

TABLE 15. ANCHOR SYSTEM MATERIALS SPECIFICATIONS

Component	Specification
Anchors	Anchors must be tested and listed to resist a minimum ultimate load of 4,725 lbs and a minimum allowable working load of 3,150 lbs or ultimate and corresponding working load limited by soil conditions and anchor length. The working load is the maximum load the designer can use. Ground anchors must be provided with protection against weather deterioration and corrosion at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 oz per sq ft of surface coated.
Straps	Straps must be minimum 1-1/4" x 0.035" zinc-coated (0.30 oz per sq ft) steel strapping conforming to ASTM D3953-97, Type 1, Grade 1, Finish B with a minimum allowable working load capacity of 3,150 lbs and a minimum ultimate load of 4,725 lbs. Slit or cut edges of zinc-coated strapping do not need to be zinc coated.
Stabilizer plates	The size and type of stabilizer plate, if required by the ground anchor manufacturer, will be specified in the anchor manufacturer's instructions. Stabilizer plates must be provided with protection against weather deterioration and corrosion at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 oz per sq ft of surface coated. Alternatively, ABS stabilizer plates may be used when listed and certified for such use.

1.

INSTALL STRAPS

Follow the instructions below to connect straps from the home to sidewall frame, end wall frame and vertical anchors.

Always protect straps at sharp corners including around I-beams with radius clips or other methods (**Figure 54**). Radius clips may be fabricated from 26ga (min) by 1 1/4-inch wide galvanized steel strap formed to fit around corners.



Grading area

around anchors. Anchor heads should not rest in sunken spots. Grade the ground so that water does not collect around anchor heads, but runs away from the anchor and out from under the home. Do not bury anchor heads.

Figure 51. *In-line anchor configuration*

Figure 52. *Stabilizer plate configuration*

Figure 53. *Determining anchor and stabilizer plate location*

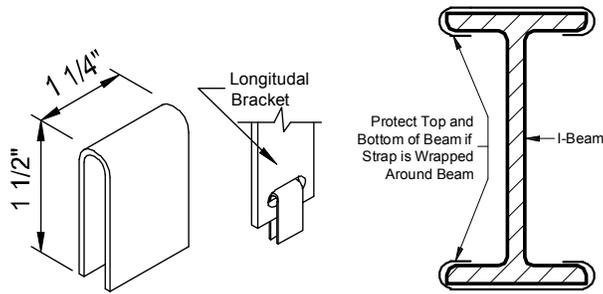


Soil depression.

Do not locate anchor heads in soil depressions where water may pool.



Figure 54. Radius clips



SPLICING STRAPS

Splicing may be required when a pre-cut strap is of insufficient length. Splices in tie-down straps are not permitted in a 'Y' configuration. Overlap straps by 12 inches, applying one splice clip from above and the other from below; use a crimping tool to tightly seal the splice clips (Figure 55). Do not run any portion of the splice through an anchor head bolt.

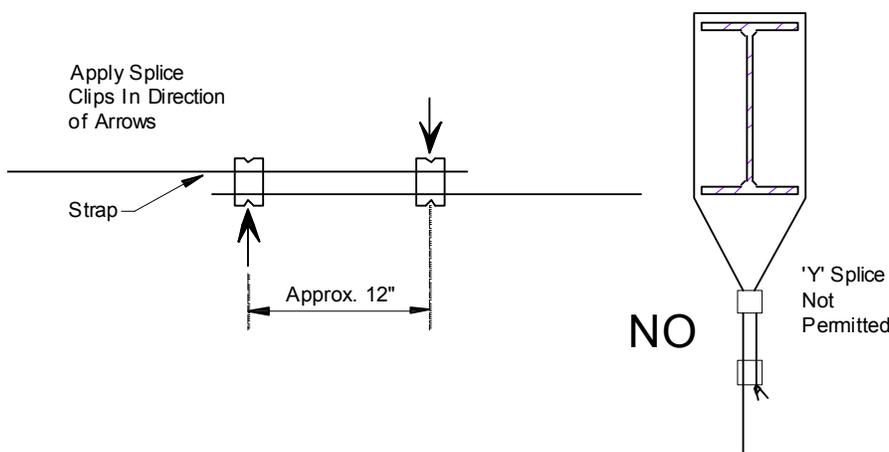
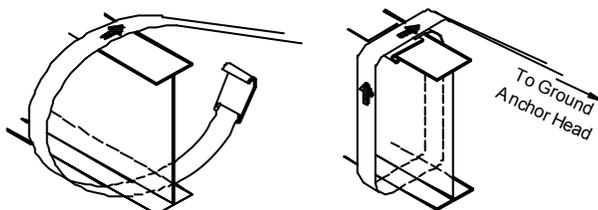


Figure 55. Tie-down strap splice

SIDEWALL FRAME ANCHORS

Install straps to sidewall frame anchors as follows:

1. **Connect strap to home.** Connect one end of the strap to the home connection point using approved buckles or clips (swivel or hook clip preferred).



- 1 Wrap strap around main beam
- 2 Connect hook to top of main beam and connect other end of strap to anchor head.

2. **Connect strap to anchor.** Connect the other end of the strap to the split bolt in the anchor. Leave enough strap length to be able to make at least three, but no more than five complete turns around the bolt before it becomes tight (approximately 2 1/2 inches per turn or 7 1/2 to 13 inches total). Fewer than three turns and the strap may not hold onto the bolt when force is applied.

Figure 56. Strap to beam connection

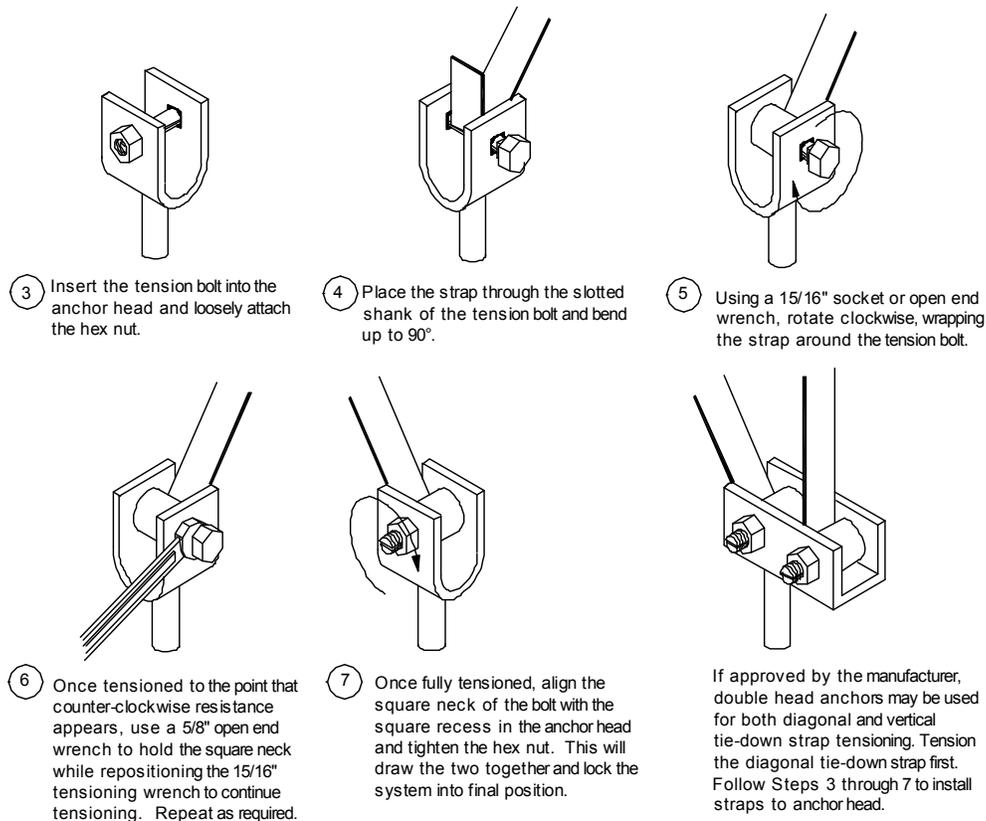


Strap to beam connection. Regardless of the strap supplier's recommendations, the strap must be connected to the top of the main beam to prevent damage to the structure.

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Conversely, more than five turns may not fit within the U-channel of the anchor head. Follow the procedure outlined in **Figure 57**.



3. **Pretension anchor.** For anchors with stabilizer plates, pretension the anchor by pulling it up to the stabilizer plate using the strap and take-up bolt to move the anchor head. Continue pulling the strap until the plate moves a small amount (about 1/2 inch). This is called packing the plate and it will yield the strongest resistance (the bottom of the anchor head should be maximum 1/4 inch above the top of the stabilizer plate).

END WALL FRAME ANCHORS

Attach straps to the bracket welded by the manufacturer to the frame (**Figure 58**). If no brackets have been installed, use approved beam clamps designed specifically for this purpose, available from anchor suppliers. Connect straps to anchors following same procedure as for sidewall frame anchors.

Figure 57. Procedure for connecting the strap to frame and anchor



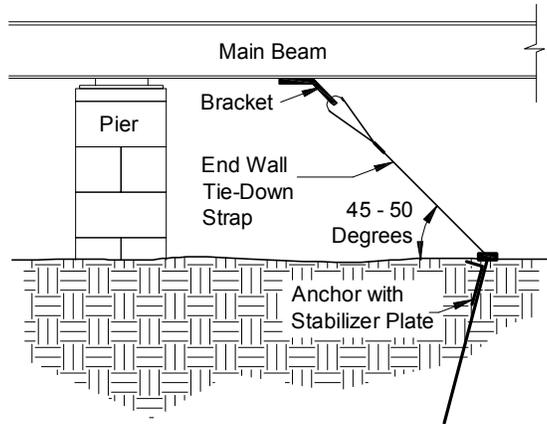
Anchor head location. As the anchor is pulled up to meet the stabilizer plate, the head of the anchor will rise. In its final position, the bottom of the anchor head should be no more than 1/4 inch above the top of the stabilizer plate.



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Figure 58. End wall frame anchor attachment method



VERTICAL ANCHORS

If vertical straps have been attached to the home by the manufacturer, connect the other end of the straps to the anchor heads. If not, install the strap from one head of a double-headed anchor, up through the brackets (if provided) (**Figure 59**) or around the I-beam (**Figure 60**) and down to the other anchor bolt in a continuous loop.

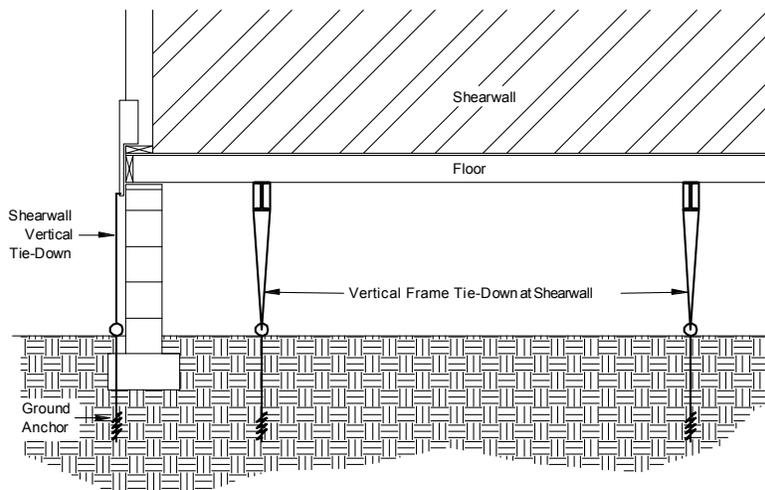


Figure 59. Vertical tie-downs

For marriage line vertical tie-downs where brackets have not been factory installed, install provided steel angles in straps as shown in **Figure 60**.



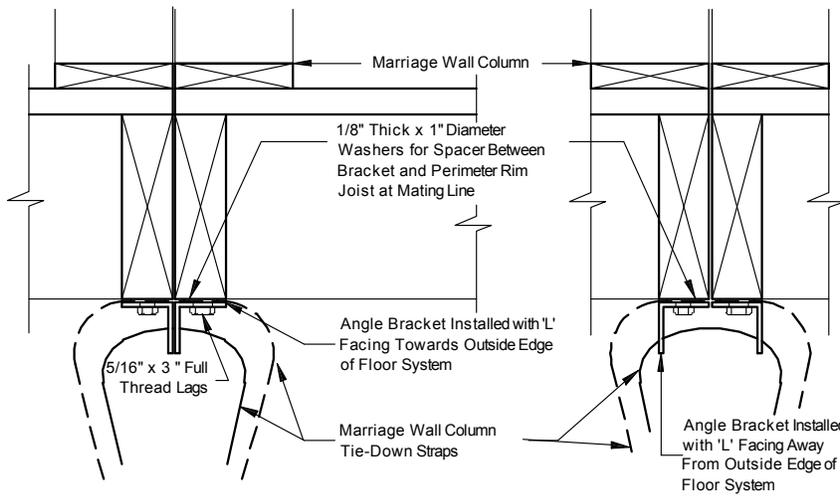


Figure 60. Marriage line tie-down connections using steel angles. Strap may run between steel angle and rim joist (shown as dashed line)

TIGHTEN AND ADJUST STRAPS

After all anchors have been installed and pre-tensioned, recheck all anchor straps to assure that they are tight and that the anchor shafts have remained in contact with the stabilizer plates. Do not over-tension straps.

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Connect Utilities

Relocation of homes: The installation process shall be reversed to make the home ready for transportation.

This chapter contains procedures and requirements for the connection and testing of utility hook-ups. Responsibility for making utility connections varies by location. Consult the LAHJ and the utility before connecting the home to any utilities.

Follow the Steps below:

- ▼ **STEP 1. CONNECT ELECTRICAL SERVICE** (p. 87)
- ▼ **STEP 2. CONNECT WATER SERVICE** (p. 90)
- ▼ **STEP 3. CONNECT GAS SERVICE** (p. 93)
- ▼ **STEP 4. CONNECT OIL SERVICE** (p. 94)

STEP 1. CONNECT ELECTRICAL SERVICE

The home is designed for connection to an electrical wiring system rated at 120/240 volt AC. All electrical field work must be done by a licensed electrician or other person approved by the LAHJ.

FEEDER WIRE AND EQUIPMENT SIZES

The current rating (in amperes) of the home can be found on the tag located on the outside next to the feeder or service entrance, and on the electrical distribution panel. Using this information, determine the required feeder wire size from **Table 16**. These sizes are based on an ambient temperature of 86 degrees Fahrenheit and do not take voltage drop into consideration.

Acceptable conductor types are: RHH, RHW, RHW-2, THHN, THHW, THW, THW2, THWN, THWN-2, XHHW, XHHW-2, SE, USE, and USE-2.

TABLE 16. ELECTRICAL FEEDER WIRE AND EQUIPMENT SIZES FOR COPPER CONDUCTORS

Main Breaker Size in Panel Box (AMPS)	Max. Neutral Feeder Load (AMPS)	Junction box size	Minimum Size Raceway Conduit Diameter (in)	Conductors (Cu)			
				Red & Black (Power)	White (Neutral)	Green (Grounding)	Bare Ground
50	35	NA	1	#4 AWG	#8 AWG	#10 AWG	#8
100	70	10x10x4	1-1/4	#4 AWG	#4 AWG	#8 AWG	#8
200	140	10x16x4	2	2/0 AWG	1/0 AWG	#6 AWG	#4
225	158	10x16x4	2	3/0 AWG	2/0 AWG	#4 AWG	#4
400	280	10x24x4	3	400 kcmil	300 kcmil	#3 AWG	1/0



Special precautions when installing electrical service. Installation of the electric power to the home can cause exposure to live electrical circuits. Exposure to live electrical circuits or improper grounding of the conductor in the panel board may result in severe shock or possible electrocution. A qualified installer must make the connections for the electric power.



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FEEDER CONNECTIONS

Feeder connections are made from above or from below the home as follows:

From above – mast weatherhead feeder

The routing, connection, and support of the service drop must meet local codes. Homes equipped this way contain all necessary conduits to the electrical distribution panel. However, the feeder conductors (not provided with the home) are installed on site. If the masthead is located above the roof overhang, allow a minimum clearance of eight feet above all roof points that the conductors pass over. There are two exceptions to this rule: (1) The vertical clearance may be reduced to three feet if the roof has a minimum slope of 4 in 12; and (2) The vertical clearance may be reduced to 18 inches if no more than four feet of service-drop conductors pass above the roof overhang, and if they terminate at a through-the-roof raceway or approved support. A minimum clearance must also be provided from the final grade to the service-drop conductors. This measurement may vary from 10 feet to 18 feet, depending on the types of traffic anticipated below the service drop (refer to the NEC). Unless impractical, locate service heads above the point of attachment of the service-drop conductors and make them rain-tight. If individual conductors do not extend downward, form drip loops.

From below – underside junction box feeder

A section of conduit is factory installed through the floor cavity. Connect to that conduit with approved fittings and conduit (not provided with the home) to the point where the service entrance cable enters the crawl space. Install properly-sized service entrance conductors from the main power supply to the panel board. Depending on the location of the main panelboard inside the home, or the point at which the service entrance conductors enter the crawl space, a separate service disconnect may be required. Refer to **Table 16** for the conductor and junction box requirements. The installer must provide the supply connection including the feeder conductors, junction box, and conduit connectors. Protect conductors emerging from the ground from a minimum of 18 inches below grade to eight feet above grade, or to the point of entrance to the home. The distance measured from the top surface of a buried cable, conduit, or raceway to the finished grade must meet the minimum burial requirements outlined in the NEC. Use a moisture-proof bushing at the end of the conduit from which the buried cable emerges.

GROUNDING

The home must be properly grounded to protect the occupants. The only safe and approved method of grounding the home is through an electrically-isolated grounding bar in the manufactured home distribution panel board. This grounds all non-current-carrying metal parts to the electrical system in the home at a single point.

Each neutral conductor must be connected to the system grounding conductor on the the supply side of the main disconnect in accordance with Articles 250.24, 250.26, and 250.28 of the National Electrical Code, NFPA No. 70-2005.

Where the meter base has a disconnect (typically when the meter is more than 6 feet from the service electric panel, although this may vary by LAHJ) the ground and neutral should be bonded at that disconnect and then grounded to the driven earth ground. Four wires will leave the service electric panel to the disconnect. Three wires will enter the disconnect from the meter base (refer to **Figure 61**).

Where there is no disconnect on the meter base or between the meter base and service electric panel (typically when the meter is within 6 feet from the service electric panel, although this may vary by LAHJ), the main circuit breaker in the service electric panel becomes the first disconnect. In this case, the neutral and ground are bonded in the service electric panel and connected to the driven earth ground from the service electric panel. Three wires lead between the meter base and the service electric panel (refer to **Figure 62**).



Power supply. A large enough power supply must be available at the site. An inadequate power supply may result in improper operation of and possible damage to motors and appliances. It may also increase electricity costs.



Grounding the electrical system. Do not provide electrical power until the grounding electrode is installed and connected. When the meter base is not on the house never use the neutral conductor of the feeder cable as a ground wire.



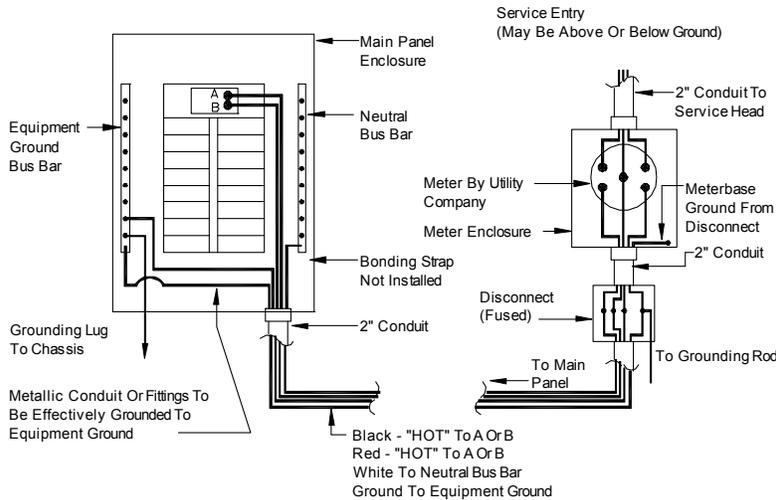


Figure 61. Electrical feeder connection when meter has a disconnect installed (typically more than 6 feet from service electric panel).

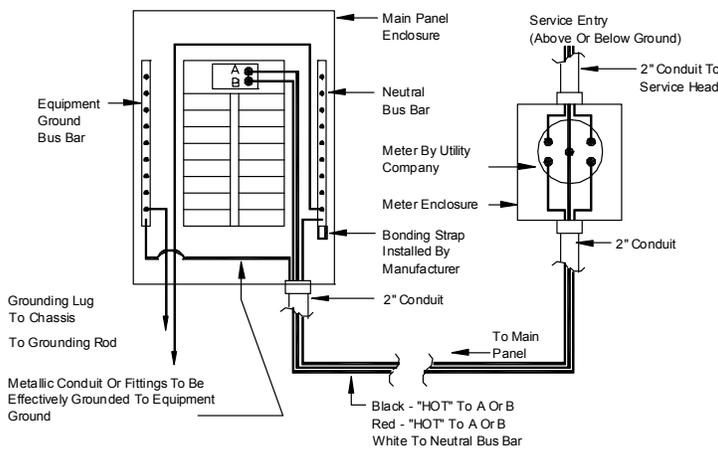


Figure 62. Meter base wiring when there is no separate disconnect installed (typically within 6 feet of service electric panel).

In all cases, a grounding electrode conductor and a ground wire must be installed according to the following specifications:

1. Grounding wire to be per **Table 16** provided by the manufacturer. If manufacturer provides a minimum 1/2 inch EMT or conduit raceway, the #6 minimum bare copper wire is provided by the retailer for installation.
2. The clamp connecting the grounding wire to the electrode shall be suitable for direct burial and located flush or below ground level.
3. Use a listed 5/8 inch diameter by eight foot long iron electrode or nonferrous rod of at least 1/2 inch diameter by eight feet long for grounding (larger sizes may be required by the LAHJ due to soil impedance).
4. Drive the electrode to a depth of not less than eight feet so that at least eight feet of the electrode is in contact with the soil.
5. When rock is encountered, the electrode may be driven at an angle not to exceed 45 degrees from vertical or buried in a trench that is at least 2-1/2 feet deep.

FIELD INSTALLED METER BASE

When a meter base is installed in the field, **Figure 63** and the following requirements must be adhered to:



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- Install the meter base according to the manufacturer's instructions.
- Use straps to support any conduit. Do not use the meter base equipment for support.
- Use exterior equipment and enclosures listed as weatherproof and entrance conductors listed for wet locations.
- The grounding bar may be installed separate from the neutral bar for purposes of testing the electrical system.
- The grounding bar may be isolated during the electrical check and re-attached, after the tests are completed.
- Check with the local electrical utility to verify meter base requirements and locations and distances for the main panel and meter box.
- The field installed meter base enclosure must be installed in accordance with its listing. Fasten securely to exterior wall studs and provide for a weather-tight seal.
- Check the local code for any requirements regarding the location of the meter base.

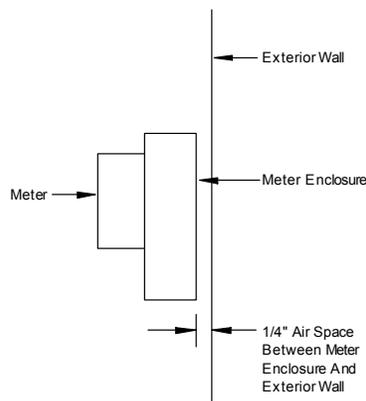


Figure 63. Meter base clearances.

STEP 2. CONNECT WATER SERVICE

CONNECTION

To connect the home's water system to the water source, identify the water inlet located under the home (usually below the water heater compartment or utility room) and follow the procedure described below (refer to **Figure 64**):

1. **Flush pipe.** Flush field-installed water piping free of all debris prior to connection to the home's water inlet.
2. **Clean threads.** Ensure that pipe threads are clean.
3. **Install pressure-reducing valve.** If the local water supply exceeds 80 psi install a pressure-reducing valve.
4. **Connect valve.** Install a main shut-off valve between the water supply and the inlet on the home. Locate the riser for the shutoff valve underneath or adjacent to the home. Select a full flow gate or ball shutoff valve, or equivalent valve. To prevent the possibility of fresh water contamination install an anti-siphon valve on all field installed exterior faucets.



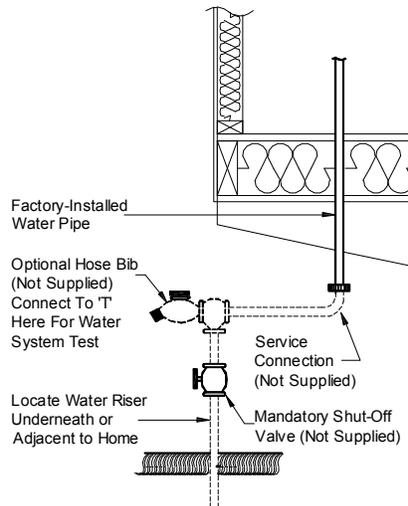
Selecting heat tape. Use only pipe-heating cable (tape) listed for manufactured homes, and install it in accordance with the cable (tape) manufacturer installation instructions.

Maximum water pressure. The water system for the home was designed for a maximum inlet pressure of 80 psi.



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Figure 64. Water system connection



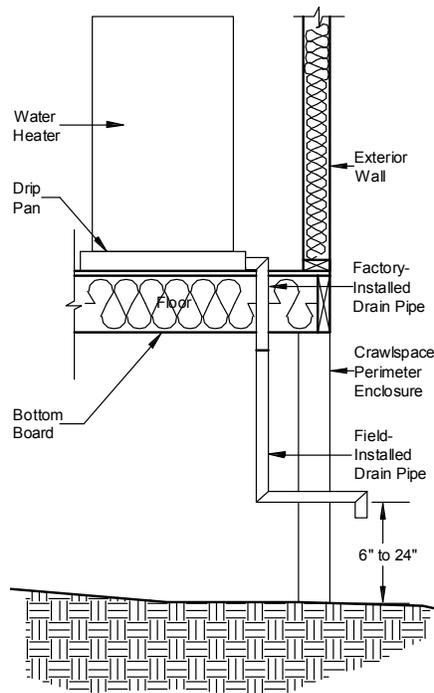
- 5. Install water heater discharge drain.** Inspect the drain opening on the water heater to ensure that it is clear of any obstruction. If the home is to be installed on a basement or enclosed crawlspace, install drain pipe connecting the discharge from the water heater temperature and pressure relief valve to the outside or to a sump.
- 6. Install water heater drip pan drain.** Assure that the drain for the water heater drip pan does not terminate under the home. Using the materials provided and the accompanying instructions run a drain line from the water heater drip pan through the wall or floor to the exterior of the crawl space. Terminate the line between six and 24 inches above grade. (Figure 65). Make the termination point rodent proof.



Using check valves.

Install a check valve on the water inlet to prevent water system drainage in the event of a loss of water pressure from the source. Such pressure loss could cause the water heater to drain, exposing the heating elements of electric water heaters causing them to fail.

Figure 65. Water heater drip pan and drain



7. **Insulate.** In areas subject to freezing temperatures, protect with insulation or heat tape pipes, valves and pressure reducers that are exposed to the outdoors; and pipes in water heater compartments with non-insulated doors. Connect heat tape to the electrical outlet under the home near the water supply inlet.

TESTING

After testing the electrical system and connecting the water lines check the water system for leaks using one of the procedures described below. Before testing, close all water faucets, spigots, and toilet-tank float valves.

Hydrostatic (preferred):

1. **Bypass water heater.** Bypass the hot water heater by disconnecting the hot outlet and cold inlet water lines from the water heater and joining them together. This will protect the hot water tank from damage and protect those involved in the test from possible injury.
2. **Fill water heater.** Confirm that the water heater tank is full of water.
3. **Pressurize system.** Connect a hydrostatic pump, valve, and gauge to the location shown in **Figure 64**. Pressurize the system with water at 100 psi, and then isolate it from the pressure source. Bleed all air from the highest and farthest points in the system.
4. **Hold pressure.** Monitor the pressure for at least 15 minutes.
5. **Fix leaks.** If the pressure drops below 100 psi, locate and correct any leaks by cutting out and discarding bad pipe sections or joints and installing new pipe or joints with couplings.
6. **Repeat.** Repeat the test until all leaks have been eliminated.

Pneumatic:

1. **Bypass water heater.** Bypass the hot water heater by disconnecting the hot outlet and cold inlet water lines from the water heater and joining them together. This will protect the hot water tank from damage and protect those involved in the test from possible injury.
2. **Pressurize system.** Connect an air pump and pressure gauge to the water inlet, pressurize the system to 100 psi and isolate the pressure source from the system.
3. **Hold pressure.** Monitor the pressure for least 15 minutes. If the pressure drops below 100 psi, locate any leaks by applying soapy water to the connections and looking for bubbles.
4. **Fix leaks.** Correct any leaks by cutting out and discarding bad pipe sections or joints and installing new pipe or joints with couplings.
5. **Retest.** Repeat the procedure until all leaks have been eliminated.
6. **Restore connections.** Reconnect the water heater and the water supply.

FREEZE PROTECTION FOR UNOCCUPIED HOMES

If the home is to be left unheated in cold weather, protect water lines from freezing as follows:

1. **Disconnect supply.** Turn off the water supply and disconnect the water supply inlet.
2. **Drain water heater.** Turn off the water heater; if necessary, attach a hose to the valve to direct water away from under the home, open the drain valve and drain the tank completely.
3. **Drain faucets.** Open all faucets throughout the home (including the laundry area if plumbed, and any exterior faucets) and let them drain completely.
4. **Drain toilets.** Flush toilets and drain water tanks completely.
5. **Close faucets.** Close all water faucets with the exception of one.
6. **Connect compressor.** Connect a maximum of 30 psi air supply to the water inlet connection using a low pressure compressor.



Selecting heat tape. Use only pipe-heating cable (tape) listed for manufactured homes, and install it in accordance with the cable (tape) manufacturer installation instructions.

Testing water lines. Only use pneumatic (air) testing when hydrostatic testing is not practical. Air under pressure is explosive. Exercise extreme caution and notify all site personnel of the test. Wear protective eyewear and take precautions to prevent impact damage to the system while the test is in progress. Do not pneumatically test CPVC systems. Pneumatically test Flow Guard Gold systems only at low pressure levels (20 psi or less).

Pressurizing water lines.

When pressurizing the water system, connect the pump to a location above a closed shut-off valve so as not to introduce pressure into the municipal water supply.



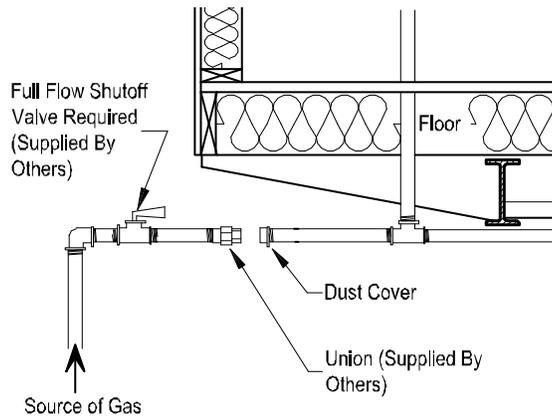
7. **Open faucets.** With the air supply on the system, open one faucet at a time throughout the home.
8. **Disconnect compressor.** After the entire system has been drained of all water, disconnect the air supply and close the water inlet valve.
9. **Pour anti-freeze.** Pour an antifreeze solution into all drain traps, including sinks, tubs, and toilets. Be sure that the antifreeze is safe for the fixtures and P-traps.

STEP 3. CONNECT GAS SERVICE

CONNECTION

If the home uses natural or liquid petroleum gas (LPG, also known as propane) for water or space heating, cooking or other appliances, follow the procedure described below:

1. **Inspect vents.** Assure that all exhaust vents on gas-fired equipment are securely connected and that roof jacks and stacks have not come loose during transit and they are properly installed.
2. **Review appliance instructions.** Review each appliance manufacturer's instructions before the home is connected to the gas supply. Most gas appliances are typically configured to operate on natural gas. If the gas supply will be LPG, consult the appliance manufacturer's instructions to determine what changes need to be made. For homes located above 3,000 feet, appliances may require a different orifice.
3. **Remove cap.** Remove the protective cap from home inlet pipe and install a full flow shut-off valve at the supply inlet (**Figure 66**).
4. **Install regulator.** The gas piping system is designed for a pressure that is at least seven inches of water column (4 oz. per sq in or 0.25 psi) but not more than 14 inches of water column (8 oz. per sq in or 0.5 psi). If gas from any supply source exceeds, or could exceed this pressure, install a regulator if required by the LAHJ.
5. **Connect supply.** Using matching threaded fittings, connect the gas supply to the inlet side of the shut-off valve.
6. **Close valves.** Close all valves at appliances prior to opening the main supply valve.



Installing gas lines. Only qualified professionals may connect and test gas service.

Figure 66. Gas service connection

TESTING

Test the gas piping system in the following two ways: 1) piping only and 2) entire system. Consult with the LAHJ for any additional testing or start-up requirements.

Before testing is begun, the temperature of the ambient air and the piping should be approximately the same. Conduct the tests when and where air temperatures will remain constant.



Fill gas water heaters. Before lighting the pilot on a gas powered water heater, fill the tank with water.

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Piping only test (all appliances isolated)

1. **Isolate appliances.** Isolate all appliances from the system by closing all appliance shut-off valves.
2. **Attach gauge.** Attach to the home's gas inlet a mercury manometer or slope gauge calibrated in increments of not more than 1/10 lb.
3. **Pressurize system.** Using an air compressor, pressurize the system with compressed air to three psi and isolate the pressure source from the system.
4. **Monitor pressure.** Monitor the pressure for at least 10 minutes.
5. **Check for leaks.** If pressure drops below three psi, check for leaks by applying a non-corrosive, ammonia-free gas leak detection fluid to the joints at all valves, appliance connections, and crossover connections (do not use dish washing detergents, soap, or other household chemicals). If bubbles form, tighten the connection and recheck.
6. **Repair leaks.** If leaks persist, replace defective pipes or fittings with sound material and retest.
7. **Release pressure.** Release pressure and open all appliance shut-off valves.
8. **Rinse connections.** Thoroughly rinse all tested connections with water to remove leak detection fluid.

Entire system test (with appliances)

1. **Close appliances.** Close all gas equipment controls and pilot light valves according to the individual gas equipment manufacturer's instructions.
2. **Open valves.** Assure that gas shut-off valves for all gas equipment are in the open position.
3. **Attach gauge.** Attach to the home's gas inlet a pressure gauge calibrated in ounces.
4. **Pressurize system.** Pressurize the system with compressed air to six to eight ounces (3/8 to 1/2 psi, or 10 to 14 inches of water column).
5. **Check for leaks.** Check for leaks as described above in step 4 of the Piping only test. Replace defective pipes or fittings with sound material and re-test.
6. **Rinse connections.** Thoroughly rinse all tested connections with water to remove leak detection fluid.

GAS APPLIANCE START-UP

Open the shut-off valve for each appliance and adjust the burners according to the appliance manufacturer's instructions. Verify that the furnace and water heater thermostats are operating properly and set them to the desired temperatures.

STEP 4. CONNECT OIL SERVICE

Homes that are equipped with oil burning furnaces must have oil supply piping installed and tested on site by a qualified professional in accordance with NFPA 31, Standard for the Installation of Oil Burning Equipment, 2001 or the requirements of the LAHJ, whichever is more stringent. The home manufacturer does not supply oil piping or tanks.

OIL CONNECTION

Consult the furnace manufacturer's instructions for proper pipe-sizing and installation procedures. Where piping is run through the bottom of the home, ensure all holes in the bottom board are sealed tight with foam, mastic, and/or tape specially made for that purpose and made rodent proof.

When equipping the home with an oil storage tank, comply with the following:

- Install the pipe with a gradual slope toward the fill end or drain plug (if so equipped) to facilitate pumping or draining of water and sludge.
- Provide a readily accessible approved manual shut-off valve at the outlet, installed to close against the supply.
- Equip the tank with an approved oil filter or strainer located downstream from

Failure to do so could damage the water heater.



Testing oil tanks. All oil storage tank and piping installations and tests must meet all applicable local regulations and should be made only by experienced, qualified personnel.



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the tank shut-off valve. Use a filter or strainer containing a sump with a drain to trap water.

- Equip under ground tanks with a filler neck extending one foot above grade and a minimum 1-1/4 inch diameter vent pipe extending at least two feet above grade.
- Locate the tank to be accessible for service and inspection, and safe from fire and other hazards.
- If the tank is located inside a compartment of the home, provide ventilation at the bottom of the compartment to permit diffusion of vapors. If the tank is fixed to the home, provide for filling and draining from the outside.
- Insulate interior tanks from the structural members of the home. Provide tanks so installed with an outside fill and vent pipe and an approved liquid level gauge.
- Install tanks that feed vaporizing type oil furnaces so that oil flows by gravity. To achieve efficient gravity flow, make sure that the bottom of the tank is at least 18 inches above the furnace oil control level.
- Tanks for gun type oil furnaces (these furnaces include a fuel pump) may be installed above or below ground.

OIL SYSTEM TESTING

Before operating the system, fill the tank to capacity with the fuel to be burned and visually check all joints in the system for leakage. Replace (do not repair) parts that leak.

▶ go to **Prepare Appliances and Equipment** (p. 96)



Prepare Appliances and Equipment

This chapter provides instructions for installing and/or preparing appliances and other equipment. While the items below can be completed in any order, the last item, **CONDUCT ELECTRICAL TEST**, must be done last.

Follow the Steps below:

- ▼ **INSTALL AIR CONDITIONER OR HEAT PUMP** (p. 96)
- ▼ **PREPARE HEATING SYSTEM** (p. 97)
- ▼ Install Remote Heating and Cooling **EQUIPMENT** (p. 97)
- ▼ **PREPARE VENTILATION SYSTEM** (p. 98)
- ▼ **PREPARE FUEL-BURNING WATER HEATER** (p. 99)
- ▼ **PREPARE CLOTHES DRYER** (p. 99)
- ▼ **PREPARE SMOKE ALARMS** (p. 100)
- ▼ **PREPARE FIREPLACES** (p. 100)
- ▼ **PREPARE KITCHEN AND BATH APPLIANCES / FIXTURES** (p. 102)
- ▼ **INSTALL EXTERIOR LIGHTING** (p. 103)
- ▼ **INSTALL CEILING FANS AND LIGHTING** (p. 103)
- ▼ **TEST ELECTRICAL SYSTEM** (p. 104)

INSTALL AIR CONDITIONER OR HEAT PUMP (if applicable)

CENTRAL UNITS

Install split system or unitary central air conditioners and/or heat pumps as follows:

1. **Check suitability.** Check the home's Comfort Cooling Certificate (may be included with the data plate) to confirm that the home is suitable for installation of central air. If so, note the air distribution system's rated duct capacity (BTU/hr), any equipment sizing guidance provided by the manufacturer and information provided to calculate the home's heat gain.
2. **Select equipment.** Select equipment with a rated heating capacity (BTU/hr) not exceeding the maximum indicated on the home's data plate and a rated cooling capacity sized in accordance with Chapter 28 of the 1997 ASHRAE Handbook of Fundamentals or ACCA Manual J, Residential Cooling Load, 8th edition. Information needed to calculate the home's heat gain can be found on the home's comfort cooling certificate. Choose equipment with a minimum circuit amperage (found on the equipment rating plate) no greater than the branch circuit rating of the exterior air conditioning receptacle (indicated on the adjacent tag), if present.
3. **Install A-coil.** When installing a cooling A-coil in a down-flow furnace that incorporates a fresh air intake duct, position the duct in the furnace cavity according to the furnace manufacturer's instructions (**Figure 67**). For electric down-flow furnaces, trim the ventilation duct as needed to allow installation of the A-coil and secure the duct to the wall of the compartment or to the top of



Use listed appliances. All applicable appliances must be listed or certified by a nationally recognized testing agency for the application for which the unit is intended and installed in accordance with the terms of its listing or certification.

Properly sizing equipment. Oversized cooling equipment can lower energy efficiency, reduce comfort, shorten equipment life, and may cause moisture problems in the home (including potentially damaging the home's structure). Sizing guidance



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the A-coil. Do not restrict the flex duct opening; allow the duct insulation to contact the A-coil, or allow the duct to become kinked, restricted, or configured to form a trap.

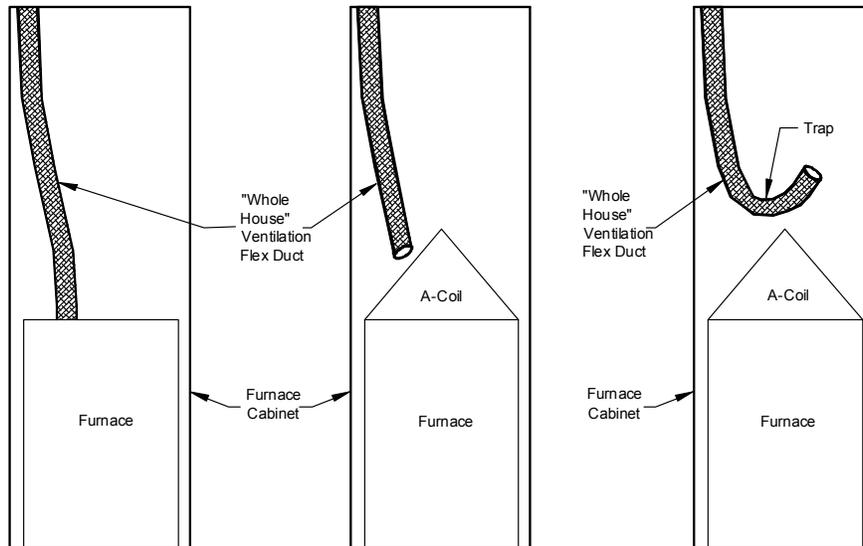


Figure 67. Whole house ventilation flex duct in an electric down-flow furnace. From left to right: as prepared in the factory; proper installation with A-coil; improper installation with A-coil



Selecting A-coils. Use only A-coil units compatible and listed for use with the furnace in the home and installed in accordance with the furnace manufacturer's instructions.

PREPARE HEATING SYSTEM

If the home does not contain a factory installed heating appliance, install a remote heating appliance according to **INSTALL REMOTE HEATING AND COOLING EQUIPMENT**, p. 97. Prepare fuel-burning heating systems included with the home as follows:

1. **Inspect for damage.** Inspect the furnace and report any damage to the home manufacturer.
2. **High altitude.** If the home is located more than 2,000 feet above sea level or as indicated in the furnace manufacturer's instructions, derate gas furnaces 4% for each 1,000 feet above sea level. This work must be done by a qualified (and in some jurisdictions, licensed) technician.
3. **Convert for LPG gas.** If LPG gas (propane) will be used, convert the appliance from natural gas to LPG gas use. Conversion must be made by a qualified and (if required by the LAHJ) licensed technician.
4. **Install intake air pipe.** Consult the appliance manufacturer's instructions for maximum allowable pipe run length, requirements for air dampers, locations relative to expected snow levels (check with the LAHJ for expected snow levels), acceptable materials, pipe supports, and pipe termination requirements.
5. **Install flue.** For combustion appliances, install the flue roof cap and stack assembly as described in **PREPARE FIREPLACES, Chimneys** (p. 100).

INSTALL REMOTE HEATING AND COOLING EQUIPMENT

Install remote units in compliance with all heating and cooling equipment requirements in this chapter above and the following:

1. **Locate connections to the home.** Find the manufacturer-installed connectors, labels, or tags under the home indicating the required connection points for supply and return air. If connectors are not provided nor location indicated, select a supply duct location such that there are approximately equal numbers of supply registers forward and rear of the connection point. Locate the return duct in the center of the home.

Installing flue stacks with a hinged roof. If flue stack components are installed above the finish roof line (as is often the case with hinged roofs), an Alternative Construction letter is normally required along with a follow-up inspection. Contact the factory for guidance.

Venting appliances to the outside. Vent to the exterior of the home all combustion appliances except ranges and ovens.

Selecting ducts. Exterior ductwork for remote units must be provided by the installer or HVAC contractor. Ducts must be approved for exterior installation and should be wrapped with insulation of at least R-4 under a vapor barrier with a perm rating of not greater than one. (For ENERGY STAR homes, the R-value must be at least that specified on the manufacturer's ENERGY STAR Site Installation Checklist.)

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2. **Install ducts.** Install the appropriate supply and return ducts (not provided) between the remote unit and the home (**Figure 69**), making connections according to the instructions for crossover ducts in **Crossover Connections** (p. 59).
3. **Install dampers.** If installing a remote cooling unit in a home with a factory installed furnace, install dampers between the furnace and the home's air duct system, and between the remote unit and the home's air duct system to prevent warm air in heating mode from escaping to the remote cooling unit and vice versa.

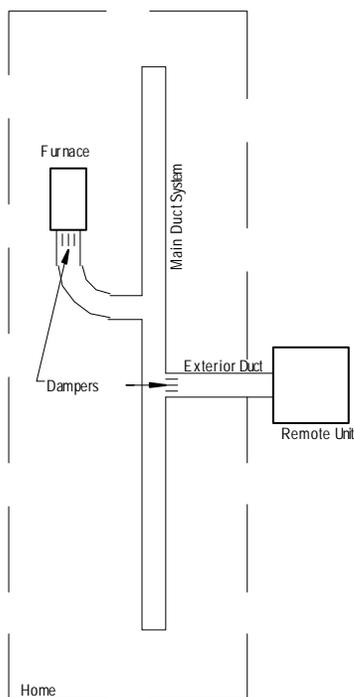


Figure 68. Remote unit damper locations

4. **Connect wiring.** Install a thermostat containing a fan switch. Connect utilities in accordance with all manufacturer's instructions and local codes.
5. **Seal penetrations.** Repair or replace all floor insulation disturbed during the duct installation and seal holes in the bottom board using foam, mastic, or tape specially made for that purpose.

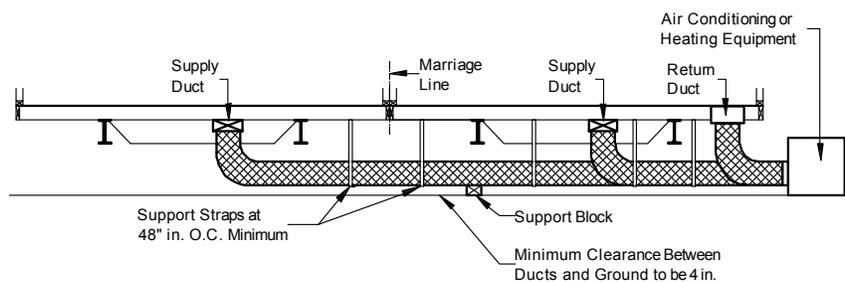


Figure 69. Ducts connecting exterior heating and/or cooling equipment to the home

PREPARE VENTILATION SYSTEM

Prepare the whole-house ventilation system according to the ventilation system manufacturer's instructions. Confirm that any fresh air intake ducts extend to the exterior and do not draw air from the crawlspace under the home. Do not allow any fresh air ventilation intake ducts to become kinked or restricted, forming a trap (**Figure 69**).



Choosing pipe lengths.

The appliance manufacturer



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PREPARE FUEL-BURNING WATER HEATER

The water heater discharge and drip pan drains should have been installed in **Connect Utilities** (p. 87).

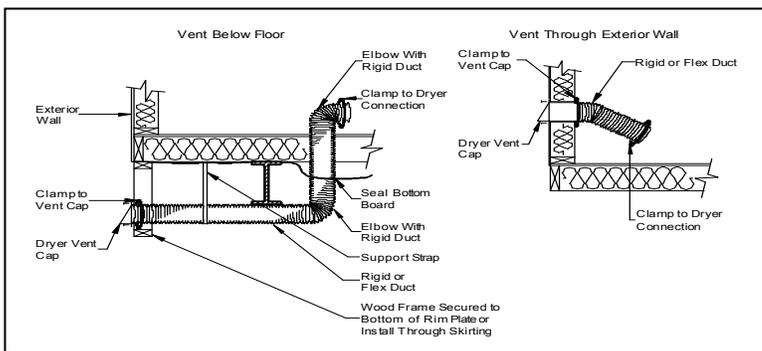
In homes with direct-vent water heaters (that utilize gas, oil, or other combustion fuel), and where the water heater is not independently vented to the exterior through a grilled opening, provide combustion air from under the floor using pipe and cement acceptable to the appliance manufacturer or through the roof via a double-walled flue pipe. If provided through the floor, run the air piping to the exterior of the home, with supports spaced every 3-1/2 feet o.c. or less. Terminate the pipe facing downward a minimum of 12 inches above the ground surface and provide a screen on the pipe vent cap.

PREPARE CLOTHES DRYER

DRYER VENTS

If the home includes a clothes dryer, the components for ventilating the dryer are included with the home (but not necessarily installed) and a vent opening has been roughed in either in the wall or floor. (If a dryer is not installed, seal all dryer vent openings).

Run the dryer vent to the outside through the exterior wall or through the floor to a point beyond the perimeter of the home, using materials approved by the clothes dryer manufacturer (see **Figure 70**).



Manufacturer's exhaust hood or equivalent shall be above snow level.

Install the vent as follows:

1. **Remove temporary caps.** Remove any temporary seals and duct caps from the vent rough openings.
2. **Install ductwork.** Install ductwork using clamps (do not use screws or other fasteners that penetrate into the duct) and support the duct with metal straps connected to the floor joists or chassis at two feet o.c. or less. Ensure duct connections are internally overlapped to prevent inhibiting the flow of air and thereby causing lint accumulation.
3. **Install cap and damper.** Install an approved dryer vent cap with damper on the exterior termination of the duct. If the vent terminates at skirting, secure the cap to framing or skirting with sheet metal screws and seal edges with caulk or sealant. If the vent terminates through a wall, apply a bead of sealant to the back of the cap around the opening and secure with sheet metal screws to metal, hardboard or fiber cement siding or with wood screws to a mount block for vinyl siding.
4. **Seal opening.** Seal openings inside and outside of the home including at the floor, interior walls, siding and skirting (with caulk), and at the bottom board using foam, mastic and/or tape specially made for that purpose.

GAS DRYERS

If the home was not fitted for a gas dryer, installing one requires substantial alteration to the home. Gas supply piping and adequate venting must be provided as specified by

designate the length of the pipe run based on the pipe diameter and the number of turns in the pipe run.

Venting exhaust systems.

Exhaust vents must extend to the home's exterior through skirting. Termination of the dryer exhaust underneath the home can cause condensation and moisture damage to the home. Lint and dust accumulation can ignite, causing a fire. The exhaust system must not contain reverse slope.

Figure 70. Clothes dryer ventilation ductwork through floor (left) or exterior wall (right)



Avoid damaging structural elements. Do not cut or otherwise damage structural elements such as floor joists or wall studs for the installation of the dryer exhaust system.

Gas. Ventilation components that may be included with the home for an electric dryer may not be acceptable for gas dryers. Consult the gas dryer manufacturer instructions.



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the dryer manufacturer and installed by a trained professional. Do not cut major structural elements to accommodate a gas dryer.

PREPARE SMOKE ALARMS

The home has several factory installed smoke alarms that are wired to a 120-volt circuit. If the home was designed for placement on a basement, an additional alarm is provided for installation at a pre-wired location under the home. Connect the basement smoke alarm and test all alarms as follows:

1. **Check circuit.** Ensure that electrical power to the home is activated and that the smoke alarm circuit is on.
2. **Remove batteries.** Make sure backup batteries (if any) are removed from all smoke alarms.
3. **Test alarms.** Press the test button on each alarm sequentially. All alarms should sound simultaneously when the test button on any one smoke alarm is pressed. Replace (with the same brand as those installed elsewhere in the home) any alarms that do not sound and retest.
4. **Replace batteries.** After successful test, replace the backup batteries, discarding the protective tabs.

300.100

PREPARE FIREPLACES

Install chimneys, chimney flashing and roofing, fireplace combustion air inlets, and hearths according to the manufacturer's instructions and the procedures described below.

CHIMNEYS

Fireplace and wood stoves may require on-site installation of additional sections of approved chimney pipe, a spark arrestor, and a rain cap assembly. Follow the manufacturer's instructions and the procedures described below:

1. **Remove coverings.** Remove protective materials covering the roof flashing and any foreign material from the installed part of the chimney.
2. **Install chimney pipe.** Assemble and seal the chimney per the fireplace or wood stove manufacturer's installation instructions and if there is a conflict between the instructions and the figure, follow the instructions. To assure sufficient draft for proper operation, extend the chimney at least three feet above the highest point where it penetrates the roof and at least two feet higher than any surface within 10 feet of the chimney (**Figure 72**). Use additional section(s) of chimney pipe (not provided) if required by local code or if the site has obstructions within 10 feet of the chimney.

Keep ductwork straight and smooth as possible without excess slack. Slope it slightly downward towards the exterior to facilitate moisture drainage.



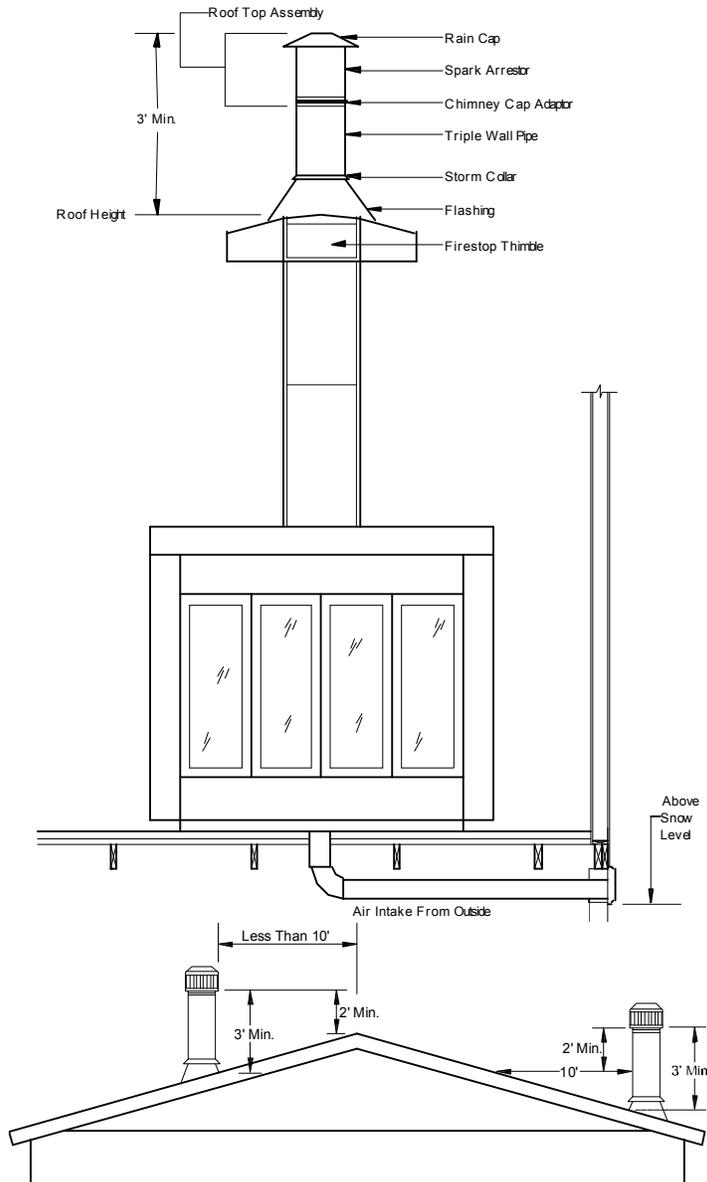


Figure 71. Chimney and combustion air intake duct installation



Selecting the appropriate flue. Wood fireplaces use larger diameter flues than gas fireplaces. Make sure flue matches the appliance type. Gas fireplaces cannot burn wood because the flue is too small and smoke will back up into the home. If wood fireplaces are converted to gas the flue will be too large resulting in excessive heat loss through the chimney.

Figure 72. Chimney clearance

3. **Install shingles.** Install shingles up to the edge of the flue cut-out in the roof deck. Secure shingles installed under the roof flashing with asphalt cement.
4. **Install flashing.** Place flashing over pipe section and shingles and set in asphalt cement. Secure flashing to roof deck at top two corners with roofing nails.
5. **Complete shingles.** Cut shingles in successive courses to fit around the pipe and embed them in asphalt cement where they overlap the flashing. Secure shingles with roofing nails through flashing and apply asphalt cement over nail heads. The completed installation should appear as shown in **Figure 73**, with the lower part of the flange overlapping the lower shingles and the side and upper shingles overlapping the flange.

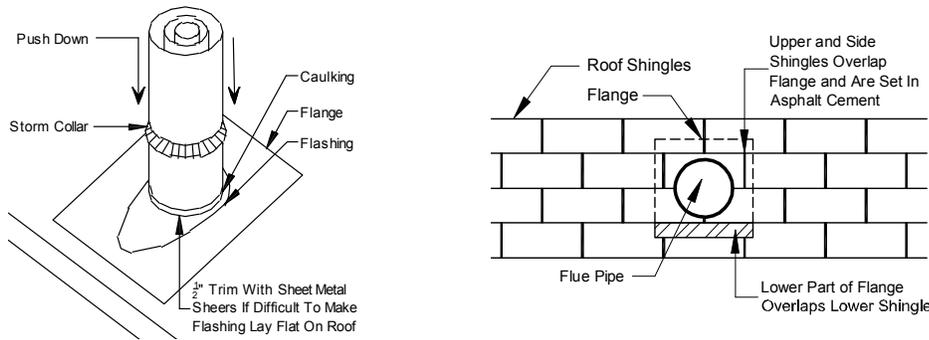


Figure 73. Roof flashing and shingle installation around chimney

COMBUSTION AIR INLETS

Combustion air inlets provide combustion air through the floor or an exterior wall to a combustion appliance. If through an exterior wall, site installation is not required. If through the floor, extend the duct from its point just below the floor to the outside (additional duct material required for this may or may not be provided with the home). Locate the inlet damper above expected snow levels (contact the LAHJ for snow levels).

Follow the fireplace manufacturer's instructions (typically in the fireplace/stove or with the chimney parts).

HEARTH

If shipped loose, install the fireplace hearth according to the fireplace manufacturer's instructions.

PREPARE KITCHEN AND BATH APPLIANCES / FIXTURES

Install kitchen and bath appliances according to the manufacturer's instructions and the procedures described for each appliance below.

COOKING APPLIANCES

If the home is provided with a range, cook top and/or grill containing its own exhaust system that penetrates the floor, complete the exhaust system as follows:

1. Remove covers. Remove the cover on the factory-installed exhaust pipe protruding from beneath the floor near the appliance.
2. Install termination fitting. Secure the provided termination fitting at the outside edge of the floor.
3. Install duct. Use the provided flexible metallic duct to connect the elbow protruding from the floor and the termination fitting. Refer to the manufacturer's installation instructions for guidance on supporting the duct and making the connections.

SITE-INSTALLED GAS APPLIANCES

Install only appliances with a Btu capacity equivalent to or less than the capacity of the factory-installed piping and at the location of a factory-installed gas riser.

REFRIGERATOR

Prepare the refrigerator as follows:

- Remove straps, blocks, or other securement devices used for shipping and patch any resulting marks on floors or walls.
- If the refrigerator has an icemaker, check water lines for leaks upon installation and a few days later to make sure no leaks have developed.

SITE-INSTALLED APPLIANCES AND FIXTURES

If sinks, tubs, showers or other fixtures or appliances are to be site-installed, follow the manufacturer's installation instructions. Use only products listed for use in manufactured homes and follow all applicable local codes.



Installing combustion air inlets. Do not install the combustion air inlet such that material from the hearth can drop beneath the home.

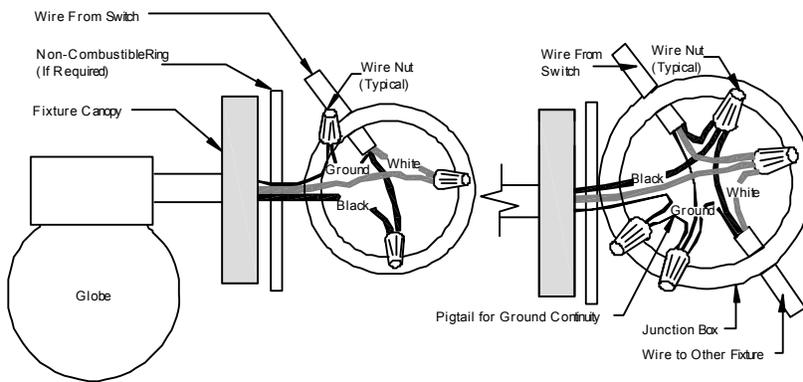


Installing exhaust ducts. Route exhaust ducts so they do not terminate beneath the home.

INSTALL EXTERIOR LIGHTING

Install exterior lighting according to **Figure 74** and the following:

1. **Remove cover.** Remove the screws and cover from electrical junction box.
2. **Install flash ring.** Place the non-combustible flash ring over the junction box.
3. **Connect wires.** Connect fixture wires to house wires in the box, black to black, white to white, and equipment ground to equipment ground, using listed wire connectors. Push wires into the box.
4. **Connect fixtures.** Connect the fixture to the junction box or strap using screws provided with the light fixture.
5. **Weatherproof.** Weatherproof/caulk around the base of the fixture, leaving a small gap in the caulking on the bottom to permit drainage of water that may accumulate.
6. **Complete installation.** Install bulb and globe on the fixture and verify proper operation.



INSTALL CEILING FANS/LIGHTS

Install ceiling fans no closer than 44 inches to a smoke alarm, measured from the center of the fan to the center of the alarm and with the trailing edges of the blades at least six feet-four inches above the finished floor. Comply with all unit manufacturer's instructions and the requirements below.

CEILING FAN/LIGHT MOUNTED TO FACTORY-INSTALLED ELECTRICAL BOX IN CEILING

Before installing the unit, make sure that adequate structural bracing is present in the ceiling. If uncertain, check with the manufacturer. Follow the fan or light manufacturer's instructions to connect the unit and complete the wiring. If the instructions are not available, connect the wiring as shown in **Figure 75**.



Lighting installation. A qualified electrician should install lighting. Before connecting lighting, disconnect power to the lighting circuit. Ground all exterior light fixtures.

Using a non-combustible ring. Install a non-combustible ring completely covering any combustible surfaces the fixtures may be mounted on (e.g. hardboard, clad wood and vinyl siding), or when ceiling material is exposed between the light fixture canopy and the junction box.

Figure 74. Exterior lighting connection



Installing ceiling fans. A qualified electrician should install lighting and fans. Before connecting the ceiling fan or light, disconnect power to the fan wires. Any unit installed outside of the home (such as in a porch ceiling) shall be listed for wet locations.



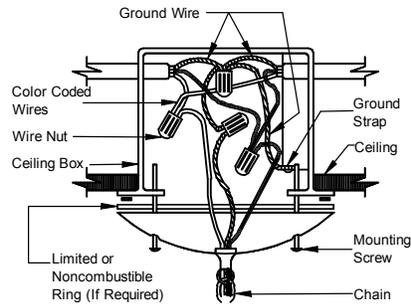


Figure 75. Wiring for a ceiling fan or chain-hung light fixture with a maximum weight of 35 lbs



Choosing ceiling fan

junction boxes. Connect ceiling fans only to junction boxes listed and marked for ceiling fan application in accordance with Article 314.27(b) of 2005 NEC. Always ground metal junction boxes.

Selecting fan weight. Do not use any ceiling fans or light fixtures that exceed the weight rating of the box (35 lbs unless otherwise noted).

Grounding electrical devices. Ground fans/lights using a fixture-grounding device or a fixture-grounding wire as specified in the manufacturer's instructions.

TEST ELECTRICAL SYSTEM

After completion of all electrical wiring and connections, including crossovers, appliances, lights, and ceiling fans, inspect and test the electrical system as follows:

1. **Fill water heater.** Fill water heater before turning on power to the home or switching on the circuit breaker.
2. **Test continuity.** Before turning on the electrical power to the home, conduct an electrical continuity test to ensure that exposed metallic parts of the home and the chassis are effectively bonded.
3. **Test operation.** After turning on the electrical power to the home, conduct operational tests of all devices (except water heaters, electric ranges, electric furnaces, dishwashers, clothes washers/dryers, and portable appliances) to demonstrate that they are connected and in working order.
4. **Test polarity.** After turning on the electrical power to the home, conduct electrical polarity checks to determine that connections of electrical equipment installed or completed during installation have been made properly. Visual verification is an acceptable electrical polarity check.



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▶ go to **Complete Exterior Work** (p. 106).



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Complete Exterior Work

This chapter covers sealing the bottom board, installing the ground cover and skirting, preparing wind protection shutters, and completing site-built structures.

Follow the Steps below:

- ▼ STEP 1. REPAIR AND SEAL BOTTOM BOARD (p. 106)
- ▼ STEP 2. INSTALL GROUND MOISTURE RETARDER (p. 106)
- ▼ STEP 3. INSTALL SKIRTING (p. 107)
- ▼ STEP 4. COMPLETE SITE-BUILT STRUCTURES (p. 108)

STEP 1. REPAIR AND SEAL BOTTOM BOARD

Tears and openings in the bottom board can result from transportation or installation activities. Inspect for holes and gaps the entire bottom board, especially areas around service penetrations, crossover connections, pipe and duct hangers, foundation elements, and the perimeter of the floor. Using approved materials appropriate for the type of repair, repair the bottom board wherever torn or loosened as follows:

1. **Insulate.** Replace any missing insulation prior to closure and repair of the bottom board, paying particular attention to insulation gaps that may have been created at P-traps.
2. **Repair large openings.** Repair large openings with a durable patch made of bottom board fabric or other compatible material and fastened with vinyl bottom board tape held in place by fasteners installed with a divergent stapler. Seal the edges around patches with foam or mastic. For large openings, install a rigid backer board behind the bottom board to provide a fastening substrate for the patch.
3. **Repair small openings.** Repair small gaps and tears with a combination of vinyl bottom board tape, patches, mastic, or foam sealant.

STEP 2. INSTALL GROUND MOISTURE RETARDER

If the space under the home is to be enclosed with skirting or other materials, a ground moisture retarder of a minimum six mil thick polyethylene sheeting or equivalent must be installed covering the ground under the home. Moisture retarders are not required in arid regions (less than 15 inches of rainfall annually) with dry soil conditions. If on-grade (surface) footings are used, install the ground moisture retarder prior to placing the footings, or install it around the footings after all other work under the home is complete.

Install the ground moisture retarder as follows:

1. **Apply sheeting.** Unroll the ground moisture overlapping joints in the sheeting a minimum of 12 inches and covering the entire area under the home except for areas under recessed entries, decks, and porches.
2. **Seal joints.** Seal joints in the retarder with mastic.
3. **Weigh down.** To keep the retarder in place, weigh it down with stones, concrete blocks, or other heavy, durable materials.
4. **Repair tears.** Repair any voids or tears in the retarder by patching with like material, maintaining a minimum 12-inch overlap and sealing joints with mastic.



Sealing bottom boards. A continuous and sealed bottom board is critical for home performance, energy efficiency, protection against moisture problems, prevention of pipe freezing, and protection against insects and rodents.

Bottom board sealing methods. Tapes shall never be used alone to repair a bottom board. Divergent staples or mastic must be used in tandem with tape to prevent future tear off.

Fastening vinyl siding. Do not install fasteners directly into vinyl siding. Allow for siding thermal expansion by pre-drilling minimum 1/2 inch diameter fastener holes or fastening skirting to a ledger under the home (see Best Practice tip).



Avoiding radon.

For enclosed perimeter wall crawlspace foundations in areas where radon is commonly found in the soil,



STEP 3. INSTALL SKIRTING

Skirting is any structural or non-structural perimeter crawlspace enclosure. Complete site-built structures (see **STEP 5. COMPLETE SITE-BUILT STRUCTURES**, p.108) that abut the home (such as porches, attached garages, and steps) prior to installing skirting.

TABLE 17. ANCHOR SYSTEM MATERIALS SPECIFICATIONS

Component	Specification
Skirting	Skirting must be of weather-resistant materials or provided with protection against weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 oz per sq ft of surface coated. Skirting made from wood or wood products and used within six inches of the ground needs to be made of materials naturally resistant to decay and termite infestation or pressure treated.
Vents	Ventilation openings must be covered for their full height and width with a perforated (1/4 inch maximum opening in any dimension) corrosion and weather-resistant covering that is designed to prevent the entry of rodents. In areas subject to freezing, the coverings for the ventilation openings must have an operable damper, permitting them to be in the open or closed position depending on the weather.

To design and install skirting, comply with the skirting manufacturer's instructions (if provided) and the following:

- 1. Configure skirting.** Run the skirting along the perimeter of the home's heated, conditioned space. Do not enclose with skirting areas under recessed entries, porches, or decks (whether constructed as part of the home or added on site) unless skirting is of the fully vented type and installed so as to allow water to freely flow out from under the home.
- 2. Fasten skirting.** Recess the skirting under the siding or trim and attach it to the home in a manner that prevents water from being trapped between the siding or trim and the skirting. For wood, aluminum, or fiberglass skirting, install a skirt rail (lumber strip) under the floor inset at least 1-1/2 inches from the edge of the siding for attachment of the skirting. Allow for frost heave when installing skirting in areas subject to frost.
- 3. Provide ventilation.** Unless the skirting has integral ventilation openings that meet the following ventilation requirements, install equally sized ventilation openings on at least two opposite sides of the foundation. Size ventilation area to equal at least one square foot or each 150 square feet of under-floor area (or for each 1,500 square feet if a ground moisture retarder is installed according to **STEP 2. INSTALL GROUND MOISTURE RETARDER**, p. 106). Place vents as high above the ground as practical.
- 4. Install access.** Provide an access opening not less than 18 inches wide and 24 inches high and located so that any utility connections located under the home are accessible.
- 5. Extend vents, drains, and inlets.** Run appliance exhaust vents, combustion air inlets, and air conditioner condensation drains through the skirting to the outside and terminate each as instructed in the sections of this manual corresponding to each appliance.

continue the moisture retarder up the perimeter wall at least 12 inches, sealing the edges and between the seams with mastic.

Attaching vinyl siding. To install skirting on vinyl-sided homes, screw a treated 2 x 4 on edge to the underside of the floor joists two inches back from the edge of the home. Screw skirting tight to the 2 x 4.



Avoid backfilling against skirting. Do not backfill against non-structural skirting.



STEP 4. COMPLETE SITE-BUILT STRUCTURES

Install site-built structures such as steps, landings, garages, awnings, carports, breezeways, porches, decks, railings, sheds, and utility rooms according to manufacturer's instructions (if any), in compliance with all local regulations including fire separation and electrical requirements, and according to the following:

- Do not obstruct any of the two required exit doors from the home.
- Construct site-built structures to be structurally independent unless provided for in the design of the home (instructions will be provided by the manufacturer).
- Do not damage the integrity of the home's structural or weatherproofing system. Seal any weatherproofing connections between the site-built structure and the home and flash any roof connections.
- Utilize only GFCI outlets for site-built structures.
- Install and test smoke alarms in any site-built structures according to local code.

▶ go to **Prepare Home for Occupancy** (p. 109).



Designing site-built

structures. All site-built structures must support their own dead, live, and wind loads and must not transmit any loads to the home's structure. All carports should be freestanding.

Prepare Home for Occupancy

Follow these steps for final inspection and completion of the home.

Follow the Steps below:

- ▼ **STEP 1. VERIFY ALTERNATIVE CONSTRUCTION (A/C) INSPECTION** (p. 109)
- ▼ **STEP 2. COMPLETE INSPECTION CHECKLIST** (p. 109)
- ▼ **STEP 3. COMPLETE ENERGY STAR CHECKLIST** (p. 109)
- ▼ **STEP 4. CLEAN THE HOME** (p. 109)

STEP 1. VERIFY ALTERNATIVE CONSTRUCTION (A/C) INSPECTION

This is normally the responsibility of the retailer and the manufacturer, however, the installation is not complete until the alternative construction inspection has been passed and documented.

STEP 2. COMPLETE INSPECTION CHECKLIST

After all previous steps have been accomplished, inspect the home to verify that it has been completely and properly installed using the checklist starting on p. 110.

Correct any deficiencies found, if possible, or if not possible, inform the retailer or manufacturer immediately.

STEP 3. COMPLETE ENERGY STAR CHECKLIST

For ENERGY STAR qualified homes (check with the retailer or manufacturer), this step is to be completed by the manufacturer's designated representative. Ask the retailer or the manufacturer who this is.

The manufacturer's representative must complete the Energy Star Site Installation Checklist, obtain signatures on the ENERGY STAR label, and return the completed ENERGY STAR Site Installation Checklist to the manufacturing plant.

STEP 4. CLEAN THE HOME

Remove and properly dispose of all installation-generated dust, debris, and packaging materials from the home and the surrounding property. Ensure that the home is in "move-in" condition.

Installation is Complete



Complete Installation Checklist

Use this checklist to confirm that the listed aspects of the installation are complete and correct.

FOUNDATION

- Footings properly sized and constructed for the soil conditions
- Pier spacing per data plate and applicable table and roof load zone
- Piers properly constructed and vertical
- Perimeter blocking installed (if required)
- Piers at each side of large sidewall openings
- Center line piers installed at columns
- Shims in place and tight

ANCHORS

- Approved anchors are used
- Anchors are installed at correct angles
- Anchor spacing and installation correct
- Longitudinal ties installed (if required)
- Anchor straps are tensioned

UNDER THE HOME

- Moisture retarder installed
- The ground is properly graded to prevent water accumulation
- HVAC ducts are supported off the ground and connected tightly to collars at all ends
- Fireplace combustion air intake free and unrestricted
- No holes or tears in bottom board
- Skirting has been installed per manufacturer's instructions with proper venting and provision for frost heave
- Dryer vent, range/cook top exhaust, water heater temperature and pressure overflow pipe and AC condensate drain installed to perimeter of crawl space

EXTERIOR

- Shingled roofs are free of visible damage and serious defects and there are no missing or loose shingles
- Shingle close-up and ridge cap have been completed per applicable details
- All hold down straps on shingled roofs have been removed and staple holes have been properly sealed
- Penetrations at roof stacks, vents and chimneys have been properly sealed
- Siding and trim is free of gaps, voids, missing fasteners, damage, and serious defects. All seams are sealed and hardboard edges are sealed
- Drip edge and fascia is properly installed and free of damage and serious defects
- Gutters and downspouts are installed properly such that water is diverted away from the home
- Trees and bushes have been trimmed to prevent brushing against the home in windy conditions or under snow loads
- The HUD label is exposed, intact and legible



Limits of the checklist. This checklist is not all-inclusive. Some homes have important features not listed here. Completing this checklist does not guarantee that all installation requirements have been met.



- The exterior of the home and immediate surroundings is clean, clear of construction materials, dust, and debris

INTERIOR

- Ceilings, walls, and floor coverings are free from damage and serious defects
- Carpeting is properly stretched and seamed
- All trim and molding is installed properly and free of damage and defects
- All cabinets, countertops, plumbing fixtures, appliances, furnishings, and window coverings are free of damage or serious defects
- All cabinet doors and drawers work properly
- All interior and exterior doors and windows open, close, and latch properly
- One window in each bedroom meets emergency egress requirements, has operating instruction labels on it, and operates properly
- All temporary shipping hardware has been removed
- Floors are level
- The data plate is intact and legible
- Smoke alarms have been tested
- The interior of the home is clean, clear of materials, dust, and debris

WATER AND DRAIN SYSTEMS

- Crossover and service connection and splices have been properly made with correct materials
- Water and drain lines are insulated or otherwise protected from freezing
- Pipe supports are installed and properly spaced
- Proper slope has been maintained on all drain lines
- All necessary inspections and tests have been performed
- All sinks, basins, tubs, and toilets operate properly
- All hot and cold water lines are properly connected to fixtures, dispense water as labeled, and operate properly

ELECTRICAL SYSTEMS

- The panel amperage matches the connection to the home
- The home has been properly grounded
- The main power supply has been properly connected and tested by a licensed electrician
- All electrical crossovers have been connected
- All receptacles, switches, and light fixtures operate properly
- Ground fault circuit interrupters operate properly
- All exterior lights have been properly installed

GAS/FUEL OIL SYSTEMS

- The gas system pressure test has been conducted
- Connections between units are properly made with access as required
- The main fuel line has been properly connected and tested by a qualified technician

APPLIANCE OPERATING AND VENTING

- All appliances are working properly
- Appliance venting is in accordance with the manufacturer's instructions



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 APPROVED

- Fresh air intakes are properly installed
- Whole house, kitchen, and bath exhaust fan operation are correct
- Fireplace chimney stack extension and roof cap have been installed in accordance with the manufacturer's instructions
- Air conditioner/heat pump is sized properly

MISCELLANEOUS

- Installation/anchoring certificates or seals have been issued and installed (if required)
- Owner's and operation manuals are available for all appliances
- This installation manual is left with home

