location. Tables 504.3(1), 504.3(2), 504.3(3), 504.3(4) and 504.3(5) shall be used only for chimneys and vents not exposed to the outdoors below the roof line. A Type B vent or listed chimney lining system passing through an unused masonry chimney flue shall not be considered to be exposed to the outdoors. A Type B vent shall not be considered to be exposed to the outdoors where it passes through an unventilated enclosure or chase insulated to a value of not less than R8.

Tables 504.3(6a), (6b) and Tables 504.3(7a), (7b) shall be used for clay-tile-lined exterior masonry chimneys, provided that all of the following conditions are met:

1. Vent connector is Type B double wall.
2. At least one appliance is draft hood equipped.
3. The combined appliance input rating is less than the maximum capacity given by Table 504.3(6a) for NAT+NAT or Table 504.3(7a) for FAN+NAT.
4. The input rating of each space-heating appliance is greater than the minimum input rating given by Table 504.3(6b) for NAT+NAT or Table 504.3(7b) for FAN+NAT.
5. The vent connector sizing is in accordance with Table 504.3(3).

Exception: Vents serving listed appliances installed in accordance with the appliance manufacturer's installation instructions.

[M] 614.6.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal a minimum 0.016 inch (0.4 mm) thick. With the exception of the transition duct, flexible ducts are prohibited. The exhaust duct size shall be 4 inches (102 mm) nominal in diameter.

[M] 614.6.2 Duct installation. Exhaust ducts shall be supported at 4-foot (1219 mm) intervals and secured in place and shall terminate not less than 12 inches (305 mm) above finished grade. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude into the inside of the duct.

Exception: Where the duct termination is less than 12 inches (305 mm) above finished grade an areaway shall be provided with a cross-sectional area not less than 200 square feet (18.6 m²). The bottom of the duct termination shall be no less than 12 inches (305 mm) above the areaway bottom.

[M] 614.6.4 Transition ducts. Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is *listed* and *labeled* in accordance with UL 2158A. Transition ducts shall be a maximum of 8 feet (2438 mm) in length, shall not be concealed within construction, and must remain entirely within the room in which the appliance is installed.

[M] 614.6.6 Length identification. The equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.

[M] 614.6.7 Exhaust duct required. Where space for a clothes dryer is provided, an exhaust duct system shall be installed.

Exception: Where a *listed* condensing clothes dryer is installed prior to occupancy of structure.

618.2 Forced-air furnaces. The minimum unobstructed total area of the outside and return air ducts or openings to a forced-air warm-air furnace shall be not less than 2 square inches for each 1,000 Btu/h (4402 mm²/W) output rating capacity of the furnace and not less than that specified in the furnace manufacturer's installation instructions. The minimum unobstructed total area of supply ducts from a forced-air warm-air furnace shall be not less than 2 square inches for each 1,000 Btu/h (4402 mm²/W) output rating capacity of the furnace and not less than that specified in the furnace manufacturer's installation instructions. With the addition of a cooling coil, the sizing criteria shall be based on 6 square inches for each 1,000 Btu/h (13 206 mm²/W) output.

Exception: The total area of the supply air ducts and outside and return air ducts shall not be required to be larger than the minimum size required by the furnace manufacturer's installation instructions.

618.5 Prohibited sources. Outside or return air for a forced-air heating system shall not be taken from the following locations:

1. Closer than 10 feet (3048 mm) from an appliance vent outlet, a vent opening from a plumbing drainage system or the discharge outlet of an exhaust fan, unless the outlet is 3 feet (914 mm) above the outside air inlet.

2. Where there is the presence of objectionable odors, fumes or flammable vapors; or where located less than 10 feet (3048 mm) above the surface of any abutting public way or driveway; or where located at grade level by a sidewalk, street, alley or driveway.

3. A hazardous or insanitary location or a refrigeration machinery room as defined in the International Mechanical Code.

4. A room or space, the volume of which is less than 25 percent of the entire volume served by such system. Where connected by a permanent opening having an area sized in accordance with Section 618.2, adjoining rooms or spaces shall be considered as a single room or space for the purpose of determining the volume of such rooms or spaces.

Exception: The minimum volume requirement shall not apply where the amount of return air taken from a room or space is less than or equal to the amount of supply air delivered to such room or space.

5. A room or space containing a fuel-burning appliance or fireplace where such a room or space serves as a source of return air.

Exception: This shall not apply where:

1. The appliance is a direct-vent appliance or an appliance not requiring a vent in accordance with Section 501.8.

2. The room or space complies with the following requirements:

2.1. The return air shall be taken from a room or space having a volume exceeding 1 cubic foot for each 10 Btu/h (9.6 L/W) of combined input rating of all fuel-burning appliances therein.

2.2. The volume of supply air discharged back into the same space shall be approximately equal to the volume of return air taken from the space.

2.3. Return-air inlets shall not be located within 10 feet (3048 mm) of any appliance firebox or draft hood in the same room or space.

3. Rooms or spaces containing solid fuel-burning appliances, provided that return-air inlets are located not less than 10 feet (3048 mm) from the firebox of such appliances.

6. A closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or attic.

Exception: Where return air intakes are located not less than 10 feet (3048 mm) from cooking appliances and serve only the kitchen area, taking return air from a kitchen area shall not be prohibited.

7. A non-conditioned crawl space by means of direct connection to the return side of a forced air system.

618.9 Refrigeration coils in warm-air furnaces. When a cooling coil is located in the supply plenum of a warm-air furnace, the furnace blower shall be rated at not less than 0.5 inch water column (124 Pa) static pressure unless the furnace is listed and labeled for use with a cooling coil. Cooling coils shall not be located upstream from heat exchangers unless listed and labeled for such use. Conversion of existing furnaces for use with cooling coils shall be permitted provided the furnace will operate within the temperature rise specified for the furnace.

618.10 Return-air intake (nonengineered systems). If only one central return-air grille is installed, it shall be of proper size. The size shall be sufficient to return a

volume of air compatible with the CFM requirements and the temperature rise limitations specified by the equipment manufacturer. The face velocity of return air grilles shall not exceed 450 feet per minute (fpm) (2.3 m/s). At least one separate return shall be installed on each level of a multilevel structure. For split-level and split-foyer structures, one return may serve more than one level if located near the levels served and the total area of the levels does not exceed 1,600 square feet (148.6 m²). Return-air grilles shall not be located in bathrooms. The return air from one residential living unit shall not be mixed with the return air from other living units.

In dwellings with 1,600 square feet (148.6m²) or less of conditioned area, a central return is permitted. When the dwelling contains more than 1,600 square feet (148.6m²) of conditioned area, additional returns shall be provided. Each return shall serve not more than 1,600 square feet (148.6 m²) of area and shall be located in the area it serves. Return air may travel through the living space to the return-air intake if there are no restrictions, such as solid doors, to the air movement. When panned joists are used for return air, the structural integrity shall be maintained. Air capacity for joists 16 inches (406 mm) on center shall be a maximum of 375 cfm (0.177 m³/s) for 8-inch (203 mm) joists and 525 cfm (0.248 m³/s) for 10-inch (254 mm) joists. Wiring located in spaces used for return-air ducts shall comply with the *North Carolina Electrical Code*.

621.7 Unvented log heaters. An unvented log heater shall not be installed in a factory-built fireplace unless the fireplace system has been specifically tested, listed and labeled for such use in accordance with UL 127.

621.7.1 Ventless firebox enclosures. Ventless firebox enclosures used with unvented log heaters shall be listed as complying with ANSI Z21.91.

SECTION 634 (IFGS) CHIMNEY DAMPER OPENING AREA

634.1 Free opening area of chimney dampers. Deleted.

TABLE 634.1 FREE OPENING AREA OF CHIMNEY DAMPER FOR VENTING FLUE GASES FROM UNLISTED DECORATIVE APPLIANCES FOR INSTALLATION IN VENTED FIREPLACES Deleted