

STANDARDS

of the

National Board of Fire Underwriters

for the

Installation of

Oil Burning Equipments

as recommended by the

NATIONAL FIRE PROTECTION ASSOCIATION

NATIONAL BOARD OF FIRE UNDERWRITERS

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APRIL, 1941

NOTE

This pamphlet supersedes the edition of 1934 and the revisions issued in 1936 and 1939.

DEFINITIONS

The word "approved" as used in these standards means acceptable to the inspection department having jurisdiction: it means installed in accordance with standards of the National Board of Fire Underwriters pertaining thereto and, when referring to appliances, means tested and found suitable for installation and use. The inspection department having jurisdiction will determine the correctness of installation and use.

Underwriters' Laboratories, Inc., tests devices and materials for compliance with the standards of construction and performance established by the Laboratories and with regard to their suitability for installation in accordance with the appropriate standards of the National Board of Fire Underwriters. Such devices and materials are listed in the following publications:

List of Inspected Fire Protection Equipment and Materials,

List of Inspected Gas, Oil and Miscellaneous Appliances,

List of Inspected Electrical Equipment,

List of Inspected Appliances Relating to Accident Hazard, Automotive Equipment, and Burglary Protection.

Copies may be obtained from inspection departments or from Underwriters' Laboratories, Inc., Chicago, New York or San Francisco.

Many products may be identified by the Laboratories' label indicating both listing and factory inspection of current output.

A device or system having materials or forms different from those detailed in these standards may be examined and tested according to the intent of the standards and if found equivalent may be approved.

In these standards those provisions which are considered essential for adequate protection of life and property from fire are indicated by the words "shall" and "must."

The words "should" or "preferably" indicate advisory provisions, concerning which the inspection department having jurisdiction should be consulted.

STANDARDS

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National Board of Fire Underwriters for the Installation of OIL BURNING EQUIPMENTS

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Standards for the Installation of OIL BURNING EQUIPMENTS

1. Application and Scope. (a) These standards apply to oil-burning equipments for installation in furnaces and boilers used for heating dwellings and for various commercial and industrial applications.

NOTE. For the installation of oil burners in stoves and ranges originally designed for solid fuels see separately published standards.

(b) These standards are intended to prescribe reasonable provisions for the installation of oil burning equipments, based on minimum requirements for safety to life and property from fire. They cover the installation of the oil burners and all equipment connected thereto, including tanks, piping, pumps, control devices and all accessories. Careful attention to the maintenance and proper operation of the equipment is necessary for the continued safety of oil burning equipments.

(c) Where the circumstances or conditions of any particular installation are unusual and such as to render the strict application of these standards impracticable, the inspection department having jurisdiction may permit such modifications as will provide a substantially equivalent degree of safety.

2. Approval of Plans. Before installing or remodeling any oil burning equipment in other than dwellings, it is recommended that plans or sketches showing the relative location of burners, tanks, pumps, piping and elevations of buildings and their lowest floors or pits, relating to the proposed installation or alteration, be submitted for approval to the inspection department having jurisdiction.

3. Approved Burners. (a) Oil burners shall be of approved type.

(b) Oil burners for which a competent attendant will not be constantly on duty in the room where the burner is located, while the burner is in operation, shall be arranged to prevent abnormal discharge of oil at the burner by automatic means specifically approved for the burner with which it is used.

NOTE. Burners so equipped are listed by Underwriters' Laboratories as domestic oil burners.

(c) Oil burners for which a competent attendant will not be constantly on duty in the room where the burner is located, while the burner is in operation, are not required to be equipped with automatic means for preventing abnormal discharge of oil at the burner. When automatic features are installed in connection with oil burners of this type such automatic devices shall be specifically approved for use with the burner to which they are attached.

NOTE. Oil burners of this type are listed by Underwriters' Laboratories as industrial oil-burning systems.

4. Fuel Oil. (a) Fuel oil used with the burners to which these standards apply shall have a flash point of not less than 100 F., and shall be a hydro carbon oil free from acid, grit, and fibrous or other foreign matter likely to clog or injure the burners or valves. The flash point shall be determined by the Pensky-Martens Closed Tester, in accordance with the method of test adopted by the American Society for Testing Materials (A. S. T. M. Designation: D93-22), except that the Tag Closed Tester (A. S. T. M. Designation: D56-21) shall be authoritative in case of dispute concerning oils having a flash point in the vicinity of 100 F.

(b) The grade of fuel oil used with any burner shall be one which tests and experience have shown to be suitable for use with that burner.

NOTE. The list of inspected oil burners issued by Underwriters' Laboratories gives, for each burner, the minimum grade of fuel oil for which the burner is suitable.

5. Gravity Feed to Burners. (a) Gravity feed shall be used only with burners arranged to prevent abnormal discharge of oil at the burner by automatic

means specifically approved for the burner with which it is used.

(b) Gravity supply tanks shall not exceed 275 gallons individual capacity. Where more than one gravity supply tank is used, such tanks shall be connected to the feed pipe leading to the burner through a manually operated, approved three-way valve in such a way that only one tank can discharge its contents at a time.

(c) Where oil is supplied to a burner requiring gravity feed and a constant level valve is not incorporated in the burner assembly or in an auxiliary tank used in connection with an automatic pump, an approved constant level valve shall be installed in the oil feed line at the gravity tank or as close thereto as practicable, to insure uniform delivery of oil to the burner. The vent opening of such constant level valve shall be connected by piping or tubing to the outside of the building, unless the constant level valve is provided with an anti-flooding device. Vent piping or tubing of constant level valves shall not be connected to tanks or tank vents.

6. Pressure Tank Feed shall be used only with burners arranged to prevent abnormal discharge of oil at the burner by automatic means specifically approved for the burner with which it is used.

Pressure tanks shall not exceed a capacity of 60 gallons, and shall not be operated at pressures exceeding 50 pounds per square inch. Pressure tanks shall be equipped with a reliable pressure gage.

7. Installation of Underground Tanks. (a) Oil supply tanks should preferably be located outside of buildings and underground with top of tank below the level of all piping to which the tank is connected, to prevent discharge of oil through a broken pipe or connection by syphoning.

(b) Underground tanks shall be so buried as to have a cover of earth not less than 2 feet thick, or shall be covered with not less than 1 foot of earth on top of which shall be placed a slab of reinforced concrete not less than 4 inches thick. The slab shall be set on a firm, well tamped earth foundation and shall

extend at least 1 foot beyond the tank in all directions. Where tanks are buried underneath buildings such a concrete slab shall be provided in every instance.

8. Installation of Tanks Inside Buildings. (a) Oil supply tanks larger than 60 gallons capacity shall not be located in buildings above the lowest story, cellar or basement.

(b) Unenclosed inside storage tanks and auxiliary tanks shall not be located within 7 feet, horizontally, of any fire or flame.

(c) Oil supply tanks located inside buildings shall not exceed 275 gallons individual capacity or 550 gallons aggregate capacity (in one building), unless installed in an enclosure or casing constructed as follows:

The walls of the enclosure shall be constructed of reinforced concrete at least 6 inches thick or of brick at least 8 inches thick, and shall be bonded to the floor. The space between the tank and the enclosure shall be completely filled with sand or well tamped earth. Where the floor or other construction immediately above the tank is of fire-resistive construction capable of safely sustaining a load of 150 pounds per square foot, the walls of the enclosure shall be carried to a height not less than 1 foot above the tank and the space filled with sand or well tamped earth to the top; otherwise the enclosure shall have a top of reinforced concrete at least 5 inches thick or of equivalent construction.

Instead of an enclosure as above described the tank may be encased in reinforced concrete not less than 6 inches in thickness, applied directly to the tank so as to completely eliminate any air space.

(d) In buildings of ordinary construction the nominal gross capacity of tanks shall not exceed 5,000 gallons.

(e) In fire-resistive buildings the nominal gross capacity of the tanks shall not exceed 15,000 gallons.

(f) In any building, if in a fire-resistive or detached room cut off vertically and horizontally in an approved manner, from other floors of the main build-

ing, the nominal gross capacity of tanks shall not exceed 50,000 gallons, with an individual tank capacity not exceeding 25,000 gallons.

9. Installation of Outside Aboveground Tanks.

(a) Outside aboveground tanks shall not be located in closely built-up areas.

(b) The distance from outside aboveground tanks to line of adjoining property or nearest building shall not be less than set forth in the table below.

Capacity of Tanks, Gallons	Minimum Distance, Feet
750 or less	5
1,100 or less	10
3,000 or less	20
21,000 or less	25
31,000 or less	30
45,000 or less	40
64,000 or less	50
80,000 or less	60
128,000 or less	75
200,000 or less	85
266,000 or less	100
400,000 or less	150
666,000 or less	250
1,333,000 or less	300
2,666,000 or less	350

(c) For tanks of over 400,000 gallons capacity, a minimum distance of 175 feet to adjoining property or nearest building may be permitted, provided that an approved type of fire extinguishing system is installed for the tank and covering other parts of the yard or system.

(d) For tanks permitted from 50 feet and up to 175 feet of building or property line, the capacity may be increased 33 per cent if the tank is provided with an approved fire extinguishing system.

(e) The minimum distance from tanks to adjacent tanks shall conform to the following table:

Capacity of Tank, Gallons	Minimum Distance to any Other Tank
18,000 or less	3 feet
24,000 or less	5 feet
48,000 or less	10 feet
75,000 or less	13 feet
100,000 or less	15 feet
100,000 to 2,500,000	One tank diameter

(f) Tanks shall be so located as to avoid possible danger from high water. When tanks are located on a stream without tide, they shall, where possible, be down stream from burnable property.

(g) EMBANKMENTS OR DIKES. In locations where aboveground tanks are liable in case of breakage or overflow to endanger surrounding property, each tank shall be protected by an embankment or dike. Embankments or dikes shall be made of clay-core cinder-fill, earthwork, masonry or approved concrete. Such dikes shall have a capacity of not less than that of the tank or tanks surrounded. Earthwork embankments shall be firmly and compactly built of good earth from which stones, vegetable matter, etc., have been removed, and shall have a flat section at the top of not less than three feet and a slope of at least $1\frac{1}{2}$ to 1 on both sides. Small tanks with capacities of not over 25,000 gallons each may be grouped and a dike built around the group of tanks.

Embankments or dikes shall be continuous with no openings for piping or roadways. Piping should preferably be laid over or under embankments.

10. Setting of Tanks. (a) Underground tanks shall be set on a firm foundation and surrounded with soft earth or sand well tamped in place. Where necessary to prevent floating they shall be securely anchored or weighted.

(b) Inside storage and auxiliary tanks shall be securely supported by substantial incombustible supports to prevent settling, sliding or lifting.

(c) It is recommended that inside storage tanks be provided with draw-off or drain openings. When draw-off or drain openings are provided the tanks shall be installed with the bottom pitched to the draw-off or drain opening with a slope of not less than $\frac{1}{4}$ -inch per foot of length. The draw-off or drain opening shall be provided with suitable pipe connections in a form to provide a sump from which water or sediment can be readily drained at regular intervals.

(d) Outside aboveground tanks shall be set on a firm foundation. Those more than one foot above the ground shall have supports of masonry or protected

steel, except that wooden cushions may be used. No combustible material shall be stored under or within 10 feet of outside aboveground tanks.

11. Construction of Tanks. (a) Underground tanks and tanks inside buildings shall be constructed of steel or wrought iron of a minimum gauge (U. S. Standard) in accordance with the following table, except that for tanks of 181 to 275 gallons capacity, installed in buildings, and without masonry enclosures the minimum gauge shall be No. 14. Steel or wrought iron thinner than No. 7 gauge used in the construction of underground and enclosed tanks shall be galvanized.

Capacity, Gallons	Minimum Thickness	Weight Lb. per sq. ft.
7 to 285	16 gauge	2.50
286 to 560	14 gauge	3.125
561 to 1,100	12 gauge	4.375
1,101 to 4,000	7 gauge	7.50
4,001 to 12,000	$\frac{1}{4}$ inch (nominal)	10.00
12,001 to 20,000	$5/16$ inch (nominal)	12.50
20,001 to 30,000	$3/8$ inch (nominal)	15.00

If adequate internal bracing is provided, tanks of 12,001 to 30,000 gallons capacity may be built of $\frac{1}{4}$ -inch plate.

NOTE. For tanks larger than 1,100 gallons capacity, a tolerance of 10 per cent. in capacity is permitted.

(b) Outside aboveground tanks, including tops, shall be constructed of steel or wrought iron of a thickness in accordance with the following requirements.

1. HORIZONTAL OR VERTICAL TANKS NOT OVER 1,100 GALLONS CAPACITY.

Capacity (Gallons)	Minimum Thickness of Material
1 to 60	18 gauge U. S. Standard
61 to 350	16 gauge U. S. Standard
351 to 560	14 gauge U. S. Standard
561 to 1,100	12 gauge U. S. Standard

2. HORIZONTAL TANKS OVER 1,100 GALLONS CAPACITY.

Tanks having a diameter of not over 6 feet shall be made of at least $3/16$ -inch steel or wrought iron.

Tanks having a diameter of over 6 feet and less than 11½ feet shall be of at least ¼-inch steel or wrought iron.

3. VERTICAL TANKS OVER 1,100 GALLONS CAPACITY.

The minimum thickness of shell or bottom shall be 3/16-inch. The minimum thickness of roof shall be 1/8-inch.

The thickness of shell plates shall be in accordance with the following formula.

$$t = \frac{H \times D}{8,450 \times E}$$

t = thickness of plate in inches.

H = height of tank in feet above the bottom of the ring under consideration.

D = diameter of the tank in feet.

E = efficiency of vertical joint in ring under consideration.

In computing the efficiency of vertical joints the tensile strength of steel shall be taken as 55,000 pounds per square inch, and the shearing strength of rivets, 40,000 pounds per square inch.

NOTE. Vertical steel tanks with riveted shells constructed in accordance with American Petroleum Institute standard No. 12-A may be considered as meeting the above requirements.

(c) Joints shall be riveted and calked, brazed, welded or made tight by some equally satisfactory process. Tanks shall be tight and sufficiently strong to bear without injury the most severe strains to which they may be subjected in practice. Shells of tanks shall be properly reinforced where connections are made. All connections to storage tanks other than outside aboveground storage tanks, shall be made through the top of tank above the liquid level, except that tanks of not over 275 gallons capacity may have one bottom connection for gravity feed and one opening for an approved key stem gate valve to facilitate cleaning or for a scavenging line to be run to the outside and capped oil tight when not in use.

NOTE. While correct design and use of proper materials are essential, regardless of the type of construction employed, where tanks are welded the safeness and suitability of the completed container for the purpose intended will also equally depend upon the skill and competence of the welder. For this reason it is urged that the inspection department having jurisdiction assure itself of the integrity and responsibility of the firm or individual doing the work, the degree to which welders are qualified, and the character of supervision maintained while welding is in process.

(d) Pressure tanks shall be designed for at least six times the maximum working pressure.

(e) Prior to installation, underground and enclosed tanks shall be protected against corrosion on the outside in a manner satisfactory to the inspection department having jurisdiction, but in every case at least equivalent to two preliminary coatings of red lead followed by a heavy coating of hot asphalt.

NOTE. Tanks labeled by Underwriters' Laboratories have been tested and examined for compliance with these standards and detail standards of the Laboratories covering their design and construction.

(f) For fuel oil heavier than 35° API, tanks may be made of concrete. (See separately published standards for details of construction of concrete tanks.)

12. Tank Vents. (a) Storage tanks shall (except for hydraulic or inert gas systems) be equipped with an open vent or an approved automatically operated vent, arranged to discharge to the open air. Vent openings and vent pipes shall be of ample size to prevent abnormal pressure in the tank during filling but not smaller than 1¼-inch pipe size.

NOTE. Where storage tanks are filled by the use of a pump through tight connections special consideration should be given to the size of the vent pipe to insure that it is adequate to prevent the development of abnormal pressure in the tank during filling. This may be accomplished by providing a vent pipe commensurate in size with the discharge of the pump used or by means of an approved signaling or limiting device.

(b) Vent pipes shall be arranged to drain to the tank. The lower end of the vent pipe shall not extend through the top into the tank for a distance of more than one inch.

(c) Vent pipes shall terminate outside of buildings at a point not less than 2 feet measured vertically or horizontally from any window or other building opening. Outer ends of vent pipes shall be provided

with a weatherproof hood. Vent pipes should terminate sufficiently above the ground to prevent their being obstructed with snow and ice. Vent pipes of tanks containing heaters shall be extended to a location where oil vapors discharging from the vent will be readily diffused without danger of ignition.

(d) Vent pipes shall not be cross-connected with fill pipes or return lines from burners.

(e) Pressure tanks shall be equipped with an automatic relief valve piped to discharge outside of buildings.

(f) Vent openings on outside aboveground tanks shall be provided with approved flame arresters.

(g) Emergency Pressure Reliefs. With the exception of vertical, cone-roof tanks having a roof slope less than $2\frac{1}{2}$ inches in 12 inches and in which the strength of the joint between roof and shell is no greater than that of the weakest vertical joint in the shell, all aboveground tanks shall have some form of relief for preventing the development of excessive internal pressure in case of exposure fire surrounding the tank. The method of relief shall be acceptable to the inspection department having jurisdiction.

13. Tank Fill and Overflow Pipes. (a) Storage tanks, other than outside aboveground tanks, shall be filled only through fill pipes terminating outside of buildings at a point at least 5 feet from any building opening at the same or lower level. Fill terminals shall be closed tight, when not in use, by a metal cover designed to prevent tampering.

NOTE. In tanks containing heaters the tank end of the fill pipe should be sealed by a trap or should be extended to a point below the lower end of the suction pipe.

(b) Auxiliary tanks shall be filled by pumping from storage tanks.

(c) Cross connections permitting gravity flow from one tank to another shall be prohibited. This, however, shall not be construed as prohibiting the filling of an outside service tank by gravity, provided filling is through an open connection located within a dike

surrounding the service tank, and provided further that such dike shall have a capacity equal to $1\frac{1}{2}$ times the capacity of the tank being filled.

(d) Auxiliary tanks other than vacuum tanks shall be equipped with an overflow pipe draining to the storage tank, at least one size larger than the supply pipe.

(e) Overflow pipes of auxiliary gravity tanks shall have no valves or obstructions. Overflow pipes of auxiliary pressure tanks shall be provided with interconnected valves or other means for automatically venting the tank during filling.

14. Oil Gauging. (a) All tanks in which a constant oil level is not maintained by an automatic pump shall be equipped with an approved method of determining the oil level.

(b) Test wells shall not be installed inside buildings and where permitted for outside service shall be closed tight, when not in use by a metal cover designed to prevent tampering.

NOTE. The gauging of inside tanks by means of measuring sticks is a pronounced hazard and should not be permitted.

(c) Gauging devices such as liquid level indicators or signals shall be installed so that oil or vapor will not be discharged into the building from the fuel supply system.

15. Oil Pumps. (a) Oil pumps shall be of approved type, secure against leaks and shall be rigidly fastened in place.

(b) Automatic pumps not an integral part of the burner shall be arranged to stop automatically in case of total breakage of the supply line to the burner.

(c) In isolated locations, where fire protection equipment is dependent upon a heating plant fired by an oil burner, oil pumps supplying the burner shall be installed in duplicate.

(d) Pumps used in connection with the supply and discharge of outside aboveground storage tanks shall be located outside of the embankments or dikes sur-

rounding the tanks, and at such a point that they will be accessible at all times, even if the oil in the tank is on fire.

16. Piping. (a) All piping shall be standard full weight wrought iron, steel or brass pipe with standard fittings or approved brass or copper tubing with approved fittings, except that approved flexible metal hose may be used for reducing the effects of jarring and vibration or where rigid connections are impracticable.

(b) Pipe used in the installation of domestic type burners shall not be smaller than ¼-inch iron pipe size; pipe used in the installation of industrial type burners shall not be smaller than ½-inch iron pipe size. Copper or brass tubing shall not be smaller in size than the equivalent of the iron pipe sizes mentioned above, with wall thickness not less than 0.049 inch. Flexible metal hose shall be installed strictly in accordance with the limitations of its approval.

(c) Piping shall be rigidly secured in place and protected from injury in a workmanlike manner, and where necessary, shall be protected against corrosion. Where practicable, oil piping shall be buried underground or in a concrete floor or placed in a metal-covered pipe trench. Oil piping preferably should not be located close to other piping or in the same trench with other piping, except steam or hot water lines intended for heating the oil.

(d) Pipe joints and connections shall be made tight in a workmanlike manner. Unions and tubing fittings shall be of approved type. Unions requiring gaskets or packing, and right and left couplings shall not be used in oil lines.

(e) Proper allowance shall be made for expansion, contraction, jarring and vibration. Pipe lines, other than tubing, connected to underground tanks, except fill lines and test wells, shall be provided with double swing joints arranged to permit the tank to settle without impairing the efficiency of the pipe connections.

(f) Where storage tanks are set below the level of the burner the oil piping should preferably be so laid as to pitch toward the storage tank without traps.

(g) Openings for pipes through outside walls below the ground level shall be made oil tight by securely packing with flexible material.

(h) Oil supply lines to burners shall be provided with approved strainers.

NOTE. Where oil burners are fed by oil pumps drawing from supply tanks of considerable size located some distance above the level of the burner, the installation of an approved anti-siphoning device at the highest point in the suction line is recommended.

17. Valves. (a) Readily accessible shut-off valves of approved type shall be installed in oil supply lines near each burner and close to gravity and pressure supply tanks. Shut-off valves of approved type shall be installed on each side of oil strainers which are not a part of the oil burner unit, and on the discharge and suction side of oil pumps which pump directly to the burner but which are not a part of the burner unit.

(b) Where a shut-off valve is installed in the discharge line of an oil pump, an approved pressure relief valve shall be connected into the discharge line between the pump and the shut-off valve and arranged to return surplus oil to the storage tank or to bypass it around the pump.

NOTE. It is recommended that approved automatically operated valves designed to shut off the oil supply in case of fire in the immediate vicinity of the burner, or to shut off the oil supply in case of breakage of the oil supply piping, be installed where burners are not equipped with approved automatic devices for preventing abnormal discharge of oil at the burner (i. e., industrial type burners).

(c) Control valves shall be of approved type provided with stuffing box of liberal size, containing a removable cupped gland designed to compress the packing against the valve stem and arranged so as to facilitate removal. Valve shall be designed to close against the supply, and to prevent withdrawal of stem by continued operation of the handwheel. Packing affected by the oil or by heat shall not be used.

18. Preheating of Oil, where necessary, shall be done by steam, hot water or approved electric heaters. Heaters shall be substantially constructed with all joints made oil tight. Thermometers shall be installed at suitable locations to indicate the temperature of the heated oil.

Heaters shall be by-passed or provided with suitable means to prevent abnormal pressure.

19. Tests of Tanks and Piping. After installation and before being covered tanks and piping shall be tested hydrostatically, or with equivalent air pressure, at a pressure not less than $1\frac{1}{2}$ times the maximum working pressure but not less than 5 pounds per square inch at the highest point of the system. Instead of a pressure test, suction lines may be tested under a vacuum of not less than 20 inches of mercury.

Tests should continue for at least 30 minutes without a noticeable drop in pressure or vacuum.

20. Oil Burner Controls. (a) Oil burning equipments shall be provided with some means for manually stopping the flow of oil to the burner, from a conveniently located point at a safe distance from the burner.

With electrically driven equipment this may be accomplished by a switch in the motor supply circuit, placed near the entrance to the room where the burner is located. A quick-closing valve in the oil supply line, preferably located outside the building, may also be used.

(b) Automatically operated oil burners used in connection with hot water, steam or warm air heating systems shall be equipped with approved automatic devices to shut down the burner in the event of undue pressure in a steam boiler or overheating within a hot water boiler or warm air furnace.

NOTE. It is recommended that oil burners used in connection with steam heating systems be equipped with approved automatic devices for shutting down the burner in the event of low water in the boiler. The device should require manual resetting or it should prevent operation until the safe water level is resumed.

(c) Limiting controls and low water shut offs intended to disconnect the burner from the electric power supply should be connected into the burner supply circuit on the supply side of all other burner circuits.

(d) In systems where either steam or air is used for atomizing the oil, the oil and atomizing supply shall be interlocked in an approved manner so that in case of interruption of the atomizing supply, the oil supply will be immediately shut off.

(e) Electric motor-driven industrial oil burners with integral oil pumps, and electric motor-driven pump sets for use with industrial burners not equipped with integral pumps, shall be supplied with an approved motor controller incorporating no-voltage protection to be wired into the power supply to the motor.

NOTE. On failure of voltage such controllers cause and maintain the interruption of power from the main circuit. These controllers are included in Underwriters' Laboratories' List of Inspected Electrical Appliances under the heading "Industrial Control Equipment."

21. Electric Wiring and Equipment in connection with oil burning equipments shall be installed in accordance with the National Electrical Code.

22. Installation of the Burner. (a) Oil burners shall be securely installed in a workmanlike manner, in accordance with the instructions of the manufacturer, by qualified mechanics experienced in making such installations.

(b) Where oil burners are installed in furnaces originally designed for solid fuel, the ash door of the furnace should be removed or bottom ventilation otherwise provided to prevent the accumulation of vapors in the ash pit, unless the burner is of a type which mechanically purges the ash pit.

(c) Manually operated dampers shall be such that they cannot close off more than 80 per cent of the internal cross section area of the smoke pipe. Automatically operated dampers shall be of approved type designed to maintain a safe damper opening at all times and arranged to prevent starting of the burner unless the damper is opened at least 20 per cent of the internal cross section area of the smoke pipe.

(d) Rooms in which oil burners are located shall be provided with adequate ventilation to assure continuous complete combustion of the oil.

(e) Acceptance tests should be conducted where more than one burner is installed in a single combustion chamber or one burner is adapted to two or more combustion chambers, to make sure that the automatic devices for preventing abnormal discharge of oil at the burner will function properly in the event of failure of one or more units to ignite on starting or in the event of flame extinguishment of one or more units during operation.

(f) Complete instructions for the care and operation of the oil burning equipment shall be conspicuously posted near the oil burner and maintained in readable condition.

(g) Contractors installing industrial oil burning systems shall furnish diagrams showing the main oil lines and controlling valves, one of which shall be posted near the oil burning equipment and another at some point which will be accessible in case of fire at the burners.

APPENDIX

From the standpoint of fire hazard, the installation of the boiler or furnace, regardless of the fuel used, is as important as the installation of other parts of the particular fuel equipment.

Smoke pipes of boilers and furnaces should be connected to flues constructed as specified in the Building Code recommended by the National Board of Fire Underwriters.

The clearances between boilers, furnaces, their smoke pipes and combustible materials should not be less than given in the following paragraphs.

Clearances from Boilers and Furnaces. In dwellings, hot air, hot water and steam heating furnaces should be located at least 18 inches in any direction from woodwork or other combustible material or construction, including plaster on a combustible base.

In all other occupancies, the clear distance between a hot air furnace, hot water or low pressure steam boiler and combustible material, including plaster on combustible base, should not be less than 4 feet at the top or front, and not less than 3 feet at the sides and rear; provided that when the appliance is encased in brick or has an incombustible protective covering not less than 1½ inches thick such distance may be 3 feet at the top and 2 feet at the sides and rear.

Smoke Pipes. The smoke pipe should not pass through any combustible partition. The clear distance between a smoke pipe or metal breeching and combustible material or construction, including plaster on combustible base, should be not less than 18 inches, provided that the clearance may be reduced to 9 inches when the smoke pipe or breeching is protected with not less than 1 inch of asbestos or equivalent protection, or such combustible material or construction is protected by sheet metal or equivalent covering placed at least 1 inch from the surface to be protected and extending the full length of the smoke pipe and not less than 12 inches beyond it on both sides.

ITEMS LISTED BY UNDERWRITERS' LABORATORIES, INC.

Underwriters' Laboratories, Inc. "List of Gas, Oil and Miscellaneous Appliances" (published annually with semi-annual supplements) contains listings of the following items referred to in the foregoing standards. Later lists may include additional items. The latest list should be consulted in each case.

<u>Item Listed</u>	<u>Heading Under Which Listed</u>
Anti-siphoning Devices	Oil Burner Accessories
Control Devices	Oil Burner Accessories
Control Devices for Industrial Oil Burners	Oil Burners and Equipment

<u>Item Listed</u>	<u>Heading Under Which Listed</u>
Dampers, Automatic	Oil Burner Accessories
Hose, Flexible Metal	Oil Burner Accessories
Low-water Shut-offs	Oil Burner Accessories
Oil Burners with Abnormal-discharge Controls	Oil Burners (Domestic)
Oil Burners without Abnormal-discharge Controls	Oil Burners and Equipment
Pipe Unions	Unions
Pumps, Oil	Oil Burner Accessories
Strainers	Oil Burner Accessories (see also Strainers)
Tanks	Tanks for Hazardous Liquids
Tank Fill and Vent Fittings	Tank Accessories
Tank Float Switch	Oil Burner Accessories
Tank Gauging Devices	Tank Accessories
Tank Vent Flame Arresters	Flame Arresters
Tubing (for Installation or Factory Assembly)	Tubing, Gas
Tubing (for Factory Assembly only)	Oil Burner Accessories
Tubing Fittings	Fittings, Gas (see also Fittings, Hazardous Liquid)
Valves, Automatic Shut-off	Oil Burner Accessories
Constant Level	Oil Burner Accessories
Pressure Relief (by-pass)	Discharge Device Accessories
Quick-closing	Valves (Hazardous Liquid)
Shut-off	Valves (Hazardous Liquid)
Three-way	Valves (Hazardous Liquid)

