**02 DEPARTMENT OF PROFESSIONAL AND FINANCIAL REGULATION**

**658 MAINE FUEL BOARD**

**CHAPTER 13 INSTALLATION OF PROPANE AND NATURAL GAS BURNING EQUIPMENT**

**Summary**: This Chapter sets forth requirements for the installation of propane and natural gas burning equipment and describes the necessary safety controls, devices and standards for the reduction of fire hazards associated with propane- and natural gas-fired equipment used in residential, commercial, and industrial applications.

**13.1 Workmanship**

All work must be conducted, installed, and completed in a neat and professional manner reflecting a minimum level of competent workmanship.

**13.2 Repair or Replacement**

Repair of any system or replacement of parts may be made in the same manner as it was in the existing system provided that such repair or replacement is not hazardous. All material, equipment and devices must be constructed and installed in accordance with their specific purposes and listings.

**13.3 Maintenance**

13.3.1 **General**

All gas burning equipment and systems, both new and existing, and parts thereof must be maintained in a safe condition.

13.3.2 **Notification to Property Owner of Code Violations**

When performing any service on a customer’s gas system, the licensee must notify the property owner in writing of any code violations and make recommendations to address them.

13.3.3 **Combustion Efficiency Test Required**

When performing an annual tune-up on a gas-fired central heating system, a combustion efficiency test must be conducted and a copy of the test results must be posted on-site.

**13.4 Installations**

13.4.1 **Code Compliance Required Prior to Firing**

13.4.1.1 Whenever a propane or natural gas appliance and/or system is installed, the total installation must be brought into compliance with the requirements of NFPA 54, NFPA 58 and all other rules of the Board **BEFORE** the furnace, direct-fired water heater, or boiler is fired. Prior to leaving the installation (whether installed inside or outside any structure) unsupervised, the licensed propane and natural gas technician must observe, inspect, and test the equipment to ensure that the installation is operating safely and properly and meets all applicable rules of the Board.

13.4.1.2 Installations of propane and natural gas appliances and/or systems must also comply with all other applicable statutes or rules of the State and all applicable ordinances, orders, rules, and regulations of local municipalities.

13.4.2 **Gas Piping Identification**

Gas piping systems installed with ½ inch ID or larger pipe, excluding CSST, shall be permanently identified by utilizing one of the following methods:

13.4.2.1 With a sticker having a yellow background with black lettering identifying the pipe as containing “flammable gas.” When used, stickers shall be placed at least every eight (8) feet along the length of the piping branch, not less than once per room and must be visible from floor level; or

13.4.2.2 A continuous stripe of yellow paint or manufacturer provided yellow covering may be utilized. The paint or covering must be continuous along the entire length of piping and must be visible from floor level.

13.4.3 **Water Connections to Boilers and Water Heaters**

13.4.3.1 **Hot and Cold Water Piping**

A propane and natural gas technician with the appliance connection and service authority may connect hot and cold water piping from a boiler or gas fired water heater to existing piping only in the same room where the installation is taking place. Such connections may not be made beyond any existing branch connection supplying water, in accordance with Maine Revised Statutes, Title 32, Section 3302.

13.4.3.2 **State Plumbing Rules**

All piping and safety controls on domestic water heaters, domestic water connections to boilers and water heaters, and condensate disposal from condensing gas fired appliances must be made in accordance with the rules of the Plumbers’ Examining Board as established by Title 5, section 12004-A, subsection 32 of the Maine Revised Statutes.

 13.4.4 **Condensate from Fuel Fired Appliances**

1. An approved neutralizer shall be installed in the condensate drain system of all fuel fired condensing appliances, so the condensate is rendered innocuous.
2. Condensate from fuel fired appliances shall be drained into an existing open receptor through an air gap that is connected to a sanitary drainage system in accordance with the rules of the Maine Plumbers’ Examining Board as established by Title 5, section 12004-A, subsection 32 of the Maine Revised Statutes.
3. If there is no existing open receptor, connection to a sanitary drainage system must be done by a Maine licensed master or journeyman plumber utilizing a permit in accordance with the rules of the Maine Plumbers’ Examining Board, as established by Title 5, section 12004-A, subsection 32 of the Maine Revised Statutes.
4. Condensate shall not be disposed of by routing through a floor and into a perimeter drain system or underneath a slab.
5. When the installation requires a condensate pump, the condensate pump must be installed in accordance with the manufacturer’s instructions. The condensate pump discharge shall rise vertically to a point where it is possible to discharge to an open receptor connected to the sanitary drainage system.
6. Where an installation requires a condensate pump, the condensate pump must be interlocked with the appliance to prevent to appliance from operating during a condensate pump failure.
7. Each fuel fired condensing appliance requiring a condensate pump shall be provided with its own individual condensate pump.

13.4.5 **Additional Requirements**

When an appliance other than a furnace, direct-fired water heater, or boiler is installed, the following must be done:

1. The entire gas piping system must be brought into compliance with the requirements of NFPA 54 and all other rules of the Board;

2. All appliances which are designed to be vented, including existing appliances, must be vented in accordance with NFPA 54; and

3. Any existing code violations must be reported to the owner in writing, a copy of which must be retained by the installer such that it may be produced for inspection upon request of a Board inspector.

13.4.6 **Vented Central Heating Appliance - Efficiency Test**

When installing a vented central heating appliance, the installer must conduct a combustion efficiency test, unless prohibited by the manufacturer, and must post a copy of the test results on-site.

13.4.7 **Unvented Heaters in Bedrooms or Bathrooms or HUD-Code Homes**

 13.4.7.1 The use of unvented heaters in bedrooms and bathrooms is prohibited.

 13.4.7.2 The use of unvented heaters, in HUD-Code homes (Manufactured Housing) as defined in Maine Revised Statutes, Title 10, Section 9002(7)(A), is prohibited.

**13.5 Low Water Control for Boilers**

13.5.1 **Low Water Control Required**

All gas-fired boilers must be provided with a properly installed and operating low water cut-off.

13.5.2 **Location**

The low water cut-off may be installed in or attached to the boiler at the level recommended by the boiler manufacturer, but in no case shall the low water cut-off be installed below the crown sheet. The low water cut-off, when not installed directly in the boiler, may be installed either in the main supply line (vertical riser) as close to the boiler as possible or in a water column of continuous piping attached directly to the boiler.

13.5.3 **Appropriate Design**

The low water cut-off must be designed and approved for the medium used (steam or water).

13.5.4 **No Obstructions**

No valves or other obstructive devices shall be installed between the boiler and safety controls.

13.5.5 **Acceptable Manufacturer’s Alternatives**

13.5.5.1 Installations meeting the low water cut off requirements of NFPA 54 shall be accepted as meeting the provisions of this Section.

13.5.5.2 A pressure switch installed by the manufacturer and specified by the manufacturer as low-water protection shall be accepted as meeting the low water cut off requirements of NFPA 54.

**13.6 Heat Loss Requirement**

13.6.1 **New Installations of Central Heating Systems**

Heat loss system design and system load calculations for all new installations of a central heating system must be performed prior to installation. The licensee must retain a copy of the heat loss system design and system load calculations such that it may be produced for inspection upon request of a Board inspector.

13.6.2 **Replacement of Central Heating Systems**

A heat loss and/or load calculation must be conducted before replacement of a central heating system. The licensee must retain a copy of the heat loss system design or system load calculations, or the stamped plans of an engineered system, such that they may be produced for inspection upon request of a Board inspector.

**13.7 Conversion Burners**

13.7.1 **400,000 btu or less**

When converting to propane or natural gas from another fuel source of which the input of the burner is 400,000 btu or less, the following requirements must be met:

1. The conversion burner must be a listed conversion burner.

2. The installer must obtain written verification from the manufacturer of the appliance to be converted or the burner manufacturer that the appliance is capable of being used with gas as a fuel source.

3. The burner selection criteria included in ANSI Z21.8, and the appliance and/or burner manufacturer’s combustion setup instructions must be used.

4. If the appliance being converted is designed to operate with a positive chamber pressure, the appliance manufacturer or the conversion burner manufacturer must provide installation and setup instructions specific to the appliance being converted.

5. The installation must conform to NFPA 54 and ANSI Z21.8, as incorporated by reference into NFPA 54.

13.7.2 **Greater than 400,000 btu**

When converting to propane and natural gas from another fuel source of which the input of the burner is over 400,000 btu, the burner must be listed by Underwriters’ Laboratory or by an independent nationally recognized testing laboratory and the following requirements must be met:

1. The installer must obtain written verification from the manufacturer of the appliance to be converted or the burner manufacturer that the appliance is capable of being used with gas as a fuel.

2. The burner must be selected for use in the make and model of appliance in which it is intended to be installed and must meet one of the following conditions:

A. The burner manufacturer must provide written documentation that the burner has been approved by the burner manufacturer for use in the appliance intended to be converted;

B. The burner has been tested by an independent testing laboratory in the make and model of appliance in which it is intended to be installed and has been certified for use in such appliance by the nationally recognized independent testing laboratory;

C. The burner has been tested by the appliance manufacturer in the make and model appliance in which it is intended to be installed and has been approved for use in such appliance by the appliance manufacturer.

 Cannot be used before the appliance and/or burner manufacturer provides installation and combustion set-up instructions for the appliance being converted.

3. The installation must conform to the requirements of NFPA 54 and NFPA 211 for the installation of a gas appliance.

13.7.3 **Oil** **Tank Requirements Upon Conversion to an Alternative Fuel**

The requirements of this Section must be performed by a master or journeyman oil burner technician.

If an oil burning appliance is replaced with a gas fired appliance, the fuel oil tank and burner supply piping must be removed from the premises in accordance with NFPA 31.

If an oil burning appliance is converted to an alternative fuel, but the tank is left in place so that it can be returned to service at some future date, all of the following requirements must be met before the alternative fuel is used:

13.7.3.1 The vent piping must remain intact and open to the outside of the building;

13.7.3.2 The fill pipe must be removed completely and the tank must be plugged with a threaded malleable iron plug;

13.7.3.3 The burner supply line must be removed and the valves on both the tank and burner must be capped or plugged; and

13.7.3.4 If an underground oil supply line is in use and complies with Section 8.9 of Chapter 8 of Board Rules, it may remain in place provided that all of the following conditions are met:

1. The oil line is emptied of its contents;

2. The oil line is disconnected from the oil tank and burner; and

3. The oil line is plugged on both ends in addition to the burner and tank fittings being plugged.

Oil can remain in the tank unless prohibited by the local authority having jurisdiction or the Maine Department of Environment Protection.

**13.8 Electrical Wiring and Equipment**

13.8.1 **Code Compliance; General Requirements**

The following requirements must be met with respect to the electrical wiring and equipment used in connection with propane or natural gas burning equipment:

1. The electrical wiring and equipment used must be installed in accordance with NFPA 70;

2. Safety control circuits must be two-wire, one side grounded, having a nominal voltage not exceeding 150 Volts. A safety control or protective device must be connected so as to interrupt the ungrounded conductor; and

3. The control circuit must be connected to a power supply branch circuit fused at not more than the value appropriate for the rating of any control or device included in the circuit.

4. Whenever a furnace, direct-fired hot water heater, or boiler is installed, each unit must have its own dedicated electrical circuit.

13.8.2 **Emergency Switch**

13.8.2.1 For central heating equipment and water heating appliances where the interruption of an electrical circuit will arrest the combustion process, an identified emergency shutdown switch must be placed outside of and adjacent to the entrance of the room where the appliance is located.

13.8.2.2 An emergency switch shall not be placed outside of any building.

13.8.2.3 If the entrance to the boiler room is only accessible from the outside, the emergency switch may be placed at the inside not more than one foot beyond the door opening.

13.8.2.4 On multi-unit installations of commercial and industrial equipment, the emergency switch must be installed in accordance with Figure 13-1.

13.8.2.5 On multi-unit installations, in other than one- and two-family residences, the emergency shut-off switch must be placed at the outside entrance of the room containing the appliances. The emergency switch must be wired so that, if the emergency switch is opened, all central heating equipment and water heating appliances (within that room) where the interruption of an electrical circuit will arrest the combustion process will be rendered inoperable. Where there are other (new or existing) multi-unit appliance rooms in the same building, those rooms must also be made compliant with this requirement.



13.8.3 **Service Switch**

For central heating equipment and water heating appliances where the interruption of an electrical circuit will arrest the combustion process, a service disconnect switch for control of the burner while observing the flame must be placed at the unit, within three (3) feet of the burner.

13.8.4 **Thermal Cut-Off Switches**

13.8.4.1 For central heating equipment and water heating appliances where the interruption of an electrical circuit will arrest the combustion process, a thermal cut-off switch must be wired into the burner circuit to shut off the burner in the event of a fire at the unit. The switch must be placed at the highest point directly above the unit to be fired with the thermal element pointed downwards, and must be placed on the bottom of the floor joist or stringer at the front of the unit. In no case shall it be lower than the point where the flue connector enters the chimney. The switch must be wired to shut off the burner, circulating fan, forced or induced draft fan and any electrically-operated gas valves. A thermal electric switch is required for each electrically-powered gas-fired unit in a multi-appliance installation.

13.8.4.2 On multi-unit installations other than one- and two-family residences the thermal electrical switches must be wired in series through individual unit relays so that, if one switch is opened, all equipment will be rendered inoperable.

13.8.5 **Controls Containing Mercury**

Thermostats containing mercury must be disposed of according to all federal and state regulations. (Refer to 38 M.R.S. § 1663 and check with your local supplier.)

**13.9 Steam Boilers**

Steam boilers must be installed according to manufacturer’s instructions.

**13.10 Safety and Pressure Relief Valves**

13.10.1 **Approved Safety or Pressure Relief Valve Required**

Steam and hot water boilers must be equipped with listed or approved steam safety or pressure relief valves that conform to ASME requirements. A shut-off valve shall not be placed between the relief valve and the boiler or on discharge pipes between such valves and the atmosphere.

* + 1. **Termination**

13.10.2.1 All steam safety or pressure relief valves must terminate in a manner which precludes the possibility of accidental scalding in accordance with ASME.

13.10.2.2 Steam safety relief valves over two (2) inches in diameter must terminate outside of the structure in a safe location.

13.10.2.3 Steam safety or pressure relief valves which terminate in the structure must terminate six (6) inches to twelve (12) inches above the floor.

13.10.3 **Installation in Upright Vertical Position**

Steam safety and pressure relief valves on boilers must be installed with the spindle in the upright vertical position.

**13.11 Water and Steam Boiler Pipe Supports**

13.11.1 **Generally**

Piping must be supported with pipe hooks, metal pipe straps, bands, brackets or hangers suitable for the size of the piping and must be of adequate strength and quality and located at intervals so as to prevent or damp out excessive vibration.

13.11.2 **Spacing**

Spacing of supports shall not be greater than as shown in Table 13-1.

13.11.3 **Allowance for Expansion and Contraction**

Supports, hangers, and anchors must be installed so as to not interfere with the free expansion and contraction of the piping between anchors. All parts of the supporting equipment must be designed and installed so that they will not be disengaged by movement of the supporting piping.

**Table 13-1**

**Support of Piping**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Steel Pipe, Nominal Size of Pipe(Inches) | Spacing of Supports(Feet) |  | Nominal Size of Tubing(Inch O.D.) | Spacing of Supports(Feet) |
| ½” | 6’ |  | ½” | 4’ |
| ¾” or 1” | 8’ |  | 5/8” or ¾” | 6’ |
| 1 ¼” or larger (horizontal) | 10’ |  | 7/8” or 1” | 8’ |
| 1 ¼” or larger (vertical) | every floor level |  |  |  |

**13.12** **PEX Tubing**

 All PEX tubing and fittings used in heating systems must be listed by the manufacturer for use on heating systems and be manufactured with an oxygen barrier.

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STATUTORY AUTHORITY: 32 MRSA §18123(2)

Effective date:

 September 27, 2014 – filing 2014-246

AMENDED:

 December 8, 2015 – Section 13.7 added, filing 2015-240

REPEALED AND REPLACED:

 September 16, 2023 – filing 2023-169