**02 DEPARTMENT OF PROFESSIONAL AND FINANCIAL REGULATION**

**658 MAINE FUEL BOARD**

**CHAPTER 9 INSTALLATION OF SOLID FUEL BURNING EQUIPMENT**

**Summary**: This Chapter sets forth requirements for the proper installation of solid fuel burning equipment.

**9.1 Scope**

This Chapter applies to residential, commercial and industrial installations of solid fuel burning equipment which are connected to a central heating system or water heating equipment.

**9.2 Nationally Accredited Testing Laboratory**

All heating, chimney and fireplace equipment, as well as any accessory equipment, must be listed and approved by Underwriters’ Laboratories or by an independent nationally recognized testing laboratory. Such listing must be in effect at time of installation.

**9.3 Workmanship**

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

**9.4 Installations**

Whenever a furnace, direct-fired water heater, or boiler is installed, the total installation must be brought into compliance with the requirements of NFPA 211 and all other rules adopted by 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) unattended, the licensed solid fuel technician must observe, inspect, and test the equipment to ensure that the installation is operating safely in accordance with the Board’s rules.

**9.5 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.

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

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

**9.7 Heat Loss Requirement**

9.7.1 **New Installations**

Heat loss system design and system load calculations for all new installations must be performed prior to the installation. The licensee must supply a copy to the owner and 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.

9.7.2 **Replacement Systems**

A heat loss and/or load calculation must be conducted before replacement. The heat loss and/or load calculation may be obtained from the original design plans. The licensee must retain a copy of the heat loss system design or system load calculations and produce it for inspection upon request of a Board inspector.

**9.8 Appliances**

9.8.1 **Installation to Conform to Listing**

Solid fuel burning appliances must be listed and installed in accordance with the terms of their listing.

9.8.2 **Manufacturer’s Instructions**

The manufacturer’s instructions must be provided to the owner along with a copy of the 9.7.1 calculations.

9.8.3 **Installation to be Made by Experienced Technicians**

The installation must be made by licensed technicians experienced in making such installations.

9.8.4 **Accessibility for Cleaning, Repair and Maintenance**

The installation must be such as to provide reasonable accessibility for: cleaning heating surfaces; removing burners (multi-fuel and/or combination units); replacing motors, controls, air filters, draft regulators, chimney connectors, and other working parts; and adjusting, cleaning, and lubricating parts requiring such attention. This requirement also pertains to stoker-fired units.

9.8.5 **Clearance From Combustible Materials**

No combustible material shall be placed adjacent to the solid fuel burning appliance with less clearance than permitted by the manufacturer, NFPA 211 or the Board’s rules.

9.8.6 **Flammable Vapors or Gases**

Solid fuel burning units shall not be installed where gasoline or any other flammable vapors or gases are likely to be present unless the unit is a sealed combustion system for which the air is taken from the outside.

9.8.7 **Installations in Conjunction With Oil Burning Equipment**

Whenever a solid fuel appliance is installed to work in conjunction with an oil burning appliance, the wiring of the oil burning appliance must be brought into compliance with the requirements of the Board’s rules before the unit is fired. The wiring update must include the following where applicable:

1. Properly rated fuse or breaker;

2. Properly rated wiring;

3. Properly installed and located emergency switch;

4. Properly installed and located thermal electric switch;

5. Properly installed and located service switch; and

6. Properly installed and located low water cut-off.

**9.9 Solid Fuel in Garages**

Except as described in Section 9.9.1, solid fuel burning appliances shall not be installed in any garage unless installed in a separate room, either in or attached to the garage, that is accessible only from the outside. For a major repair garage, the required fire wall separation is two (2) hours. For a minor repair or parking garage, the required fire wall separation is one (1) hour. All combustion air must be taken from outside the building.

9.9.1  **Exception for Solid Fuel in Garages of One-and Two-Family Dwellings**

Solid fuel burning appliances using sealed combustion systems for which the air for combustion is taken from the outside may be installed in garages of one- and two-family dwellings.

**9.10 Power Failure By-Pass and Valves**

9.10.1 **Power Failure By-Pass and Valve Required**

A solid fuel boiler must be provided with a power failure by-pass and valve in a closed system.

9.10.2 **Installation of By-Pass Valves**

To prevent overheating conditions during a power failure, a normally open zone valve must be connected to the largest heating loop in the system above the level of the boiler. A manual by-pass valve must be installed in case of the failure of the zone valve. This shall be accomplished by installing the zone valve prior to the flow valve and connecting it to the largest loop in the system. The hand valve must be installed in a loop around the zone valve as illustrated in Figure 9-1.

9.10.3 **By-Pass Valves – Outside Boilers**

Section 9.10.2 does not apply to listed outdoor solid fuel burning central heating appliances.

9.10.4 **Limitation of Applicability**

Section 9.10.2 does not apply to solid fuel burning appliances for which the interruption of power will arrest combustion and interrupt fuel supply if the appliance is a residential-type heating appliance as defined in NFPA 211 

**9.11 Air Combustion and Ventilation**

Solid fuel burning appliances must be installed in a location and manner to provide adequate ventilation and combustion air supply to permit proper fuel combustion, chimney draft and maintenance of safe temperatures. In cases of buildings which are so tight that normal infiltration does not provide the necessary air, outside air must be introduced in accordance with manufacturer’s instructions.

**9.12 Electrical Wiring and Equipment**

9.12.1 **Basic Standards**

The following standards must be met for the electrical wiring and equipment used in connection with solid fuel burning equipment:

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

9.12.1.2 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

9.12.1.3 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.

9.12.2 **Additional Standards: Automatic Feed**

The following additional standards must be met for solid fuel burning appliances where the fuel is automatically fed:

9.12.2.1 **Electrical Equipment, Required Control Switches**

9.12.2.1.1 **Thermal Electric Switches**. 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 directly above the unit to be fired with the thermal element pointed downwards and must be placed at the front of the unit. The switch must be no lower than the highest point of the flue connector where it enters the chimney. The switch must be wired to shut-off the burner, circulating fan, forced or induced draft fan and any remote fuel delivery device that is not an integral part of the burner. A thermal electric switch is required for each unit in a multi-appliance installation.

9.12.2.1.2 On multi-appliance installations the emergency and thermal electrical switches must be wired in series through individual unit relays such that, if one thermal switch or the “EMERGENCY” switch is open, the combustion air fan and fuel delivery system will be shut off. This also applies if there are two or more appliance rooms in the same building connected to a common fuel supply system.

[NOTE: An example of wiring for multi-appliance installations is illustrated in Figure 9-2.]



9.12.2.2 **Disconnect Switch**. A burner disconnect switch must be placed within three (3) feet of the burner.

9.12.2.3 **Emergency Switch**

9.12.2.3.1 An identified switch to shut down the boiler, furnace or water heater in an emergency must be placed outside of and adjacent to the entrance to the room where the appliance is located.

9.12.2.3.2 If the entrance to the room where the appliance is located is only accessible from outdoors, the emergency switch may be placed inside not more than one (1) foot beyond the door opening.

**9.13 Installation of Combination Units (Solid Fuel/Oil/Gas)**

All multi-fueled appliances must comply with the applicable provisions of the Board’s rules.

**9.14 Conversion Burners**

When an appliance is converted from a liquid or gaseous fuel to a solid fuel, the conversion burner must be listed by Underwriters’ Laboratory or by an independent nationally recognized testing laboratory and must comply with all Sections of this Chapter***.***

9.14.1 **Testing in Individual Appliance Required**

A conversion burner must be tested for use in the individual appliance in which it is intended to be installed and must meet one of the following conditions:

1. The conversion burner has been tested by the burner manufacturer in the individual appliance in which it is intended to be installed and has been approved for use in such appliance by a licensed professional engineer with the proper disciplines;

2. The conversion burner has been tested by an independent testing laboratory in the individual appliance in which it is intended to be installed and has been certified for use in such appliance by the independent testing laboratory; or

3. The conversion burner has been tested by the appliance manufacturer in the individual appliance in which it is intended to be installed and has been approved for use in such appliance by the appliance manufacturer.

Such appliance manufacturer or licensed professional engineer must provide installation and combustion set-up instructions for the appliance.

9.14.2 **Installation into Direct Vent Appliances**

A conversion burner shall not be installed into direct vent appliances unless the conversion burner has been approved for use in the appliance by the manufacturer of the appliance.

9.14.3 **Installation into Power Vented Appliances**

A conversion burner shall not be installed into power vented appliances unless the power venter is specifically approved for use with solid fuel.

9.14.4 **Conversion From Another Fuel Source**

When converting to solid fuel from another fuel source, the installation must comply with all applicable provisions of NFPA 211 and the Board’s Rules.

9.14.5 **Clearance From Combustible Materials Required**

Warm air furnace plenums and ductwork must comply with the applicable provisions of NFPA 90B for clearance from combustible materials.

9.14.6 **Oil Tank Requirements upon Conversion to Solid Fuel**

9.14.6.1 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:

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

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

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

9.14.6.2 If an underground oil supply line is in use and complies with Section 8.8 of these 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.

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

9.14.6.4 The requirements of this section must be performed by a master or journeyman Oil Burner Technician.

9.14.7 **Interlock Device Required**

An interlock device must be installed so that combustion will be arrested if the burner is removed from the heating appliance.

9.14.8 **Limited Control Required**

Furnaces must have a 250 degree Fahrenheit limit control installed in the supply plenum not more than 10″ above the top surface of the heat exchanger. The limit control shall extend at least 12″ into the supply plenum.

**9.15 Low Water Control For Solid Fuel Fired Boilers**

Low water protection shall be accomplished in one of two ways:

9.15.1 **When Electrical Circuit Arrests Combustion**

If the opening of an electric circuit will arrest the combustion process, a low water cut-off will be satisfactory if it conforms to the following:

1. All solid fuel fired boilers must be provided with a properly installed and operating low water cut-off. 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;

2. The low water cut-off must be designed and approved for the media in which it is used, either steam or water; or

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

9.15.2 **When Electrical Circuit Does Not Arrest Combustion**

If the opening of an electric circuit will not arrest the combustion process, low water protection must be accomplished in accordance with the appliance manufacturer’s instructions.

**9.16 Safety and Pressure Relief Valves**

9.16.1 **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.

9.16.2 **Termination**

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

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

1. Steam safety or pressure relief valves which terminate in the structure must terminate 6″ to 12″ above the floor.

9.16.3 **Installation in Upright Vertical Position Required**

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

**9.17 Water and Steam Boiler Pipe Supports**

9.17.1 **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 appropriate intervals so as to prevent or damp out excessive vibration.

9.17.2 **Spacing**

Spacing of supports shall not be greater than shown in Table 9-1.

 **Table 9-1**

 **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 |  |  |

9.17.3 **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 disengage by movement of the supporting piping.

**9.18** **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 oxygenbarrier.

**9.19 Thermostatically-Controlled, Hand-Fired Warm Air Units**

9.19.1 **Limit Control Required**

A 250 degree Fahrenheit limit control must be installed in the supply plenum not more than 10″ above the top surface of the heat exchanger and must extend at least 12″ into the supply plenum.

9.19.2 **Operation of Limit Control**

The limit control must automatically prevent operation of the furnace in the event of power failure or shut off when 250 degrees Fahrenheit temperature is reached whether or not the electrical power source is available.

9.19.3 **Barometric Draft Control**

A barometric draft control, if required, must be installed in accordance with the manufacturer’s instructions.

**9.20 Emergency Temporary Repair of Warm Air Heat Exchangers**

Emergency temporary repairs of warm air heat exchangers in solid fuel burning appliances are allowed if the safety limitations of the repairs are explained in writing to the owner at the time of the repair.

**9.21** **Welding of Non-Residential Warm Air Heat Exchangers**

 Warm air heat exchangers in solid fuel burning appliances shall not be welded.

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