

## CHAPTER 6 MECHANICAL INSTALLATIONS

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### 6-1 General

**6-1.1 Mechanical Installations.** This chapter of the code is intended to supplement the mechanical requirements of the federal **Manufactured Home Construction and Safety Standards 24 CFR 3280**, the **Oregon One and Two Family Specialty Code**, and the **Oregon Mechanical Specialty Code**, but is not intended to take the place of these codes entirely.

(a) Where ever the requirements of this code differ from the **Oregon One and Two Family Specialty Code**, or the **Oregon Mechanical Specialty Code**, this code shall apply;

(b) Alternate methods and materials permitted in the **Oregon One and Two Family Specialty Code**, or the **Oregon Mechanical Specialty Code** but not mentioned in this code may be approved if acceptable to the authority having jurisdiction;

(c) All equipment and material shall be without defect. All damaged equipment and materials shall be discarded and replaced with approved component parts;

(d) All mechanical installation methods shall be according to the equipment manufacturer's installation instructions, the **Manufactured Home Construction and Safety Standards 24 CFR 3280**, this code, and where not specific, to the **Oregon One and Two Family Specialty Code**, or the **Oregon Mechanical Specialty code**; and

(e) All mechanical equipment (i.e. appliances, flues, vents, and ducts) shall be listed and labeled for the intended use

according to this code or, where not specific, to the **Manufactured Home Construction and Safety Standards 24 CFR 3280**, the **Oregon One and Two Family Dwelling Specialty Code**, or the **Oregon Mechanical Specialty Code**.

**6-1.2 Manufactured Dwelling Equipment Installations.** Installations, alterations, repairs or additions of mechanical equipment shall comply with the following:

(a) Installations, alterations, repairs or additions of mechanical equipment prior to or in conjunction with the initial sale of a manufactured dwelling shall comply with the federal **Manufactured Home Construction and Safety Standards, 24 CFR 3280**;

(b) Installations, alterations, repairs or additions of mechanical equipment during factory authorized service work on the manufactured dwelling shall comply with the federal **Manufactured Home Construction and Safety Standards, 24 CFR 3280**;

(c) Installations, alterations, repairs or additions of mechanical equipment in connection with the re-manufacturing or refurbishing of a manufactured dwelling shall comply with this code and, where not specific, with the federal **Manufactured Home Construction and Safety Standards, 24 CFR 3280**;

(d) Installations, alterations, repairs or additions of fuel-burning heat-producing appliances (i.e. fireplaces, fireplace stoves, pellet fired appliances, room heaters, furnaces, and water heaters) shall comply with this code and, where not specific, with the federal **Manufactured Home Construction and Safety Standards, 24 CFR 3280**; and

(e) Installations, alterations, repairs or additions of mechanical equipment after the initial sale of a manufactured dwelling, not covered by subsections (a), (b), (c), or (d) of this section, shall comply with this code and, where not specific, with the **Oregon One and Two Family Dwelling Specialty Code**.

## **6-2 Appliance Installations.**

### **6-2.1 Appliance Installations.**

Appliances used in conjunction with manufactured dwellings shall be installed according to this Chapter. Appliances with electrical components are also required to meet the installation requirements in Chapter 4 of this code.

### **6-2.2 Listing Requirement.**

All appliances and associated equipment shall be listed for their intended use. Where an appliance listing label or manufacturer's installation instructions state "**Do Not Install or Use In Manufactured Homes**" or similar language, the appliance shall not be installed in a manufactured dwelling.

### **6-2.3 Installations.**

All appliances shall be installed according to their listing, the manufacturer's Installation instructions, and this code. The manufacturer's installation instructions and operating instructions shall be left with the appliance and made available to the homeowner and the authority having jurisdiction during inspections.

### **6-2.4 Access.**

All appliances and appliance components shall be accessible for inspection, service, repair, and replacement without removing permanent construction.

### **6-2.5 Shipped-Loose Flues and Vents.**

Appliance chimneys, flues, and vents are often shipped loose when they exceed the maximum heights permitted for highway travel or when they may be subject to damage from road hazards. Shipped loose portions of chimneys, flues, or vents shall be installed according to the appliance manufacturer's installation instructions.

### **6-2.6 Roof Additions and Ramadas.**

Chimney, flue, or vent sections shall be installed through roof additions or ramadas according to the appliance's listing and the manufacturer's installation

instructions. All required thimbles, flashings, and termination devices shall be installed through the roof addition or ramada according to the appliance manufacturer's installation instructions. Chimney, flue, or vent pipe extensions shall be of the same type, brand, and specification as the original pipes used in the manufactured dwelling.

**6-2.7 Clearances.** Install all appliances not less than the minimum clearances shown in the manufacturer's installation instructions.

(a) Mechanical installations shall not obstruct the under-floor access to the manufactured dwelling crawl space;

(b) Flue gas vents and exhaust vents shall not terminate less than 3 feet (0.91 meters) from any motor driven air intake discharging into a manufactured dwelling or other habitable areas;

(c) Heat pump, air conditioning, evaporative coolers, fans and similar equipment shall not be installed in window or door openings which are part of an egress system or in a manner that will obstruct sidewalks or egress paths;

(d) When a manufactured dwelling is located in a flood hazard area, all mechanical equipment shall be elevated 12 inches (305 mm) above the base flood elevation excepting crossover heat ducts.

### **6-2.8 Atmospheric Separations.**

There shall be a complete separation of exhaust air, flue gases, combustion air, and drains from the interior of a manufactured dwelling and other enclosed structures.

(a) Inlets or outlets of a manufactured dwelling exhaust vent, combustion air vent, return air vent, or any other flue or vent opening shall not be located in an area where a garage, cabana, basement, or any other confined space is to be attached to a manufactured dwelling;

(b) Condensation drains from air conditioning, heat pumps, evaporative coolers, dehumidifiers, refrigeration equipment or any other appliance or fixture shall not terminate in or under a manufactured dwelling, cabana, garage,

basement, or any other confined space;  
and

(c) Flue gas vents or exhaust vents from any appliance or structure located outside a manufactured dwelling shall not terminate less than 3 feet (0.91 meters) from a manufactured dwelling window or motor driven air intake.

**6-2.9 Unvented Fuel Burning Appliances.** Unvented fuel burning heat producing appliances are restricted to cooking ranges and clothes dryers only. No other unvented fuel burning heat producing appliances are permitted to be installed in manufactured dwellings.

**6-2.10 Additional Equipment.** Additional mechanical equipment added to a manufactured dwelling on site shall comply with the following:

(a) Roof mounted equipment (i.e. air conditioners, evaporative coolers, and solar panels) add extra weight to the roof of a manufactured dwelling. Unless the manufactured dwelling has been prepared for these additions by the manufacturer, the roof structure shall be reinforced according to Chapter 7 of this code;

(b) Wall mounted equipment (i.e. air conditioners, evaporative coolers, and heat pumps) may add substantial loads to the wall of a manufactured dwelling. If the equipment is more than 100 pounds ( ) the exterior wall shall be reinforced according to Chapter 7 unless the manufactured dwelling has been prepared for these additions by the manufacturer.

### **6-3 Specific Appliances.**

**6-3.1 Appliance Requirements.** Manufactured dwelling appliances shall be listed according to **Table 6-A** of this chapter and installed according to this section. Appliances not specifically mentioned in this section shall be listed for manufactured home or mobile home use and shall be installed according to the listing and the appliance manufacturer's installation instructions.

**6-3.2 Air Conditioners and Heat Pumps.** Air conditioners and heat pumps used with manufactured dwellings shall be installed according to this section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

(a) Heat pumps or air conditioners added to a manufactured dwelling during or prior to the initial sale to the first consumer shall be listed for manufactured home or mobile home use and shall be specifically listed for use with the manufactured dwelling's heating or air handling equipment;

(b) Heat pumps or air conditioners added to a manufactured dwelling after the completion of the initial sales contract shall be listed but do not have to be specifically listed for use with the manufactured dwelling's heating or air handling equipment or listed for manufactured home or mobile home use. This equipment may be used in conjunction with existing manufactured dwelling heating or air handling equipment if the authority having jurisdiction determines the equipment is compatible;

(c) Heat pump or air conditioning equipment, installed on the exterior of a manufactured dwelling and not supported by the manufactured dwelling, shall be supported on a minimum 4 inch (10 cm) thick level concrete slab, a minimum 4 inch (10 cm) thick precast concrete slab, a listed mounting base, or according to the equipment manufacturer's installation instructions. The top surface of the slab or base shall be a minimum of 3 inches (8 cm) above the finished grade. The equipment support slab shall be made in such a manner as to permit the drainage of condensate;

(d) When installing an air conditioning coil or box above the furnace, reconnect the fresh air inlet to the furnace as required by the appliance manufacturer's installation instructions;

(e) External air conditioning or heat pump ducts shall have R-8 insulation and shall

be installed and conform to the requirements for heat ducts specified in Section 6-3.5(m) of this chapter.

**6-3.3 Clothes Dryers.** Clothes dryers shall be installed in manufactured dwellings according to this section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

**(a)** Clothes dryers installed in manufactured dwelling during or prior to the initial sale to the first consumer shall be listed for manufactured home or mobile home use;

**(b)** Clothes dryers installed in a manufactured dwelling after the completion of the initial sales contract shall be listed but do not have to be listed for manufactured home or mobile home use; and

**(c)** Except for listed non-venting type clothes dryers, all clothes dryers shall have moisture/lint exhaust ducts to remove moisture-laden air from the interior atmosphere of the manufactured dwelling. Exhaust ducts shall be installed according to the following, or where not specific, to manufacturer's installation instructions:

**1.** Exhaust ducts shall be a minimum of 4 inches (10 cm) in diameter;

**2.** Exhaust ducts shall be routed through the wall, floor, skirting, foundation, or retaining wall to the exterior of the manufactured dwelling or under-floor enclosure;

**3.** Exhaust ducts shall not terminate in or under a manufactured dwelling, cabana, garage, or any other confined space;

**4.** Exhaust duct material shall be 30 gauge rigid sheet metal or flexible metal conforming to **UL 181-96**;

**5.** Flexible foil, vinyl, or PVC exhaust duct is not permitted to be used with clothes dryers unless specifically permitted by the appliance manufacturer's installation instructions;

**6.** Exhaust ducts shall have no dips or traps in the duct run unless a ¼" (6.35 mm) hole is made at the lowest point of the exhaust duct;

**7.** Exhaust ducts shall have no screws, mechanical fasteners, screens or any other obstructions extending into any interior portion of the duct;

**8.** Exhaust ducts shall be maximum of 25 feet (7.62 meters), but shall be reduced in length by 2.5 feet (0.76 meters) for each 45 degree bend and 5.0 feet (1.52 meters) for each 90 degree bend; and

**9.** The exhaust duct termination shall be equipped with back draft damper providing full opening by design.

**6-3.4 Cooking Ranges and Ovens.**

Cooking ranges and ovens shall be installed in manufactured dwellings according to this section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

**(a)** Solid-fuel-burning cooking ranges and ovens installed in manufactured dwellings shall be approved and listed for use in manufactured homes;

**(b)** Pellet fired cooking ranges and ovens shall be approved and listed for use in manufactured homes;

**(c)** Antique cooking ranges and ovens are not permitted in manufactured dwellings unless specifically listed for manufactured home or mobile home use; and

**(d)** Ranges and ovens equipped with integral down-draft exhaust vents passing through the floor or exterior wall of a manufactured dwelling shall be installed according to the following:

**1.** Exhaust ducts shall be specifically installed according to the appliance manufacturer's installation instructions;

**2.** Exhaust ducts shall be sized according to the appliance manufacturer's installation instructions;

**3.** Exhaust ducts shall be routed through the wall, floor, skirting, foundation wall, or retaining wall to the exterior according to the appliance manufacturer's installation instructions;

**4.** Exhaust ducts shall have no dips or traps unless specifically permitted in the appliance manufacturer's installation instructions;

5. Exhaust ducts shall not terminate in or under a manufactured dwelling, cabana, garage, or any other confined space;
6. Exhaust duct material shall meet the minimum specifications in the manufacturer's installation instructions;
7. Non-metallic or flexible exhaust duct shall not be used for exhaust duct systems;
8. Exhaust ducts shall have no screws, mechanical fasteners, screens or any other obstructions extending into any interior portion of the duct;
9. Exhaust ducts shall be limited in length according to the appliance manufacturer's installation instructions;
10. Exhaust ducts shall terminate with proper termination device and a back draft damper.

**6-3.5 Furnaces.** Furnaces shall be installed in manufactured dwellings according to this section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

- (a) Furnaces installed in a manufactured dwelling during or prior to the initial sale to the first consumer shall be listed for manufactured home or mobile home use;
- (b) Furnaces installed in a manufactured dwelling after the completion of the initial sales contract shall be listed but do not have to be listed for manufactured home or mobile home use;
- (c) Fuel-burning furnaces shall be installed to provide for the complete separation of the combustion system from the interior atmosphere of the manufactured dwelling by:
  1. The installation of a listed direct vent (sealed combustion system) appliance; or
  2. The installation of the appliance within an enclosure accessible only from outside the manufactured dwelling so as to separate the appliance combustion and venting systems from the interior atmosphere of the manufactured dwelling. There shall not be any door, removable access panel, or other opening into the enclosure from the inside of the manufactured dwelling. Any

- openings or penetrations for ducts return air inlets, piping or wiring shall be sealed with non-combustible caulking or equal.
- (d) Fuel-burning furnaces shall be equipped with a direct vent combustion air inlet designed to conduct air directly into the fire chamber. Combustion air shall not be taken from within any manufactured dwelling wall, floor, or ceiling cavity or from a garage, cabana, basement, or other confined area. Combustion air may be taken from a ventilated crawl space below the manufactured dwelling. Combustion air inlets shall be listed or certified as components of the appliance;
  - (e) Flue gas vents shall be installed according to the listing and the appliance manufacturer's installation instructions. Flue gas vents shall be listed or certified as components of the appliance;
  - (f) Clearances surrounding furnaces shall not be less than those clearances specified in the terms of the listing and the appliance manufacturer's installation instructions;
  - (g) Pellet-fired furnaces shall be installed according to section 6-3.9 of this chapter;
  - (h) Solid-fuel-burning furnaces shall be installed according to section 6-3.10 of this chapter;
  - (i) Kerosene and oil-fired furnaces shall be listed according to **UL 826** and installed according to the **Standard for the Installation of Oil-Burning Equipment (NFPA 31)** and this section of the code; and
  - (j) Under-floor manufactured dwelling heating and air conditioning ducts shall be installed according to the following:
    1. Under-floor duct material shall be listed to **UL 181-96**;
    2. Under-floor duct material shall have a minimum of R-8 insulation, a vapor retarder rated at 1.0 perm or less, an inner liner of spring steel wire helix banded within two layers of 57 gauge mylar polyester film or equal, and an interior diameter not less than the diameter of the plenum collars on the manufactured dwelling;

3. Where extensions, splices or sharp turns (when the inside radius is less than the inside diameter of the duct) are used, they shall be made with 28 gauge sheet metal extensions, elbows, tees, wyes, or collars secured with proper mechanical fasteners with each seam and joint sealed with foil tape or other approved duct sealer. The insulation and a vapor required above shall be installed on all sheet metal extensions, elbows, tees, wyes, and collars;

4. Inner liner shall be secured to the extension, elbow, tee, wye, or collar with proper mechanical fasteners and installed so the insulation and vapor retarder extends up into the floor insulation and bottom board;

5. Outer liner, insulation, and vapor retarder shall be secured to the extension, elbow or collar with stainless steel worm drive clamps or nylon straps. Stainless steel worm drive clamps, nylon straps, and all duct vapor retarder joints shall be sealed with approved foil tape or other approved duct sealer;

6. Adequate clearances shall be maintained under the manufactured dwelling for the under-floor heat and air conditioning ducts. Ducts shall be elevated above the ground, footing, or slab a minimum of 1 inch (25 mm) with masonry or pressure treated blocks or straps; and

7. Under-floor heat and air conditioning ducts shall be installed with a minimum of bends and excess length so not to restrict airflow. Ducts shall be supported and connected according to the duct and appliance manufacturer's instructions, shall have a minimum of bends, shall not have sharp bends, shall not have excessive length, shall not have stress at the connections, and shall not be crushed, dented, or compressed. All tears, holes, and penetrations shall be sealed with approved foil tape or other approved duct sealer.

**6-3.6 Gas-Fired Fireplaces.** Gas-fired fireplaces, fireplace stoves, and room heaters shall be installed in manufactured

dwellings according to this section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions. In addition they shall meet the following:

(a) Be listed and labeled for manufactured home or mobile home use;

(b) Have a shut off valves installed on the supply side of the appliance;

(c) Be equipped with a safeguard device to automatically shut off the fuel supply when the means of ignition of such burners become inoperable;

(d) Have clearances not be less than those clearances specified in the terms of the listing and the manufacturer's installation instructions;

(e) Not be installed in alcoves unless specifically allowed in the appliance manufacturer's installation instructions and product listing;

(f) Be located in a manufactured dwelling so no doors, drapes or other such material can be placed or swing closer to the appliance than the clearances specified on the labeled equipment. Sufficient room shall be available to enable the operator to observe the burner, control, and means of ignition while starting the appliance;

(g) Have a hearth extension installed when required by the appliance listing or manufacturer's installation instructions;

(h) Have a 1-inch (25.4 mm) air space between the heat shield and any vertical wall surface. Heat shields shall not reduce the clearances of gas-fired fireplaces, fireplace stoves, and room heaters unless specifically permitted in the appliance manufacturer's installation instructions and product listing.

(i) Be secured to the manufactured dwelling floor to avoid displacement during transportation;

(j) Be sealed combustion appliances equipped with a direct vent combustion air inlet designed to conduct air directly into the fire chamber and installed to provide for the complete separation of the combustion system from the interior atmosphere of the manufactured dwelling;

**(k)** Not have combustion air taken from within any manufactured dwelling wall, floor, or ceiling cavity or from a garage, cabana, basement, or other confined area. Combustion air may be taken from a ventilated crawl space below the manufactured dwelling. Combustion air inlets shall be listed or certified as components of the appliance;

**(l)** Have exhaust vents installed according to the terms of their listings and the appliance manufacturer's installation instructions;

**(m)** Gas-fired fireplaces, fireplace stoves, and room heaters may be placed within a bedroom if they are sealed combustion/direct vent

**6-3.7 Gas-Fired Log Lighters.** Gas-fired log lighters shall be installed in solid-fuel-burning or gas fired fireplaces according to this section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

**(a)** Gas-fired log lighters shall be listed components of the manufactured home listed and approved fireplace;

**(b)** Gas-fired log lighters shall be listed, labeled, and installed according to the manufacturer's installation instructions;

**(c)** Gas-fired log lighters shall have a shut off valve installed on the supply side of the appliance;

**(d)** Gas-fired log lighters shall be equipped with a safeguard device to automatically shut off the fuel supply when the means of ignition of such burners become inoperable;

**(e)** Clearances surrounding gas-fired log lighters shall not be less than those clearances specified in the terms of the listing; and

**(f)** Gas-fired log lighters shall be located in a manufactured dwelling so no doors, drapes or other such material can be placed or swing closer to the appliance than the clearances specified on the labeled equipment.

**6-3.8 Pellet-Fired Appliances.** Pellet-fired appliances shall be installed in manufactured dwellings according to this

section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

**(a)** Pellet-fired appliances used in manufactured dwellings shall be listed for use manufactured homes and shall meet the requirements of **Oregon Administrative Rule (OAR) 918-520** and this chapter.

**(b)** The following statement, "**This pellet-fired appliance has been constructed, tested and listed for use in manufactured homes according to the State of Oregon Building Code**";

**(c)** Pellet-fired appliances shall not be installed in a manufactured dwelling sleeping room.

**6-3.9 Solid-Fuel-Burning Fireplaces and Fireplace Inserts.** Solid fuel burning factory-built fireplaces, fireplace stoves, and room heaters shall be installed in manufactured dwellings according to this section and the **Manufactured Home Construction and Safety Standards 24 CFR 3280.709**, and where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

**(a)** Solid-fuel-burning fireplaces, fireplace stoves, and room heaters used in manufactured dwellings shall be listed for use manufactured homes or mobile homes;

**(b)** Solid-fuel-burning fireplaces, fireplace stoves, and room heaters used in manufactured dwellings shall have a permanently attached label containing the following statements, "**For use with solid fuel only**" and "**Approved or Listed for manufactured home use**".

**(c)** Solid fuel burning fireplaces, fireplace stoves, and room heaters shall not be installed in a manufactured dwelling sleeping room unless approved by **HUD** through the alternate construction process prior to production;

**(d)** Solid-fuel-burning fireplaces, fireplace stoves, and room heaters shall not be installed in alcoves unless specifically allowed in the appliance manufacturer's installation instructions and product listing;

**(e)** Solid-fuel-burning fireplaces, fireplace stoves, and room heaters shall be secured to the manufactured dwelling floor to avoid displacement during transportation;

**(f)** Combustion air shall not be taken from within any manufactured dwelling wall, floor, or ceiling cavity or from a garage, cabana, basement, or other confined area. Combustion air may be taken from the ventilated crawl space below the manufactured dwelling. Combustion air inlets shall be listed or certified as components of the appliance;

**(g)** Antique solid-fuel-burning fireplace stoves, room heaters, or cooking stoves are not permitted in manufactured dwellings unless specifically listed for manufactured home or mobile home use; and

**(h)** Masonry fireplaces are not permitted in manufactured dwellings. A listed manufactured home or mobile home fireplace may be installed within a masonry enclosure according to terms of its listing and the manufacturer's installation instructions if the manufactured dwelling is placed on a foundation or basement according to Chapter 3 of this code.

**6-3.10 Water Heaters.** Water heaters shall be installed in manufactured dwellings according to this section and, where not specific, to the terms of their listing and the appliance manufacturer's installation instructions:

**(a)** Water heaters installed in a manufactured dwelling during or prior to the initial sale to the first consumer shall be listed for manufactured home or mobile home use;

**(b)** Water heaters installed in a manufactured dwelling after the completion of the initial sales contract shall be listed but do not have to be listed for manufactured home or mobile home use;

**(c)** Fuel-burning water heaters shall be installed to provide for the complete separation of the combustion system from

the interior atmosphere of the manufactured dwelling by:

**1.** The installation of a listed direct vent (sealed combustion system) appliance; or

**2.** The installation of the appliance within an enclosure accessible only from outside the manufactured dwelling so as to separate the appliance combustion and venting systems from the interior atmosphere of the manufactured dwelling. There shall not be any door, removable access panel, or other opening into the enclosure from the inside of the manufactured dwelling. Any openings or penetrations for ducts return air inlets, piping, or wiring shall be sealed with non-combustible caulking or equal.

**(d)** Fuel-burning water heaters shall be equipped with a direct vent combustion air inlet designed to conduct air directly into the fire chamber. Combustion air shall not be taken from within any manufactured dwelling wall, floor, or ceiling cavity or from a garage, cabana, basement, or other confined area. Combustion air may be taken from a ventilated crawl space below the manufactured dwelling;

**(e)** Flue gas vents shall be installed according to the listing and the appliance manufacturer's installation instructions. Flue gas vents shall be listed or certified as components of the appliance;

**(f)** Clearances surrounding water heaters shall not be less than those clearances specified in the terms of the listing and the appliance manufacturer's installation instructions;

**(g)** All water heater appliances shall be secured in place to prevent movement during transportation;

**(h)** Tankless water heaters shall be installed according to the product listing and the manufacturer's installation instructions.

## **6-4 Fuel Gas Connections.**

**6-4.1 General.** All fuel gas piping connections to a manufactured dwelling shall be made according to the minimum requirements of this code and, where not specific, to the federal **Manufactured**

## Home Construction and Safety Standards 24 CFR 3280.

**6-4.2 Fuel Gas Pipe Assembly.** Fuel gas piping between the manufactured dwelling gas supply inlet and the gas supply outlet shall comply with the **Oregon One and Two Family Dwelling Specialty Code**:

**6-4.3 Crossover Connections.** Fuel gas pipe running from one section of a manufactured dwelling to another section of the same manufactured dwelling shall be connected at the marriage line(s) according to the following:

- (a) Crossover piping shall be accessible;
- (b) Crossover piping shall have an inside diameter equivalent to the piping being connected;
- (c) Crossover piping shall be made of connectors supplied by the manufacturer, with flexible connectors listed for exterior use and a listed quick disconnect device, or with other materials listed in **Table 6-B** (see **Figure 6-5.6**);
- (d) If a quick disconnect device is not used, an approved shutoff valve is required at each crossover point upstream of the connection; and
- (e) Crossover piping shall be supported according to **Table 6-D** of this code.

**6-4.4 Gas Pipe Extensions.** Where it is necessary to extend the manufactured dwelling gas supply inlet under the manufactured dwelling to reach the point of connection to the gas supply outlet, the extension shall be installed according to the following:

- (a) All pipe extensions shall be sized according to **Table 6-C** of this chapter based on the length of the piping and the total demand of all appliances. Where the demand of an appliance is not known use **Table 6-E** of this chapter; and
- (b) All pipe extensions shall be closely routed against the manufactured dwelling main frame, secured, protected from physical damage, and supported according to **Table 6-D** of this code.

**6-4.5 Gas Shutoff Valve.** Where fuel gas is provided, each manufactured dwelling site shall have a listed gas shutoff valve installed upstream from the manufactured dwelling site gas outlet riser at a height of not less than 6 inches (152 mm) above grade. Such valve shall not be located under any manufactured dwelling or accessory building. The required shutoff valve shall be within 5 feet (157 cm) of the manufactured dwelling exterior wall. Gas valves shall conform to **ANSI Z21.15** or **ASME B16.33**. This gas valve may be eliminated when there is a shutoff valve or cock provided with the gas meter serving the same manufactured dwelling on the same lot. Unused gas supply outlets shall be equipped with a cap or plug to prevent discharge of gas whenever the outlet is not connected to a manufactured dwelling or cabana (see **Figures 6-4.5 and 6-4.5A**).

**6-4.6 Gas Supply Connections.** Each gas supply shall be connected to the manufactured dwelling according to the following:

- (a) Manufactured dwellings supported by and secured to foundation walls or basement walls shall be connected to the gas supply with a 2 foot (61 cm) flexible gas connector or with steel ferrous pipe and fittings;
- (b) Manufactured dwellings supported on piers and having perimeter skirting shall be connected to the gas supply according to the following:
  1. In seismic zone 2b, the gas supply connector shall be an approved 2 foot (61 cm) flexible gas connector (**See Map 3-C**);
  2. In seismic zones 3 and 4, the gas supply connector shall be an approved 6 foot (183 cm) flexible gas connector (**See Map 3-C**);
  4. In the Standard Wind Area, the gas supply connector shall be an approved 2 foot (61 cm) flexible gas connector (**See Map 3-A**);
  5. In the High Wind Area, the gas supply connector shall be an approved 6 foot

(183 cm) flexible gas connector (**See Map 3-A**); and

**6.** Where the connector size is different between the applicable wind zone and seismic zone, use the longer of the two flexible gas connectors.

**(c)** 6 foot (183 cm) flexible gas connectors shall be installed between the gas supply connector and the manufactured dwelling gas supply inlet in a “U” shape to allow for movement of the home during high winds or a seismic event;

**(d)** Required flexible gas connectors shall be listed in **Table 6-B** of this chapter;

**(e)** Flexible gas connectors shall be sized and have a capacity rating adequate to supply the connected load according to **Table 6-F** of this code;

**(f)** Required flexible gas connectors may be replaced with swing joint connections if provided with listed automatic earthquake shutoff devices;

**(g)** Connectors shall be sized equivalent to the inside diameter of the manufactured dwelling’s gas supply inlet pipe. Where the manufactured dwelling is being converted to gas or where gas appliances are being added, the supply piping shall be sized according to **Table 6-C** of this chapter based on the length of the piping and the total demand of all appliances. Where the demand of an appliance is not known use **Table 6-E** of this code; and

**(h)** Where cathodic protection is provided on the gas supply system, a dielectric fitting shall be used in the manufactured dwelling gas connection to insulate the manufactured dwelling.

## 6-5 Gas Tests

**6-5.1 Gas Tests.** Gas tests are required by the person making the gas connections to the manufactured dwelling whether the homeowner, installer, or gas utility company. The gas system in a manufactured dwelling has been designed to operate within ½ PSI to ¼ PSI. A tag may have been attached to the gas inlet indicating the size and BTU of

the listed gas supply connector to be used.

**6-5.2 Test Preparation.** Prior to beginning the gas test, make the following preparations:

**(a)** Verify the orifices of all fuel burning appliances are correct for the type of fuel used;

**(b)** If the manufactured dwelling is located at or above 3,000 feet above sea level, special orifices and regulators may be required, see appliance manufacturer’s installation instructions;

**(c)** Verify the temperature of the ambient air and the piping are approximately the same and conduct the test at such a time during the day when the air temperatures will remain constant;

**(d)** If the gas supply from any source exceeds ½ PSI or 8 ounces install a pressure reducing valve; and

**(e)** Verify each gas appliance flue pipe, vent, roof jack has been properly installed and secured to the appliance.

**6-5.3 Gas Line Test.** After installation of the manufactured dwelling, the fuel gas piping system shall be subjected to pressure testing according to both of the two following methods:

**(a)** The gas lines and connections shall be subjected to a test with the system pressurized with air according to the following steps:

**1.** With all appliance shut off valves closed, subject the piping system to three (3) PSI for a period of not less than ten minutes without showing any drop in pressure.

**2.** If there is a drop in pressure, located the source of the leak and correct as necessary.

**3.** If a leak has been repaired, then retest the system again with the appliance shut off valves closed and subjecting the piping system to three (3) PSI for a period of not less than ten minutes without showing any drop in pressure.

**(b)** After completing a successful piping test, release the air pressure, open all the appliance shut off valves and pressurize

the system with a continual pressure between 6 to 8 ounces.

1. Test each connection from the shut off valve to the appliance with a suitable soapy water or bubble solution.
2. Make appropriate corrections if there is any evidence of leakage at those connections.
3. Repeat testing until all leaks have been eliminated.
4. When the testing is completed, the soap or bubble solution must be washed from the connection with water to prevent corrosion of the fitting.

## **6-6 Oil Fired Appliances**

**6.6.1 General.** Fuel oil appliances in manufactured dwellings shall have the fuel oil supply line connected to the appliance on site. All fuel oil piping systems serving a manufactured dwelling shall be installed according to the minimum requirements of **Chapter 14 the Oregon Mechanical Specialty Code**, and, where not specific, to the **Oregon One and Two Family Specialty Code**.

**6-6.2 Appliances** Kerosene and oil-fired room heaters and water heaters shall be listed according to **UL 826** and installed according to the **Standard for the Installation of Oil-Burning Equipment (NFPA 31-97)** and this section of the code.

**6-6.3 Storage Systems.** Fuel oil storage systems shall comply with the following:  
**(a)** Fuel oil storage tanks and supply piping systems shall be installed according to the requirements of the **current Oregon Uniform Fire Code** and the **Oregon Department of Environmental Quality**.

**TABLE 6-A**  
**APPROVED APPLIANCES AND EQUIPMENT**

APPROVED REPLACEMENT APPLIANCES AND EQUIPMENT	MATERIAL IDENTIFICATION	MANUFACTURED HOME APPROVAL REQUIRED
Central Cooling Air Conditioners	UL 465	NO
Liquid Fuel-Burning Heating Appliance	UL 307A	YES
Electric Air Heaters	UL 1025	NO
Electric Baseboard Heating Equipment	UL 1042	NO
Electric Central Air Heating Equipment	UL 1096	NO
Gas-Burning Heating Appliance	UL 307B	YES
Gas Clothes Dryers	ANSI Z 21.5.1	NO
Gas-Fired Absorption Summer Air Conditioning Equip.	ANSI Z 21.40.1	NO <sup>(2)</sup>
Gas-Fired Central Furnaces (for exterior use only)	ANSI Z 21.47	NO <sup>(2)</sup>
Direct Vent Central Furnaces (for interior use)	ANSI Z 21.64	NO <sup>(2)</sup>
Household Cooking-Gas Appliances	ANSI Z 21.1	NO
Refrigerators Using Gas Fuel	ANSI Z 21.19	YES
Gas Storage Tank Water Heaters (75,000 BTUH or less)	ANSI Z 21.10.1	NO <sup>(2)</sup>
Heat Pumps	UL 559	NO
Electric Storage Tank Water Heaters	UL 174	NO
Factory-Built Fireplaces (solid-fuel burning type)	UL 127	YES <sup>(3)</sup>
Factory-Built Fireplaces (kerosene or oil-fired type)	UL 826	YES <sup>(4)</sup>
Fireplace Stoves (solid-fuel burning type)	UL 737	YES <sup>(3)</sup>
Fireplace Stoves (kerosene or oil-fired type)	UL 826	YES <sup>(4)</sup>
Pellet-Fired Appliance (solid-fuel burning type)	OAR 918-540	YES <sup>(3)</sup>
Room Heaters (solid-fuel burning type)	UL 1482	YES <sup>(3)</sup>
Room Heaters (kerosene or oil-fired type)	UL 826	YES <sup>(4)</sup>
Unitary Air-Conditioning and Air-Source Heat Pump	ANSI/ARI 210/240	NO <sup>(2)</sup>
Tankless Electric Instant Water Heater		NO
Tankless Gas-Fired Instant Water Heater		NO <sup>(2)</sup>
Factory-Made Air Ducts	UL 181	NO
Roof Jacks	UL 311	NO
Automatic Gas Ignition System and Components	ANSI Z 21.20	NO
Automatic Gas Shutoff Devices (for hot water systems)	ANSI Z 21.22	NO
Automatic Valves for Gas Appliances	ANSI Z 21.21	NO
Gas Hose End Valves	ANSI Z 21.15	NO
Gas Valves for Appliance Connections	ANSI Z 21.15	NO
Gas Appliance Thermostats	ANSI Z 21.23	NO
Gas Vents	UL 441	NO
Chimneys for solid-fuel burning appliances	UL 103	YES
Metal Connectors for Gas Appliances	ANSI Z 21.24	NO

**NOTES:**

1. Heat-producing appliances and equipment used in manufactured dwellings shall be identified with the listing marks indicated in this table, and shall be installed according to this chapter, the terms of their listing, and the manufacturer's installation instructions.
2. The fuel-burning appliances indicated shall be direct vent/sealed combustion appliances listed for mobile home or manufactured home use if they are to be installed within the interior atmosphere of the manufactured dwelling.
3. Solid-fuel-burning equipment used within the interior atmosphere of the manufactured dwelling shall have a combustion air inlet installed that is a listed component of the appliance.
4. Kerosene and oil-fired appliances shall be installed according to the terms of their listing, the manufacturer's installation instructions, and **NFPA 31**.
5. Each product must be marked with the appropriate listing identification shown in this table.
6. All materials and devices shall be installed according to the terms of their listing and the manufacturer's installation instructions.
7. The materials shown in this table are the most common used, see the **Oregon Mechanical Specialty Code** for a more comprehensive list of approved material.

## TABLE 6-B

### APPROVED GAS AND OIL PIPING AND FITTINGS

APPROVED PIPE, TUBING, AND FITTINGS	APPROVED JOINTS	MATERIAL IDENTIFICATION
Black Steel Pipe (schedule 40)	Threaded or Flanged	ASTM A 53 or A 106
Galvanized Steel Pipe (schedule 40)	Threaded or Flanged	ASTM A 53
Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines	Threaded or Flanged	ASTM A 539-90a
Soft Copper Tubing, Type K or L	Flared or Brazed	ASTM B 68, B 75, B 88, or B 280
Seamless Copper Tube for Air Conditioning and Refrigeration Field Service	Flared or Brazed	ASTM B 280
Wrought Seamless Copper and Copper –Alloy Tube	Threaded or Flared	ASTM B 251
Seamless Copper Pipe (standard sizes)	Threaded or Flared	ASTM B 42, B 43, or B 302
Tube Fittings for Flammable/Combustible Fluids	Flared or Brazed	UL 109
Plastic Pipe (restricted to use underground and outside manufactured dwelling only) <sup>(3)</sup>	Solvent Cement, adhesive, compression	ASTM D 2513
Corrugated Stainless Steel Tubing (CSST) (restricted to underfloor and in manufactured dwelling only)	Proprietary mechanical fittings	ANSI/AGA LC 1
Pigtails and Flexible Hose Connectors for LP-Gas <sup>(3)</sup>	Threaded	UL 569 and AGA 3
Gas Supply Connectors (CSST and Plastic not permitted for gas supply connections to the house) <sup>(3)</sup>	Threaded	UL 569 and AGA 3
<b>NOTES:</b> 1. Piping and tubing must be marked with the appropriate identification shown in this table. 2. The materials shown in this table are the most common used, see the <b>Oregon Mechanical Specialty Code</b> for a more comprehensive list of approved materials. 3. The noted materials are not approved for use under or in a manufactured dwelling.		

**TABLE 6-C**  
**GAS PIPE SIZING PER THOUSAND BTUH**

DIAMETER	10 FT.	20 FT.	30 FT.	40 FT.	50 FT.	60 FT.	70 FT.	80 FT.	90 FT.	100 FT.
¼-Inch I.D. Pipe	43	29	24	20	18	16	15	14	13	12
3/8-Inch I.D. Pipe	95	65	52	45	40	36	33	31	29	27
½-Inch I.D. Pipe	175	120	97	82	73	66	61	57	53	50
¾-Inch I.D. Pipe	360	250	200	170	151	138	125	118	110	103
1-Inch I.D. Pipe	680	465	375	320	285	260	240	220	215	195
¼-Inch O.D. Tubing	27	18	15	13	11	10	9	9	8	8
3/8-Inch O.D. Tubing	56	38	31	26	23	21	19	18	17	16
½-Inch O.D. Tubing	113	78	62	53	47	43	39	37	34	33
¾-Inch O.D. Tubing	197	136	109	93	83	75	69	64	60	57
1-inch O.D. Tubing	280	193	155	132	117	106	98	91	85	81

**NOTES:**

1. This table provides the maximum capacity for the Inside Diameter (I.D.) of pipe and the Outside Diameter (O.D.) of tubing in thousands of British Thermal Units per hour (BTUH) of natural gas.
2. This table is based on gas pressures of 0.5 pounds per square inch of gas (psig) or less, and a maximum pressure drop of ½-inch water column.
3. To determine proper BTUH demand of an appliance, see the BTUH input rating on the appliance name plate, if the input rating or appliance is not available, use **Table 6-F** of this chapter for estimated demand.
4. To convert these measurements to metric units of measurement or International Systems of Units (SI), use the following equations:
  - (a) 1000 BTU = 0.293 kW.
  - (b) 1-foot = 0.305 meters.
  - (c) 1 pound per square inch (psi) = 6.894 kPa.
  - (d) 1-inch water column = 0.249 kPa.

**TABLE 6-D**  
**MAXIMUM PIPING SUPPORT SPACING**

<b>PIPING MATERIAL</b>	<b>HORIZONTAL SPACING</b>	<b>VERTICAL SPACING</b>
Aluminum Pipe and Tubing	10 Feet	15 Feet
Brass Pipe	10 Feet	10 Feet
Brass Tubing	6 Feet	10 Feet
Copper or Copper Alloy Pipe	12 Feet	10 Feet
Copper or Copper Alloy Tubing	10 Feet	10 Feet
Corrugated Stainless Steel Tubing (CSST)	See ANSI LC-1	See ANSI LC-1
Chlorinated Polyvinyl Chloride (CPVC) Pipe or Tubing	3 Feet	5 Feet
Steel Pipe	12 Feet	15 Feet
Steel Tubing	8 Feet	10 Feet
Lead Pipe	Continuous	4 Feet
Polyvinyl Chloride (PVC) Pipe or Tubing	4 Feet	4 Feet
<b>NOTES:</b>		
<ol style="list-style-type: none"> <li>1. Pipe hangers and supports shall have sufficient strength to withstand all anticipated static and dynamic loading conditions and shall be spaced at the intervals in this table for the applicable piping materials used.</li> <li>2. Pipe hangers and anchors shall be adequately attached to the structure.</li> <li>3. To convert these measurements to metric units of measurement or International Systems of Units (SI), use the following equations:               <ol style="list-style-type: none"> <li>(a) 1-Inch = 25.4 mm.</li> <li>(b) 1-foot = 0.305 meters.</li> </ol> </li> </ol>		

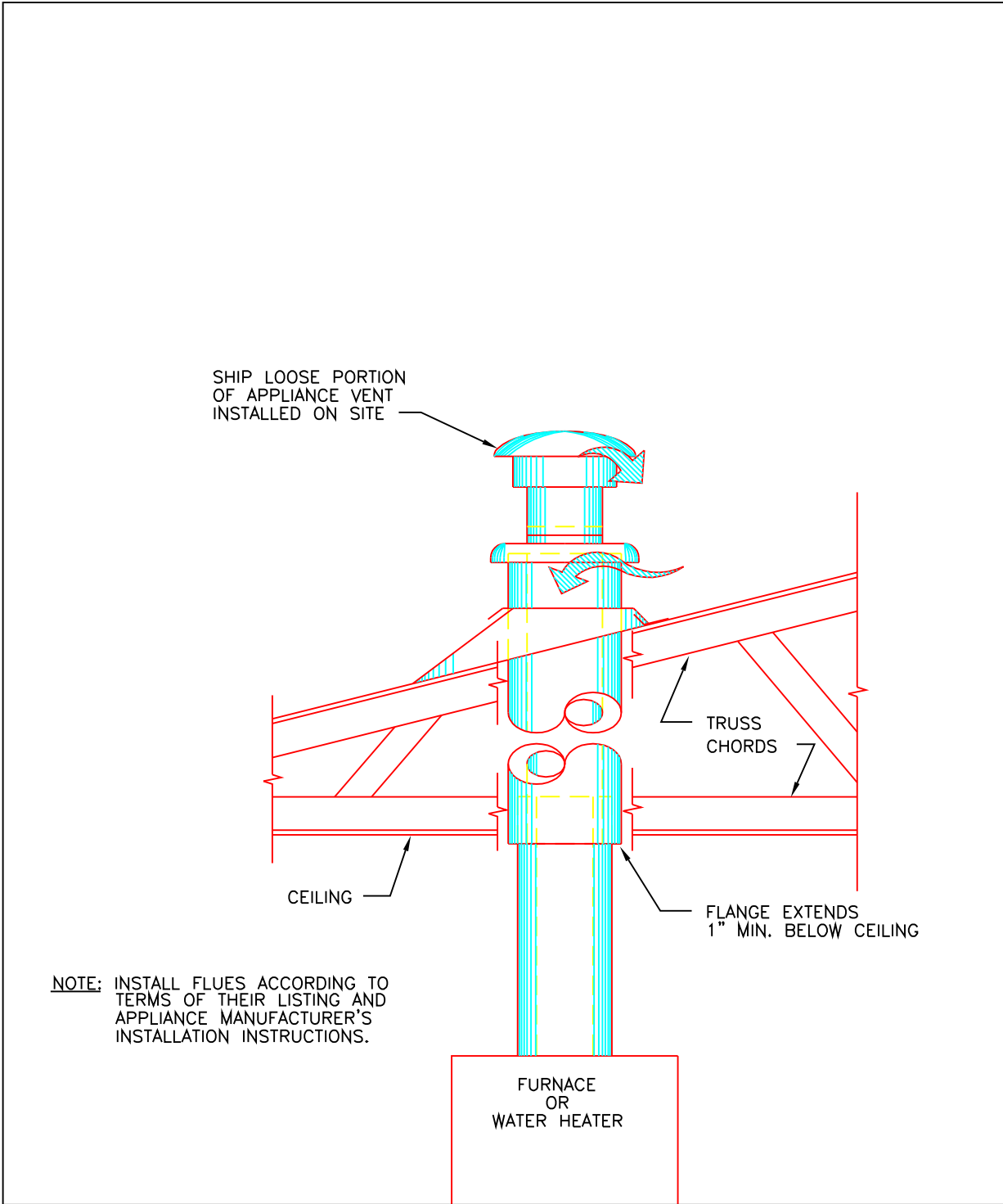
**TABLE 6-E**  
**TYPICAL DEMAND OF GAS APPLIANCE**

APPLIANCE	DEMAND (BTUH)
Range with oven	65,000
Built-in Top Burner	40,000
Built-in Oven	25,000
Storage Water Heater (up to 30 gallons)	30,000
Storage Water Heater (40 to 50 gallons)	50,000
Clothes Dryer	35,000
Fireplace Log Lighter	5,000
Gas Light	2,000
Gas Refrigerator	3,000
Barbecue	50,000
<b>NOTES:</b>	
<ol style="list-style-type: none"> <li>1. This table provides the estimated British Thermal Units per hour (BTUH) demand for typical appliances, actual demands for a given appliance may be different.</li> <li>2. Use this table to estimate pipe sizing when the nameplate BTUH input rating of an appliance is not yet known.</li> <li>3. To convert these measurements to metric units of measurement or International Systems of Units (SI), use the following equations:               <ol style="list-style-type: none"> <li>(a) 1000 BTU = 0.293 kW.</li> <li>(b) 1 Gallon = 3.785 Liters.</li> </ol> </li> </ol>	

## TABLE 6-F

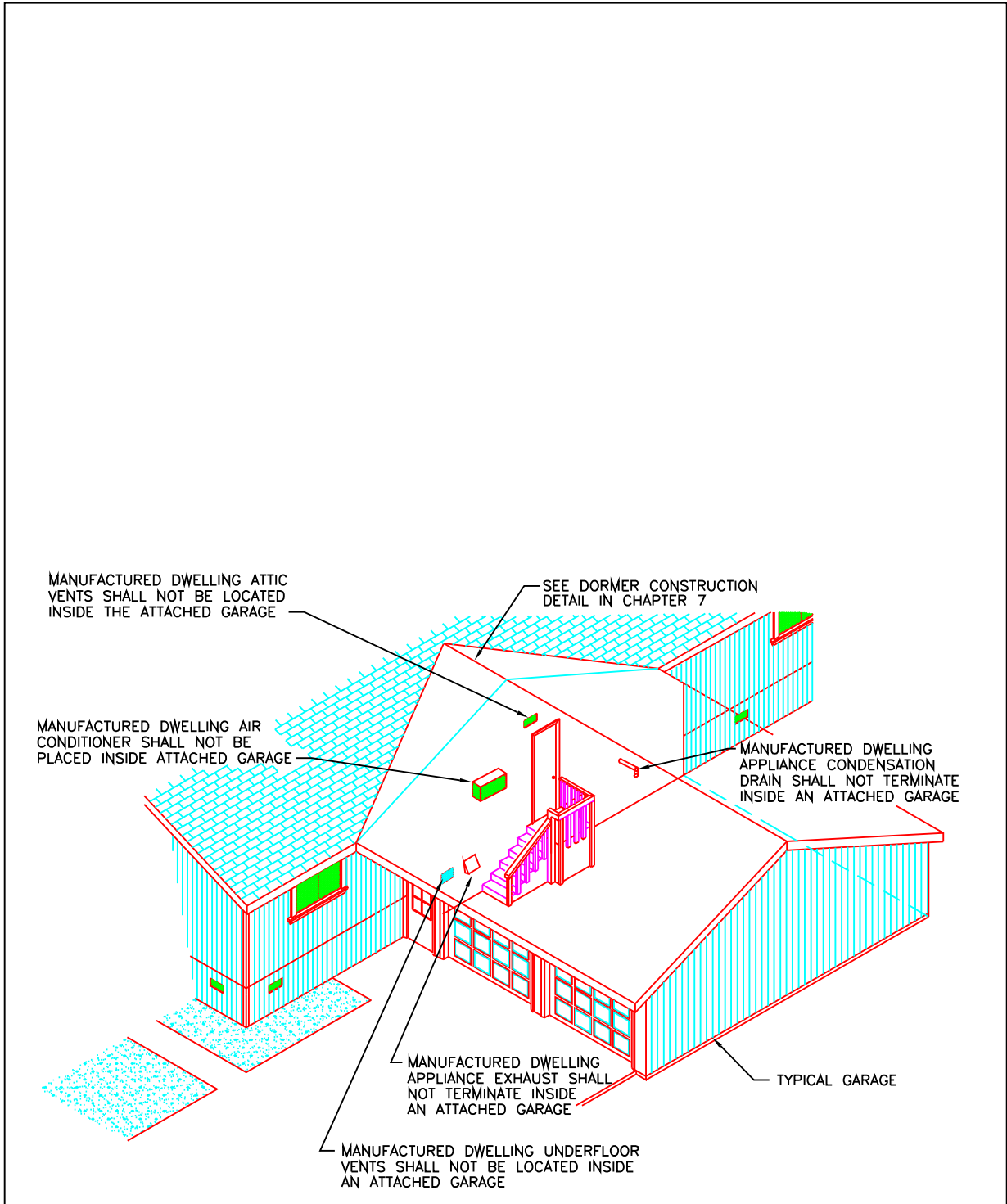
### FLEXIBLE CONNECTOR BTUH CAPACITY

<b>NOMINAL O.D. CONNECTOR</b>	<b>NOMINAL I.D. CONNECTOR</b>	<b>2-FOOT LONG</b>	<b>4-FOOR LONG</b>	<b>6-FOOT LONG</b>
3/8 INCH O.D.	1/4 INCH I.D.	40,000	28,300	23,100
1/2 INCH O.D.	3/8 INCH I.D.	85,000	60,500	49,100
7/8 INCH O.D.	1/2 INCH I.D.	150,000	106,000	86,000
1 INCH O.D.	3/4 INCH I.D.	290,900	215,000	173,900
1-1/4 INCH O.D.	1 INCH I.D.	581,800	442,700	347,800



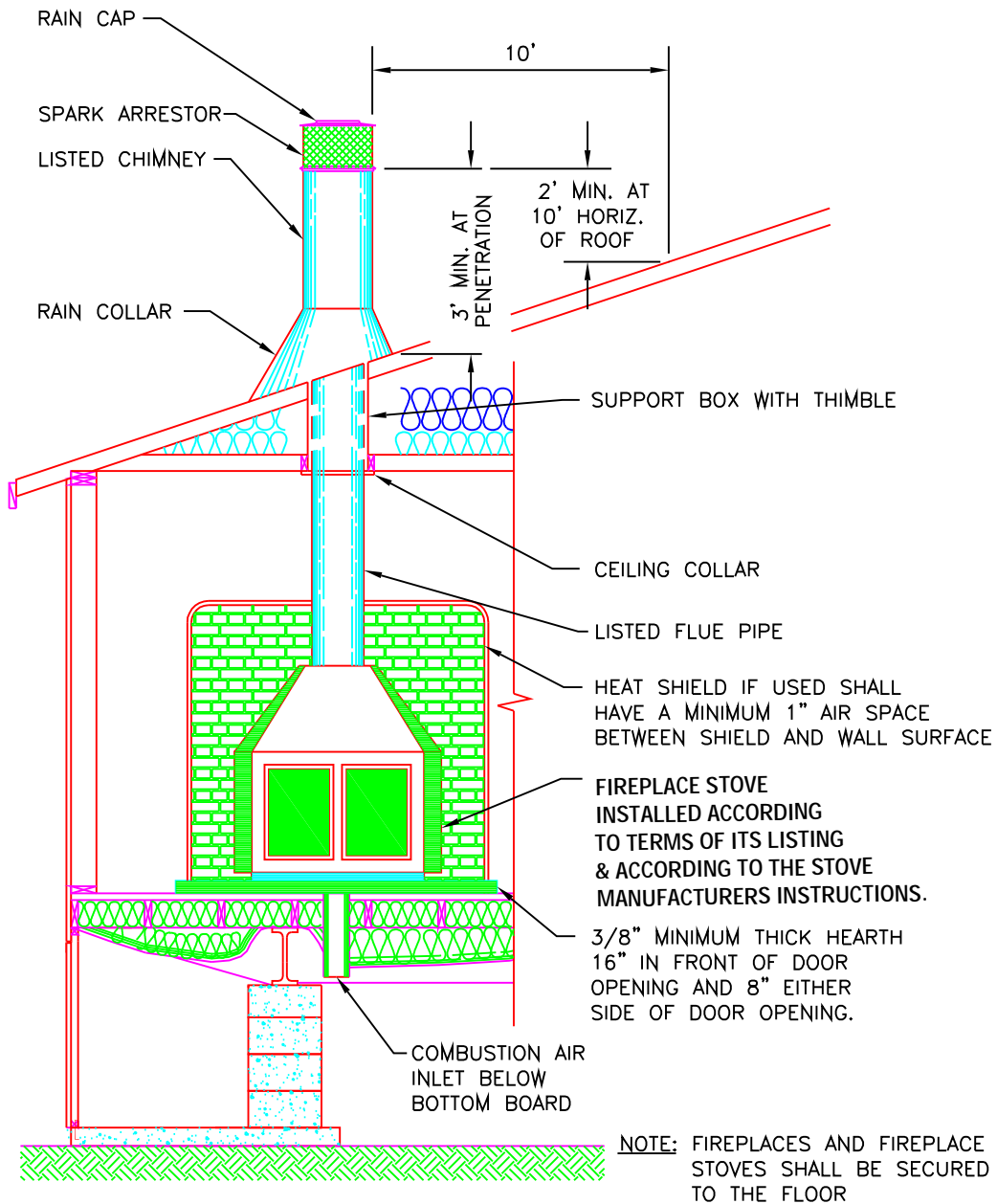
TYPICAL SHIP LOOSE APPLIANCE VENTS

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 6
REV. 12/01/01 RHW		FIGURE 6-2.5



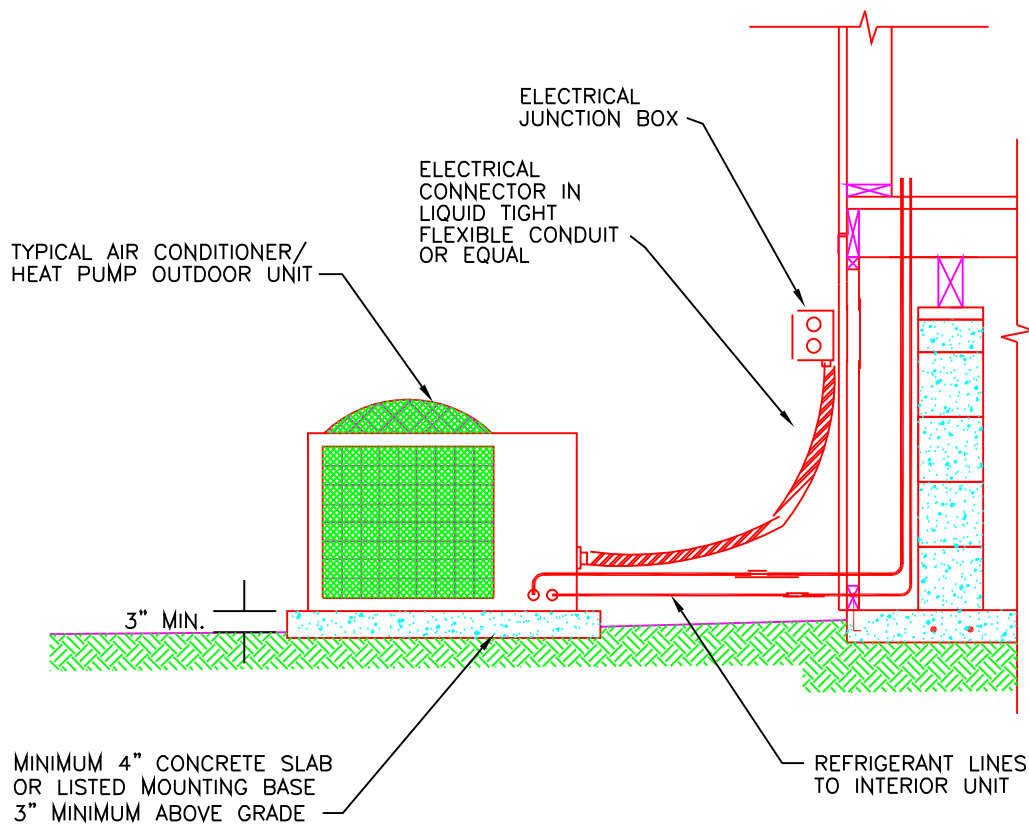
TYPICAL ATMOSPHERIC SEPARATION DETAILS

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 6
REV. 12/01/01 RHW		FIGURE 6-2.8



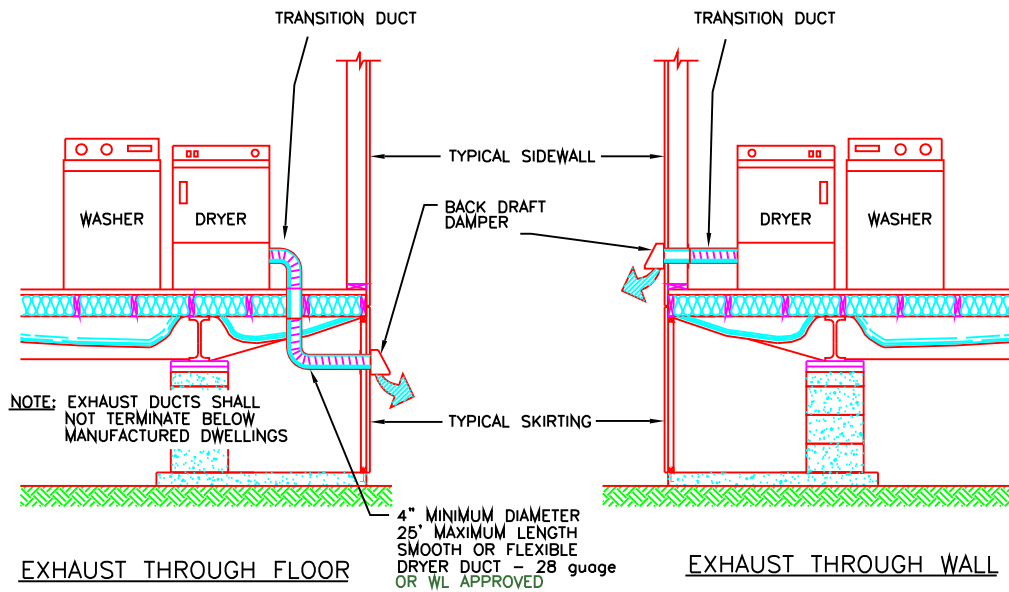
TYPICAL FIREPLACE STOVE INSTALLATION

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 6
REV. 12/01/01 RHW		FIGURE 6-3.10



TYPICAL AIR CONDITIONER/HEAT PUMP INSTALLATION

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 6
REV. 12/01/01 RHW		FIGURE 6-3.2



NOTE: DIPS OR TRAP IN THE DUCT RUN SHALL HAVE A 1/4" HOLE DRILLED AT THE LOWEST POINT. NO SCREWS OR FASTENERS SHALL OBSTRUCT DUCT INTERIOR.

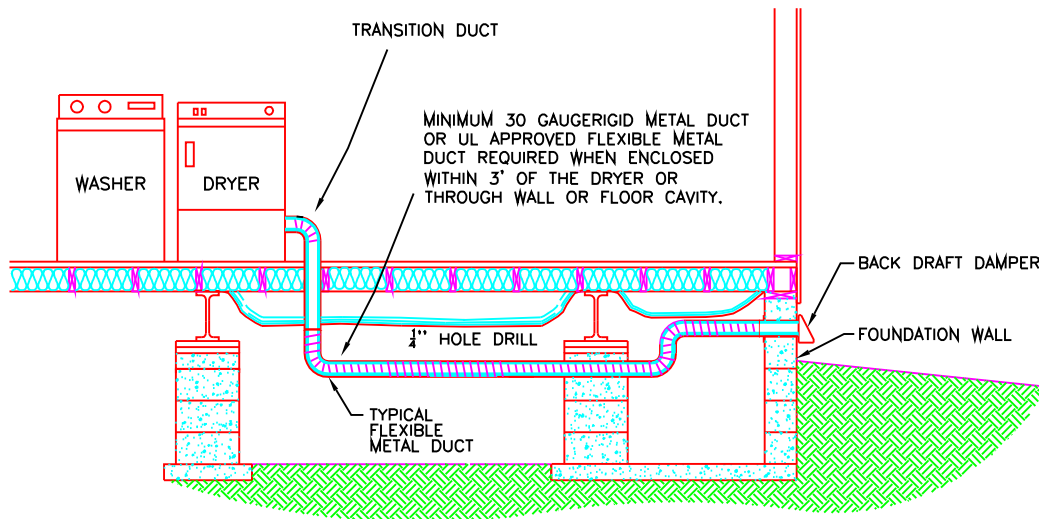
TYPICAL DRYER EXHAUST DUCT INSTALLATION

REV. 12/01/01 RHW

MANUFACTURED STRUCTURE  
AND PARK SPECIALTY CODES

CHAPTER 6  
FIGURE 6-3.3A

**NOTE:** DRYER DUCT SHALL BE A MINIMUM OF 4" IN DIAMETER AND NO LONGER THAN 25 FEET. THE DUCT RUN SHALL BE REDUCED IN LENGTH 2 1/2' FOR EACH 45° BEND AND 5' FOR EACH 90° BEND.

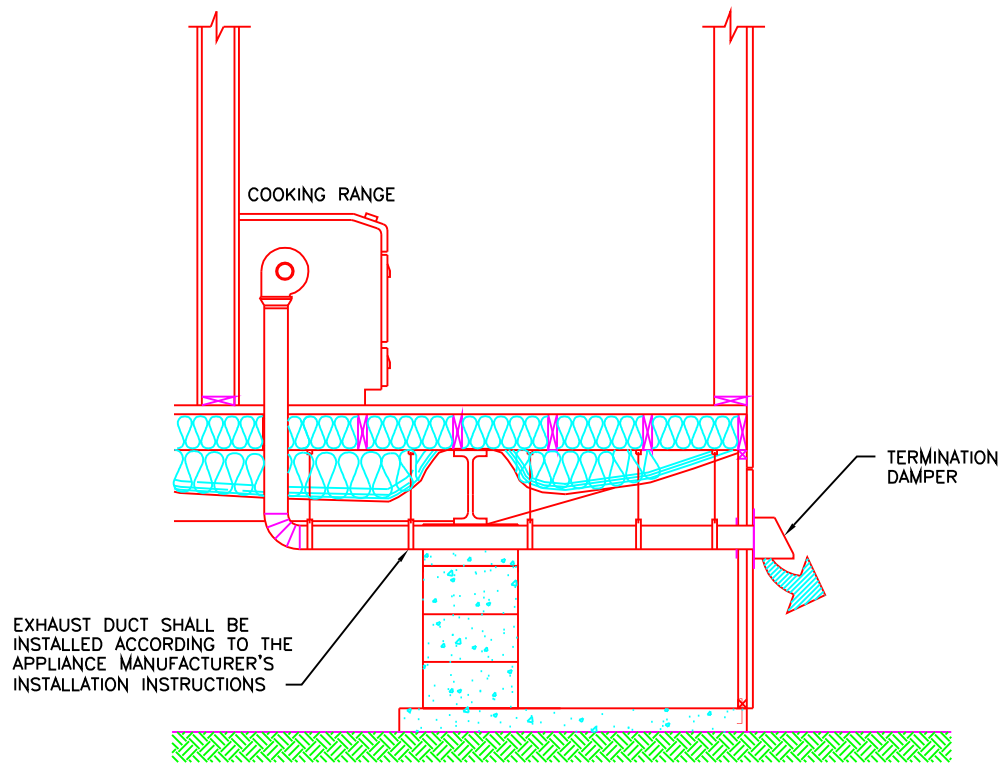


TYPICAL DRYER EXHAUST DUCT WITH TRAP

REV. 12/01/01 RHW

MANUFACTURED STRUCTURE  
AND PARK SPECIALTY CODES

CHAPTER 6  
FIGURE 6-3.3B



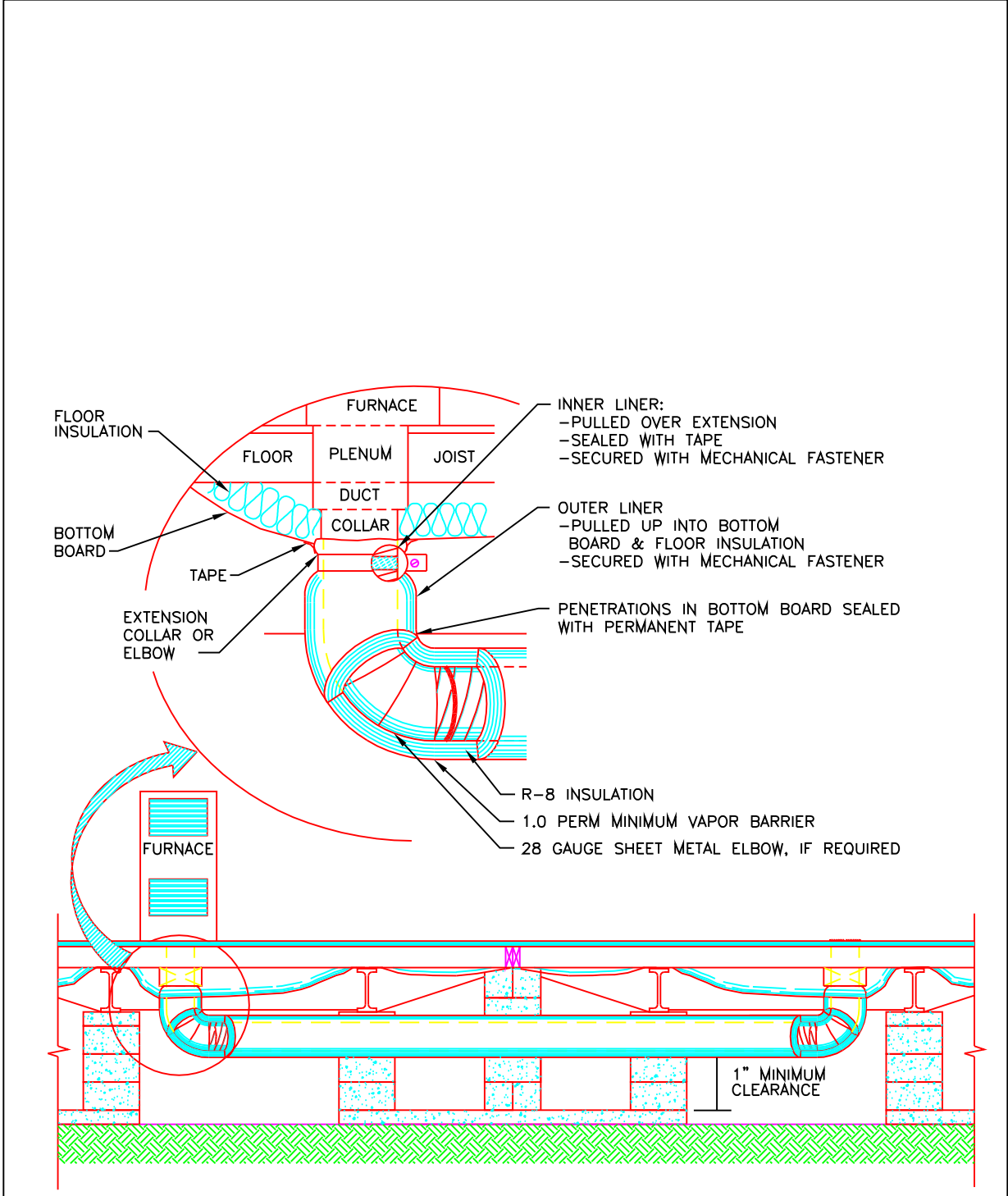
**NOTE:** EXHAUST DUCT SHALL NOT TERMINATE BELOW THE MANUFACTURED DWELLING.

TYPICAL RANGE EXHAUST DUCT INSTALLATION

REV. 12/01/01 RHW

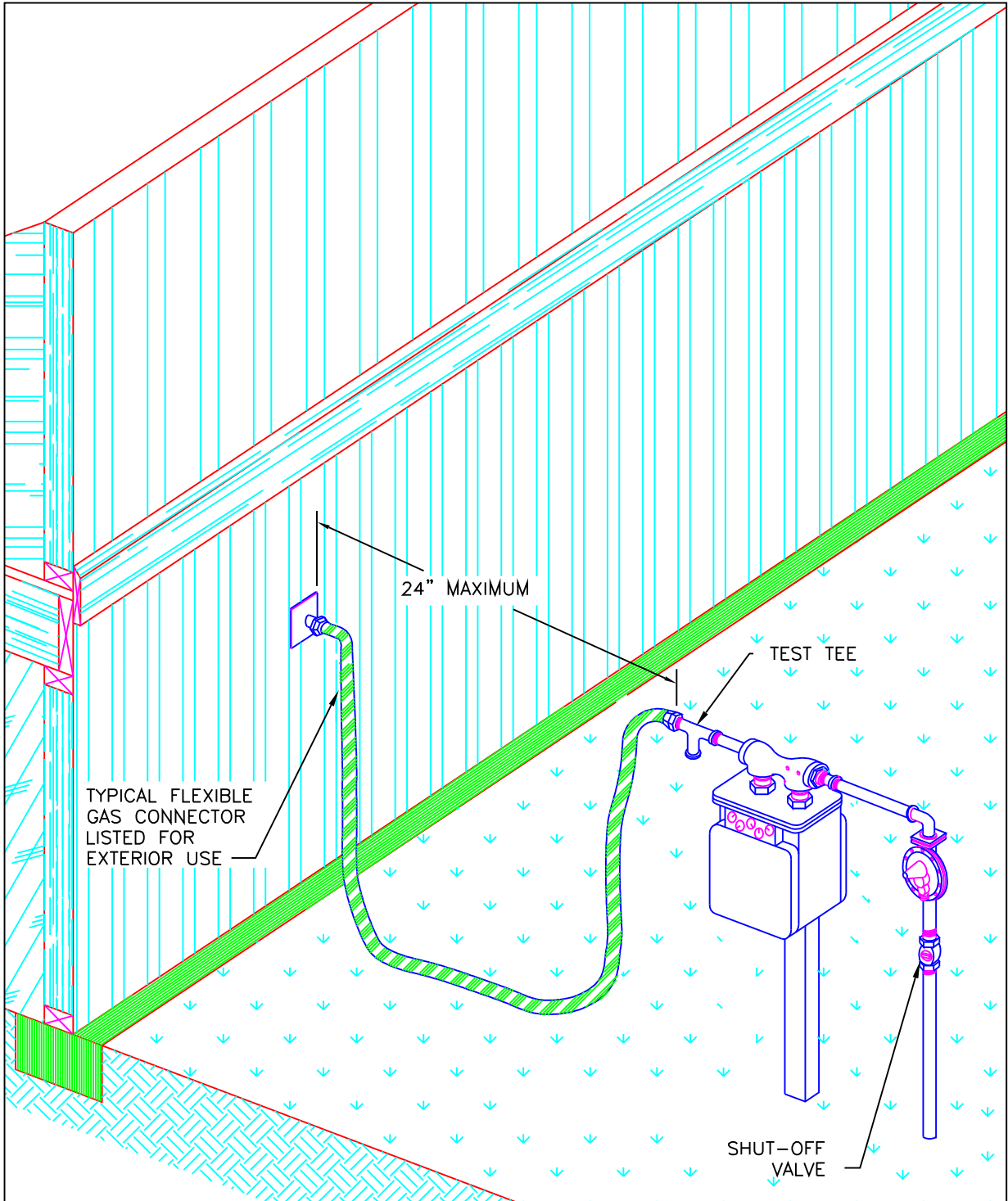
MANUFACTURED STRUCTURE  
AND PARK SPECIALTY CODES

CHAPTER 6  
FIGURE 6-3.4



TYPICAL UNDER-FLOOR CROSSOVER DUCT CONNECTION

REV. 12/01/01 RHW	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 6 FIGURE 6-3.5
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TYPICAL FLEXIBLE GAS CONNECTOR LISTED FOR EXTERIOR USE

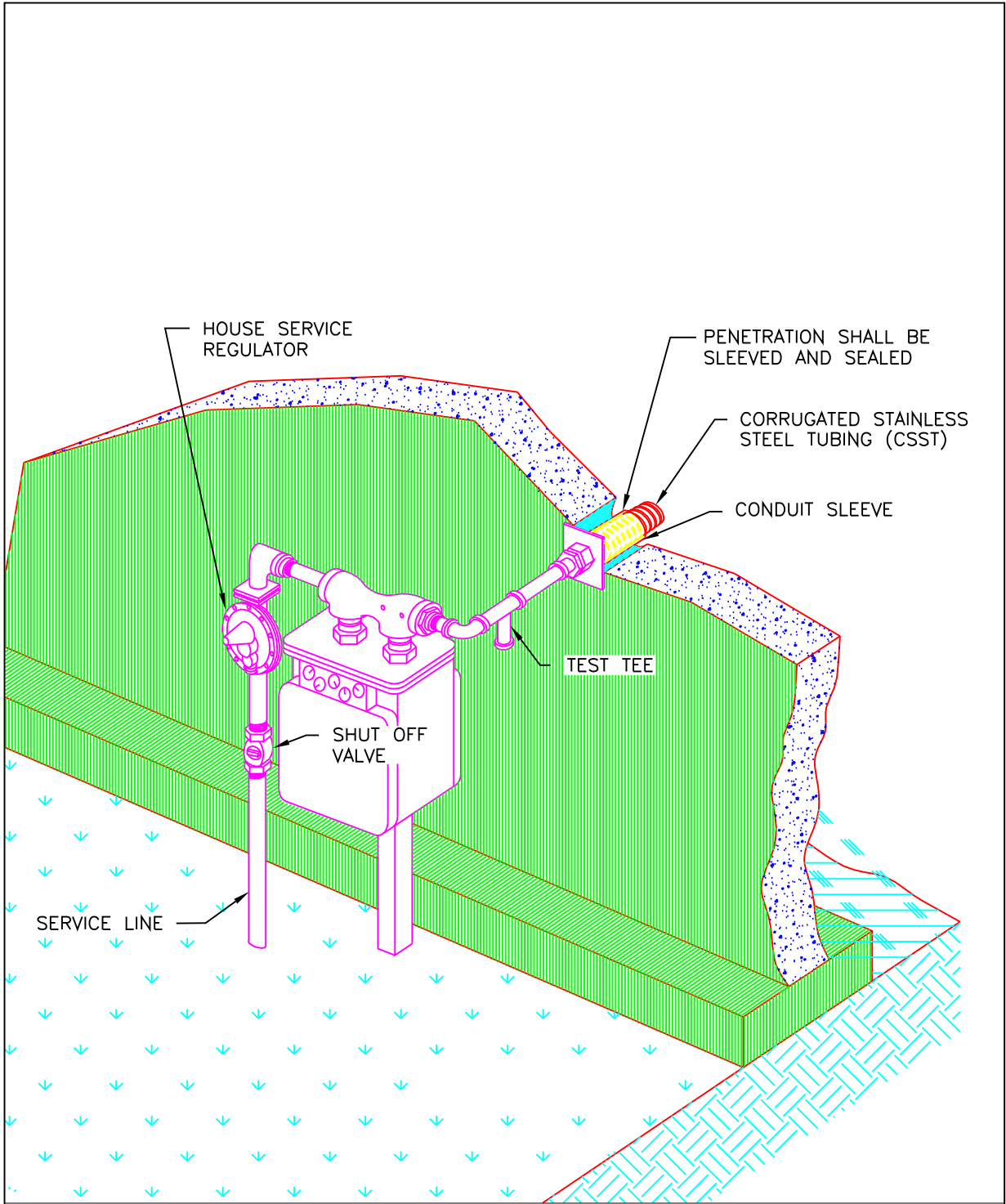
24" MAXIMUM

TEST TEE

SHUT-OFF VALVE

TYPICAL FUEL GAS METER CONNECTOR

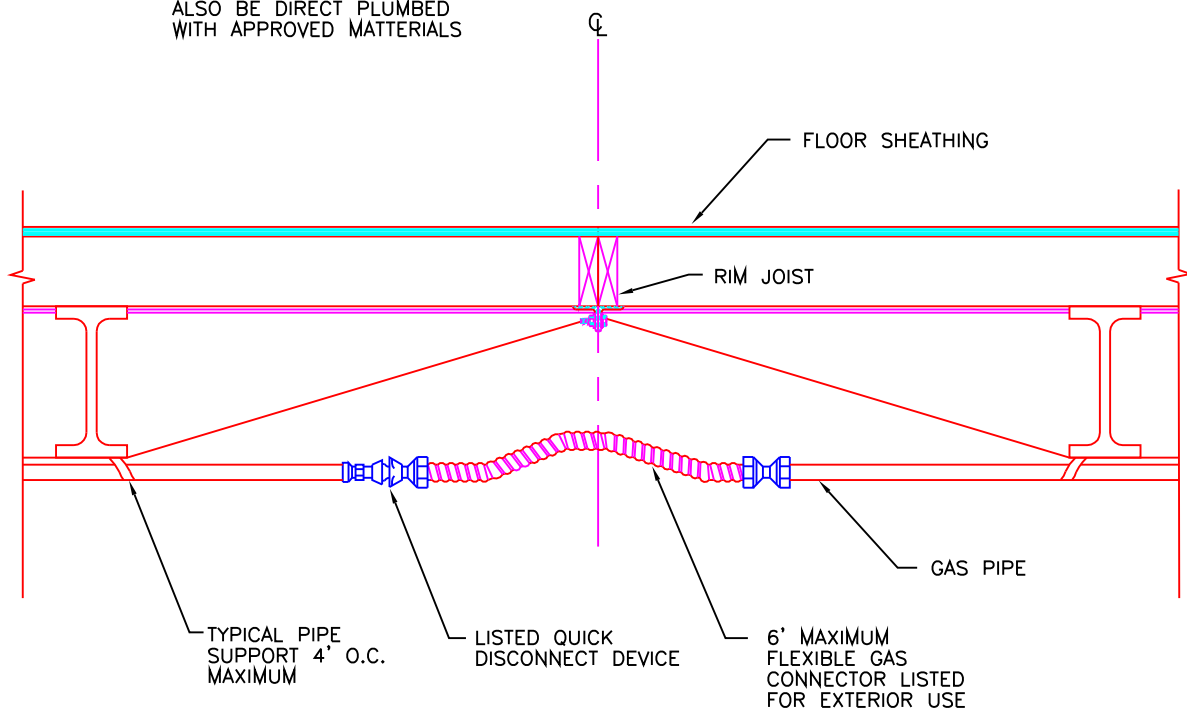
	<p>MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES</p>	<p>CHAPTER 6</p>
<p>REV. 12/01/01 RHW</p>		<p>FIGURE 6-4.5</p>



TYPICAL GAS SUPPLY CONNECTION THROUGH CONCRETE FOUNDATION

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 6
REV. 12/01/01 RHW		FIGURE 6-4.5A

NOTE: FUEL GAS CROSSOVER MAY ALSO BE DIRECT PLUMBED WITH APPROVED MATERIALS



TYPICAL FUEL GAS PIPE CROSSOVER CONNECTION

REV. 12/01/01 RHW

MANUFACTURED STRUCTURE  
AND PARK SPECIALTY CODES

CHAPTER 6  
FIGURE 6-5.6