



FBC Advanced Residential Plumbing, Gas, and Mechanical For Builders

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Course Information

Training Provider:
 Florida Home Builders Association
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 CILB & BCAIB Provider # 0000916
 FBPE Provider # 0008653

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Outline

- Residential Plumbing Systems
- Residential Fuel Gas Systems
- Residential Mechanical Systems

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Pre-Inspection Checklist

- Make sure your permit card is properly posted.
- Verify that you have the proper addresses and permit numbers.
- Make sure all approved plans are on-site.
- Make sure all relevant paperwork is properly and completely filled out.
- Make sure all rejections are itemized, telling the location of the problem, and the relevant code. Notices should be left on the job site.
- Make sure all inspections are correctly signed for on the permit card and dated correctly.

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Residential Plumbing Underground Inspection

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Residential Plumbing Underground Inspection

P2503.7 Water-supply system testing. Upon completion of the water-supply system or a section of it, the system or portion completed shall be tested and proved tight under a water pressure of **not less than the working pressure** of the system or, for piping systems other than plastic, by an air test of not less than 50 psi (345 kPa). This pressure shall be held for not less than **15 minutes**. The water used for tests shall be obtained from a potable water source.



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P2503.5.1: Water test. Each section shall be filled with water to a point not less than **5 feet (1524 mm) above the highest fitting connection** in that section, or to the highest point in the completed system. Water shall be held in the section under test for a period of **15 minutes**. The system shall prove leak free by visual inspection.

Summary:

Check the sanitary drain and perform the water test as stated in P2503.5. The drainage waste and vent are required to have at least 5' of head pressure.



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P2605.1: Piping shall be **supported** to ensure alignment and prevent sagging, and allow movement associated with the expansion and contraction of the piping system. Piping **in the ground** shall be laid on a **firm bed for its entire length**, except where support is otherwise provided. Hangers and anchors shall be of sufficient strength to maintain their proportional share of the weight of pipe and contents and of sufficient width to prevent distortion to the pipe. Hangers and strapping shall be of *approved* material that will not promote galvanic action. Rigid support sway bracing shall be provided at changes in direction greater than 45 degrees for pipe sizes 4 inches and larger. Piping shall be supported at distances not to exceed those indicated in *Table P2605.1*.



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Summary:

Ensure all piping is properly supported. (P2605.1)



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Residential Plumbing Rough-in Inspection



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Residential Plumbing Rough-in Inspection

P2503.7 Water-supply system testing. Upon completion of the water-supply system or a section of it, the system or portion completed shall be tested and proved tight under a water pressure of not less than the **working pressure** of the system or, for piping systems other than plastic, by an air test of not less than 50 psi (345 kPa). This pressure shall be held for not less than **15 minutes**. The water used for tests shall be obtained from a potable water source.

Summary:

Perform the water piping PSI test as stated in P2503.7.



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Residential Plumbing Rough-in Inspection

P2605.1 General. Piping shall be supported in accordance with the following:
1. Piping shall be supported to ensure alignment and prevent sagging, and allow movement associated with the expansion and contraction of the piping system.

Summary:

Check for strapping, backing, supports, and stud guards.

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TABLE F000.1
PIPING SUPPORT

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (ft)	MAXIMUM VERTICAL SPACING (ft)
ABS pipe	4	10 ^a
Aluminum tubing	10	15
Cast iron pipe	15 ^b	15
Copper or copper alloy pipe	12	10
Copper or copper alloy tubing (1 1/2 inches in diameter and smaller)	4	10
Copper or copper alloy tubing (1 1/2 inches in diameter and larger)	10	10
Cross-linked polyethylene (PEX) pipe, 1 inch and smaller	2.67 (32 inches)	10 ^a
Cross-linked polyethylene (PEX) pipe, 1 1/2 inch and larger	4	10 ^a
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	2.67 (32 inches)	4 ^a
CPVC pipe or tubing (1 inch in diameter and smaller)	3	10 ^a
CPVC pipe or tubing (1 1/2 inches in diameter and larger)	4	10 ^a
Lead pipe	Continuous	4
PE pipe or tubing	2.67 (32 inches)	4
Polyethylene of raised temperature (PE-RT) pipe, 1 inch and smaller	2.67 (32 inches)	10 ^a
Polyethylene of raised temperature (PE-RT) pipe, 1 1/2 inch and larger	4	10 ^a
Polypropylene (PP) pipe or tubing (1 inch and smaller)	2.67 (32 inches)	10 ^a
Polypropylene (PP) pipe or tubing (1 1/2 inches and larger)	4	10 ^a
PPVC pipe	4	10 ^a
Stainless steel drainage systems	10	10 ^a
Steel pipe	12	15

For 30" x 36" x 12" or 30" x 36" x 8" mm.

a. The maximum horizontal spacing of cast iron pipe hangers shall be increased to 10 feet where 10-foot lengths of pipe are installed.

b. For sizes 2 inches and smaller, a girth shall be installed midway between required vertical supports. Such girths shall prevent pipe movement in a direction perpendicular to the axis of the pipe.

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P3103.1.1 Roof extension. Open vent pipes that extend through a roof shall be terminated not less than 6 inches (152 mm) above the roof or 6 inches (152 mm) above the anticipated snow accumulation, whichever is greater. Where a roof is to be used for assembly, as a promenade, observation deck or sunbathing deck or for similar purposes, open vent pipes shall terminate not less than 7 feet (2134 mm) above the roof.

Summary:

Check all venting, and ensure all vents are terminated through the roof.

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P2708.4: Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016/ ASMEA112.1016/ CSA B125.16. The high stop limit shall be set to limit the water temperature to not greater than 120° (49°C). In-line thermostatic valves shall not be used for compliance with this section.

Summary:

Make sure that the tub/shower pressure valves are balanced.



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P2910.7 Insect and Vermin Control: The system shall be protected to prevent the entrance of insects and vermin into storage tanks and piping systems.

Summary:

Inspect and vermin-proof underground traps.



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P2503.6 Shower Liner Test: Where shower floors and receptors are made water tight by the application of materials required by Section P2709.2, the completed liner installation shall be tested. The pipe from the shower drain shall be plugged water tight for the test. The floor and receptor area shall be filled with potable **water to a depth of not less than 2 inches (51 mm)** measured at the threshold. Where a threshold of not less than 2 inches (51 mm) in height does not exist, a temporary threshold shall be constructed to retain the test water in the lined floor or receptor area to a level not less than 2 inches (51 mm) in depth measured at the threshold. The water shall be retained for a test period of not less than **15 minutes** and there shall not be evidence of leakage.



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P2503.5.1 Rough Plumbing: DWV systems shall be tested on completion of the rough piping installation by water or, for piping systems other than plastic, by air, without evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough-in piping has been installed, as follows:

1. Water test. Each section shall be filled with water to a point not less than 5 feet (1524 mm) above the highest fitting connection in that section, or to the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.
2. Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa). This pressure shall be held without introduction of additional air for a period of 15 minutes.



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Summary:

Ensure that the drains, waste, and vents are properly tested. (P2503.6)



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P2902.4.3 Hose Connections: Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection shall be protected by an atmospheric-type or pressure-type vacuum breaker or a permanently attached hose connection vacuum breaker.

Not required for water heater drains and clothes washing machines

Summary:

Check water distribution system. Verify the shutoff is working. Verify the hose bib vacuum breaker works.



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P2804.1 Relief Valves Required: Appliances and equipment used for heating water or storing hot water shall be protected by one of the following:

1. A separate pressure-relief valve and a separate temperature-relief valve.
2. A combination pressure-and-temperature relief valve.

P2801.6.1 Pan Size and Drain: The pan shall be not less than 11/2 inches (38 mm) deep and shall be of sufficient size and shape to receive dripping or condensate from the tank or water heater. The pan shall be drained by an indirect waste pipe of not less than 3/4-inch (19 mm) diameter. Piping for safety pan drains shall be of those materials indicated in Table P2906.5. Where a pan drain was not previously installed, a pan drain shall not be required for a replacement water heater installation.

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Summary:

Ensure the water heater is properly installed. Make sure that the temperature and pressure relief valves are working properly. Check to see that the drain pan is the proper dimensions. Check to ensure that the thermal expansion device or tank is properly installed. Ensure the shutoff valve is operational. Make sure stands and bollards are properly installed.

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P3201.3 Trap setting and protection. Traps shall be set level with respect to their water seals and shall be protected from freezing. Trap seals shall be protected from siphonage, aspiration or back pressure by an approved system of venting.

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P2705.1 General: The installation of fixtures shall conform to the following:

1. Floor-outlet or floor-mounted fixtures shall be secured to the drainage connection and to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, copper alloy or other corrosion-resistant material.
2. Wall-hung fixtures shall be rigidly supported so that strain is not transmitted to the plumbing system.
3. Where fixtures come in contact with walls and floors, the contact area shall be watertight.
4. Plumbing fixtures shall be usable.

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Fixture Installation, Cont.

5. Water Closets, Lavatories and Bidets. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) center-to-center between adjacent fixtures. There shall be a clearance of not less than 21 inches (533 mm) in front of a water closet, lavatory or bidet to any wall, fixture or door.

6. The location of piping, fixtures or equipment shall not interfere with the operation of windows or doors.

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Fixture Installation, Cont.

7. In flood hazard areas as established by Table R301.2(1), plumbing fixtures shall be located or installed in accordance with Section R322.1.6.

8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.4.



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P2717.1 Protection of Water Supply: The water supply to a dishwasher shall be protected against backflow by an air gap complying with ASME A112.1.3 or A112.1.2 that is installed integrally within the machine or a backflow preventer in accordance with Section P2902.

Summary:

Make sure that all fixtures are properly installed. All fixtures must be of approved types. All fixtures must be correctly trapped. All fixtures must have individual shutoffs, except for the shower. All fixtures must be water tested, clean, level, and properly spaced. Ensure there is a proper air gap for the dishwasher drain connection.



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P2720.1 Access to Pump: Access shall be provided to circulation pumps in accordance with the fixture or pump manufacturer's installation instructions. Where the manufacturer's instructions do not specify the location and minimum size of field-fabricated access openings, an opening of not less than **12-inches by 12-inches** (305 mm by 305 mm) shall be installed for access to the circulation pump. Where pumps are located **more than 2 feet** (610 mm) from the access opening, an opening of not less than **18 inches by 18 inches** (457 mm by 457 mm) shall be installed. A door or panel shall be permitted to close the opening. The access opening shall be unobstructed and be of the size necessary to permit the removal and replacement of the circulation pump.



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Summary:

Ensure there is sufficient access to bathtub motors.



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P2903.5 Water hammer. The flow velocity of the water distribution system shall be controlled to reduce the possibility of water hammer. A water-hammer arrestor shall be installed where quick-closing valves are utilized. Water-hammer arrestors shall be installed in accordance with the manufacturer's instructions. Water-hammer arrestors shall conform to ASSE 1010.

Summary:

Make sure water hammer arrestors are properly installed and functional.



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P3005.2.6 Cleanout plugs. Cleanout plugs shall be copper alloy, plastic or other approved materials. Cleanout plugs for borosilicate glass piping systems shall be of borosilicate glass. Brass cleanout plugs shall conform to ASTM A74 and shall be limited for use only on metallic piping systems. Plastic cleanout plugs shall conform to the referenced standards for plastic pipe fittings as indicated in Table P3002.3. Cleanout plugs shall have a raised square head, a countersunk square head or a countersunk slot head. Where a cleanout plug will have a trim cover screw installed into the plug, the plug shall be manufactured with a blind end threaded hole for such purpose.



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Summary:
Make sure cleanout plugs are properly installed and functional.

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Ensure the sewer properly cleans out to a grade. (P3005.2)

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G2417.4.1 (406.4.1) Test Pressure: The test pressure to be used shall be not less than **1 1/2 times the proposed maximum working pressure**, but not less than 3 psig (20 kPa gauge), irrespective of design pressure. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe.

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Summary:

Perform the gas line test as presented in G2417.1. Check the PSI. Check for bonding. Check to make sure lines are properly sleeved if applicable.

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G2407.1 (304.1): Air for combustion, ventilation and dilution of flue gases for appliances installed in buildings shall be provided by application of one of the methods prescribed in Sections G2407.5 through G2407.9. Where the requirements of Section G2407.5 are not met, outdoor air shall be introduced in accordance with one of the methods prescribed in Sections G2407.6 through G2407.9. Direct-vent appliances, gas appliances of other than natural draft design, vented gas appliances not designated as Category I and appliances equipped with power burners, shall be provided with combustion, ventilation and dilution air in accordance with the appliance manufacturer's instructions.

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Summary:

Check for combustion air, if it is applicable.



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G2419.2 (408.2) Drips: Where wet gas exists, a drip shall be provided at any point in the line of pipe where condensate could collect. A drip shall also be provided at the outlet of the meter and shall be installed so as to constitute a trap wherein an accumulation of condensate will shut off the flow of gas before the condensate will run back into the meter.

G2419.4 (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.



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Summary:
Verify that there are shutoffs at appliance connections, and regulators where required. Also make sure sediment traps or drips are where they are required.



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M1306.1 Appliance Clearance: Appliances shall be installed with the clearances from unprotected combustible materials as indicated on the appliance label and in the manufacturer's installation instructions.



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Summary:
Verify that appliances have the correct clearances, and they are the correct distance from windows, overhangs, and fresh air intakes.



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Residential Gas Final Inspection

G2426.5 (502.5) Installation: Vent systems shall be sized, installed and terminated in accordance with the vent and appliance manufacturer's installation instructions and Section G2427.

Summary:

Verify all combustion air openings and vent terminations.



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Residential Gas Final Inspection

M1307.1 General: Installation of appliances shall conform to the conditions of their listing and label and the manufacturer's instructions. The manufacturer's operating and installation instructions shall remain attached to the appliance.

Summary:

Make sure appliances are installed to the manufacturer's instructions.



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Mechanical Rough-in Inspection



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Mechanical Rough-in Inspection

M1601.4.1 Joints, Seams and Connections: Joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes.

Summary:

Check duct work to make sure it is properly sealed. Ensure the flex connector collar is sealed to the duct properly.

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Mechanical Rough-in Inspection

- Check flex connector tabs to make sure they are properly installed.
- Check flex for the shortest route and see if there are any sharp bends or kinks.
- Check for any snags, holes, or tears in the ducts.

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Mechanical Rough-in Inspection

M1601.4.4 Support: Factory-made ducts listed in accordance with UL 181 shall be supported in accordance with the manufacturer's installation instructions.

Summary:

Ensure flex ducts are supported according to the manufacturer's instructions.

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Mechanical Rough-in Inspection

Make sure exposed ducts are framed in or protected from damage.

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M1502.5 Protection Required: Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct.

Summary:
Inspect the dryer duct protection.

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Mechanical Rough-in Inspection-Exhaust Ducts

TABLE M1506.2
DUCT LENGTH

DUCT TYPE	FLEX DUCT										SMOOTH-WALL DUCT													
	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300								
Fan airflow rating (CFM @ 0.25 inch wc ^a)																								
Diameter ^b (inches)																								
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X								
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X								
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X								
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9								
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54								
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133								

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Mechanical Rough-in Inspection

M1502.3 Duct Termination: Exhaust ducts shall terminate on the outside of the building.

Check the gooseneck on the exhaust duct to ensure that it is installed on the roof.

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Mechanical Final Inspection

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Mechanical Final Inspection

M1305.1.1 Furnaces and air handlers. Furnaces and air handlers within compartments or alcoves shall have a minimum working space clearance of 3 inches (76 mm) along the sides, back and top with a total width of the enclosing space being not less than 12 inches (305 mm) wider than the furnace or air handler.

Summary:

Make sure there is at least 3" of clear access on all sides of the air handler.

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Mechanical Final Inspection

Ensure filter access is unobstructed.

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Mechanical Final Inspection

Ensure the plenum is properly constructed and sealed to the unit.

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Mechanical Final Inspection

M1303.1 Label Information: A permanent factory-applied nameplate(s) shall be affixed to appliances on which shall appear, in legible lettering, the manufacturer's name or trademark, the model number, a serial number and the seal or mark of the testing agency.

Check units for the proper tonnage and KW. (M1303.1) Ensure the mechanical contractor marks the heater's size.

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Mechanical Final Inspection

M1411.3 Condensate disposal. Condensate from cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than 1/8 unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley or other areas where it would cause a nuisance.

Summary:

Check the condensate drain line termination.



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Mechanical Final Inspection

M1305.1.4.1 Ground clearance. Equipment and appliances supported from the ground shall be level and firmly supported on a concrete slab or other approved material extending not less than 3 inches (76 mm) above the adjoining ground.

Summary:

Make sure the condenser is properly installed. It must be secured to a pad at least 3" above grade level. (M1305.1.4.1)



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Mechanical Final Inspection

Check that the line set is protected from damage and UV.



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Ensure all rooms have grilles and outlets.

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Mechanical Final Inspection

Make sure all bathrooms have exhaust vents.

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Mechanical Final Inspection

M1503.1 General. Range hoods shall discharge to the outdoors through a duct. The duct serving the hood shall have a smooth interior surface, shall be air tight, shall be equipped with a back-draft damper and shall be independent of all other exhaust systems. Ducts serving range hoods shall not terminate in an attic or crawl space or areas inside the building.

Summary:

If the permit includes a range hood, check to make sure it is installed correctly. Ensure that it is sealed, terminates to the exterior, and the proper size according to the manufacturer.

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