

NFPA 37
Standard for the
Installation and
Use of Stationary
Combustion
Engines and
Gas Turbines
1994 Edition



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The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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NFPA 37

**Standard for the Installation and Use of
Stationary Combustion Engines and Gas Turbines
1994 Edition**

This edition of NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*, was prepared by the Technical Committee on Internal Combustion Engines and acted on by the National Fire Protection Association, Inc. at its Fall Meeting held November 15-18, 1993, in Phoenix, AZ. It was issued by the Standards Council on January 14, 1994, with an effective date of February 11, 1994, and supersedes all previous editions.

The 1994 edition of this document has been approved by the American National Standards Institute.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

Origin and Development of NFPA 37

This standard was initiated in 1904 as "Rules and Requirements for the Construction and Installation of Gas and Gasoline Engines" by a committee of the National Board of Fire Underwriters. NFPA published editions in 1905, 1915, 1922, 1934, 1955, 1963, 1967, 1970, 1975, 1979, 1984, and 1990. In 1955, responsibility for the standard was transferred from the Committee on Gases to the Committee on Internal Combustion Engines.

In the 1994 edition of NFPA 37, significant changes include the following: clarification of applicability of document with regard to fire pumps (1-2.1), a statement added on equivalency (1.3), emergency lighting requirements clarified (3-1.2), a new section on engine protective devices for diesel engines added (4-5), and the section on fuel tanks for diesel and fuel oils completely revised, including the addition of definitions for "enclosed tank" and "unenclosed tank" (6-3).

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NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the fire safety of the installation, operation, and control of internal combustion engines, including gas turbine engines, using all types of fuel, within structures or immediately exposing structures.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Chapter 11 and Appendix B.

Chapter 1 General Provisions

1-1 Purpose and Scope.

1-1.1 This standard applies to fire safety for the installation and operation of stationary combustion engines and gas turbines not exceeding 7,500 horsepower per unit. This standard applies also to portable engines that remain connected for use in the same location for a period of one week or more and that are used instead of or to supplement stationary engines.

NOTE: For engines exceeding 7,500 hp, see NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants*.

1-1.2 This standard does not apply to engines used to propel any mobile structure.

1-2 Special Application.

1-2.1 Engines used to drive fire pumps shall comply with this standard and those contained in NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps*. In cases where provisions of NFPA 20 differ with those in this document, the provisions in NFPA 20 shall take precedence.

1-2.2 Engines used in essential electrical systems in health care facilities shall comply with this standard and any special provisions contained in NFPA 99, *Standard for Health Care Facilities*.

1-3 Discretionary Powers of Authority Having Jurisdiction. Nothing in this document is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety to those prescribed by this document, provided technical documentation is submitted to the authority having jurisdiction to demonstrate equivalency and the system, method, or device is approved for the intended purpose.

Chapter 2 Definitions

2-1 Official NFPA Definitions.

Approved. Acceptable to the authority having jurisdiction.

NOTE: The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations that is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

2-2 Definition of Terms Used in This Standard.

Engines. Prime movers such as internal combustion engines, external combustion engines, gas turbine engines, rotary engines, and free piston engines using either gaseous fuels or liquid fuels, or combinations thereof.

Engines, Portable. Engines mounted on skids, wheels, or otherwise arranged so that they can be moved from place to place as the required service indicates.

Flue Gas Temperatures. The temperatures of the flue products at the point or points of passing close to or through combustible materials, or at the entrance to a chimney, whichever is applicable.

Gallon. One U.S. gallon = 3.785 liters.

Hazardous Locations. For purposes of this document, areas where flammable or combustible gases or liquids, or combustible dusts or flyings normally exist.

Horsepower Rating:

Reciprocating Engines. The power of an engine measured at the flywheel or output shaft at standard SAE conditions of 29.61 in. (752.1 mm) Hg barometer at 77°F (25°C) inlet air temperature in accordance with SAE J1349, *Engine Power Test Code, Spark Ignition and Diesel.*

Gas Turbine Engines. The ANSI standard rated power of an engine at the output shaft at 14.696 psia (1.01325 bar) at 59°F (15°C) and a relative humidity of 60 percent in accordance with ANSI B133.6, *Procurement Standard for Gas Turbine Ratings and Performance.*

Psig. Pressure in pounds per square inch gauge.

Spark Protected. Electrical equipment enclosed in a tight case or protected by shields, screens, or insulation that will contain sparks or prevent their emission.

Tank, Day. A fuel oil tank, located inside a structure, that provides fuel to the engine.

Tank, Enclosed. A fuel tank located within a separate room, separated from other equipment.

Tank, Integral. A fuel oil tank furnished by the engine manufacturer and mounted on the engine.

Tank, Supply. A separate fuel tank for supplying fuel to the engine or to a day tank.

Tank, Unenclosed. A fuel tank not located in a separate room.

Chapter 3 Engines

3-1 General Locations.

3-1.1 Engines, with or without their weatherproof housings, that are attached to the engine subbase shall be permitted to be installed outdoors, inside structures, or on roofs of structures as follows:

3-1.1.1 Engines, and their weatherproof housings if provided, that are installed outdoors or outdoors on roofs of structures shall be located at least 5 ft (1.5 m) from openings in walls and at least 3 ft (1 m) from structures having combustible adjacent walls.

3-1.1.2 Engines rated at more than 50 hp shall be located in accordance with 3-1.1.1, or shall be installed in detached structures reserved exclusively for the purpose (or with equipment and processes having similar hazard) or in rooms within or attached to other structures.

3-1.1.2.1 Detached structures shall be of noncombustible or fire-resistive construction (*see NFPA 220, Standard on Types of Building Construction*). Provision shall be made for venting a fuel explosion with minimum structural damage (*see NFPA 68, Guide for Venting of Deflagrations*), or ventilation adequate to prevent a hazardous accumulation of flammable vapors or gases shall be provided both when the engine is operating or shut down (*see 3-1.4*).

3-1.1.2.2 Rooms located within structures shall have interior walls, floors, and ceilings of at least 1 hour fire-resistance rating. (The ceiling of such a room located on the top floor of a structure need not be fire-resistive but shall be either noncombustible or protected with automatic sprinklers.)

These rooms shall have provision for venting a fuel explosion with minimum structural damage (*see NFPA 68, Guide for Venting of Deflagrations*), or ventilation adequate to prevent a hazardous accumulation of flammable vapors or gases shall be provided both when the engine is operating or shut down (*see 3-1.4*).

Openings in the engine room that open into other sections of the structure shall be provided with automatic or self-closing fire doors or dampers to confine a fire to the engine room.

3-1.1.2.3* Rooms attached to structures shall comply with 3-1.1.2.1 except that the common wall shall have a fire resistance rating of at least 1 hour. Openings in the engine room that open into the interior of a structure shall be provided with automatic- or self-closing fire doors or dampers.

3-1.2 All engines shall have adequate emergency lighting as well as normal lighting.

3-1.3 Engines shall be situated so that they are readily accessible for maintenance, repair, and fire fighting.

3-1.4 Provision shall be made to supply sufficient air for combustion, proper cooling, and adequate ventilation. Air provided shall be sufficient to prevent flue gas products from being drawn from stacks or flues of boilers or other combustion devices in the same room used to exhaust combustion products. Requirements for air vary with the types and sizes of engines, the driven equipment, other air-consuming equipment in the room, and the nature of the engine room.

3-1.5 Combustible materials (not the engine and its appurtenances) shall not be located in a room housing an engine.

3-1.6 Gasoline or liquid-phase LP-Gas fueled engines shall not be installed in rooms or locations containing fired equipment or open flames.

3-2 Foundations. Engines shall be supported on firm foundations or suitable steel framework properly secured.

3-3 Roof Protection. If an engine is mounted on a roof, the surface beneath the engine and beyond the engine to a minimum distance of 12 in. (305 mm) shall be of a minimum 1-hour fire-resistive rating.

3-4 Hazardous Locations. In hazardous locations, engines not compressing a flammable gas or not pumping a flammable liquid shall be installed in an enclosure of fire-resistive construction well ventilated from a nonhazardous outside area and with outside access only.

3-5 Units Handling Hazardous Materials (Other than Their Own Fuel Supply).

3-5.1 The use of an integral engine-driven unit compressing a flammable gas or pumping a flammable liquid is permitted, provided the combination unit or groups of such combined units are suitably isolated from areas not having a similar hazard. Isolation shall be permitted to be achieved by location outdoors or by indoor structural separation in accordance with 3-1.1.2; except that indoor installation shall also comply with 3-5.1.1 through 3-5.1.3.

3-5.1.1 Provision shall be made for venting an explosion with minimum structural damage (*see NFPA 68, Guide for Venting of Deflagrations*).

3-5.1.2 Rooms containing combustion engines located within structures shall have interior walls, floors, and ceilings of at least 2 hours' fire resistance rating.

3-5.1.3 Such a room or structure shall be ventilated in an approved manner from a nonhazardous area.

3-5.2 Each spark-ignition engine comprising part of a unit for compressing a flammable gas or pumping a flammable liquid shall have magnetos or distributors and coils of the spark-protected type and have all leads positively attached. Ventilation openings in such devices shall be adequately protected by a fire screen unless the device is purged, pressurized, or otherwise protected.

3-5.3 Ignition wire shall be positively attached at each end by use of the outer sheath of the insulation.

3-5.4 Spark plugs shall be fully shielded against flashover. Fully radio-shielded spark plugs or spark plugs provided with insulating boots are acceptable.

3-5.5 Flame-arresting equipment shall be attached securely to the engine air intake to avoid blowoff or rupture. A firmly fixed air filter shall be considered as meeting this requirement.

3-5.6 Starter, generator, and associated electrical equipment attached to engines shall be of the spark-protected type.

3-5.7 Batteries, wiring, and electrical protective devices shall be protected against flashover and accidental shorting.

3-5.8 Means shall be provided for shutting down the engine at a readily accessible location remote from the engine.

3-6 Electrical Installations.

3-6.1 Electrical installations in rooms containing engines shall comply with NFPA 70, *National Electrical Code*®.

3-6.2 Engine rooms or other locations shall not be classified as hazardous locations as defined in Article 500 of NFPA 70, *National Electrical Code*, solely by reason of the engine fuel.

Chapter 4 Engine Protective Devices

4-1 All Engines. Each engine shall have an automatic engine speed governor.

4-2 Engines — 10 Horsepower or More. Engines of 10 hp or more shall be equipped with the device specified in 4-1 and the following additional protection shall be provided:

(a) An automatic engine shutdown device for high jacket water temperature or high cylinder temperature (*see 4-1*);

(b) An automatic engine shutdown device for low lubricating oil pressure or, in the case of a splash lubricated engine, for low oil level;

(c) If an engine is intended for emergency use only or is constantly attended, an alarm shall be permissible in lieu of the devices specified in (a) and (b).

4-3 Engines — 100 Horsepower or More. Engines of 100 hp or more shall have the devices specified in 4-1 and 4-2 and the following additional protection shall be provided:

(a) An automatic engine shutdown device for engine over speed,

(b) An automatic engine shutdown device for high lubricating oil temperature,

(c) Some means of shutting down the engine at a readily accessible location remote from the engine,

(d) A remote means of shutting off the fuel supply,

(e) A remote means of shutting down lubricating oil pumps not directly driven by the engine,

Exception: Gas turbines in excess of 1,000 hp.

(f) If the engine is intended for emergency use only or is constantly attended, an alarm shall be permissible in lieu of the engine shutdown device specified in (b).

4-4 Gas Turbines.

4-4.1 Gas turbine engines shall be equipped with the devices specified in 4-1, 4-2 (b), and 4-3 and the following additional protection shall be provided:

(a) An automatic engine shutdown device for high exhaust temperatures,

(b) A means for shutting off the fuel supply in the event of flameout.

(c) If a turbine is intended for emergency use only or is constantly attended, an alarm shall be permissible in lieu of the device specified in (a).

4-4.2 The turbine starting sequence shall include a purge cycle adequate to ensure a nonflammable atmosphere in the turbine and exhaust system prior to ignition.

4-5 Diesel Engines. Diesel engines 100 hp or more installed in hazardous locations shall be equipped with an additional protective measure:

(a) Shutdown by shutting off both the fuel supply and the combustion air supply.

Chapter 5 Fuel Supply for Gas Fueled Engines

5-1 Gas Piping.

5-1.1 Except as provided in 5-1.2 and 5-1.3, gas piping shall be installed in accordance with the appropriate standard cited in 5-1.1.1 through 5-1.1.3.

5-1.1.1 All fuel gases other than LP-Gas in the liquid phase at service pressures of 125 psig (861.8 kPa) and less

shall be installed in accordance with NFPA 54, *National Fuel Gas Code*, and NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*.

5-1.1.2 All fuel gases other than LP-Gas in the liquid phase at service pressures in excess of 125 psig (861.8 kPa) shall be installed in accordance with ANSI/ASME B31.1, *Power Piping*, and NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*.

5-1.1.3 LP-Gas in the liquid phase shall be installed in accordance with NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*.

5-1.2 Plastic pipe, carrying fuel, shall not be used in a structure housing an engine or engines.

5-1.3 The use of approved metallic flexible connectors for protection against damage caused by settlement, vibration, expansion, contraction, or corrosion shall be acceptable. The use of approved nonmetallic connectors for the same purpose shall be acceptable except for LP-Gas in the liquid phase. If flexible connectors are located so that they might be exposed to a fire of short duration, the approval shall consider the ability of the connector to stand up under such conditions.

5-2 LP-Gas Systems. LP-Gas supply systems shall be installed in accordance with the appropriate provisions of NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*.

5-3 Regulators.

5-3.1 A gas pressure regulator located inside a structure shall be provided with either a vent to the outside of the structure and discharge at least 5 ft (1.5 m) away from any structure opening, or a listed vent limiting device.

Exception: Any regulator or zero governor that operates with gas pressure on both sides of the diaphragm shall not require venting.

5-3.2 When the gas pressure on the upstream side of the regulator is more than 1/2 psig (3.5 kPa), a relief valve shall be installed on the downstream side of the regulator. Relief valves shall be connected to the outside of the structure and shall discharge at least 5 ft (1.5 m) away from any structure opening, and such relief valves and any connected piping shall be sized to vent the required volume of gas.

5-4 Shutoff Valves.

5-4.1 Gas piping to engines shall have an approved shutoff valve remote from the engine and preferably outside the structure. If the valve is locked open, the key shall be secured in a well marked accessible location near the valve.

5-4.2 Every gas engine shall have a carburetion valve, zero governor-type regulating valve, fuel control valve, or an auxiliary valve that will automatically shut off the flow of gas in case the engine stops from any cause.

5-4.3 Automatically started or unattended engines shall be provided with a fuel control valve or an auxiliary valve that will stop the flow of gas in case the engine stops for any cause. A zero governor-type regulator alone shall not be adequate protection in such installations. The auxiliary valve shall be installed ahead of any unlisted flexible connector to the carburetion valve, zero governor, or other controls.

5-5 Pressure Boosting Equipment. Where low pressure gas is supplied and pressure boosting equipment is required, compressors shall be approved for the service intended. Receivers, where required, shall be designed, constructed, and tested in accordance with the ASME *Boiler and Pressure Vessel Code*, Section VIII, Division 1, Pressure Vessels.

Chapter 6 Fuel Supply for Liquid Fueled Engines

6-1 Design and Construction of Liquid Fuel Tanks.

6-1.1 Integral tanks shall be of steel with welded or brazed joints.

6-1.2 Day tanks shall be of steel with welded joints constructed with the following thicknesses:

Minimum Thickness of Steel

Capacity		Manufacturer's Standard Gauge No.
Gallons	Liters	
10 or less	37.9 or less	18
11 to 180	41.6 to 681	16
181 to 275	685 to 1041	14
276 to 550	1045 to 2082	12

6-1.2.1 Tanks in this category that are listed and labeled "Inside Storage Tanks for Oil Burner Fuel" shall be considered as meeting this provision.

6-1.3 Outside aboveground or underground fuel supply tanks shall be constructed in accordance with the applicable tank specification in NFPA 30, *Flammable and Combustible Liquids Code*.

6-1.3.1 Underground tanks smaller than 2,500 gal (9,463 L) capacity that are listed and labeled as "Underground Tanks for Flammable Liquids," aboveground tanks that are listed and labeled as "Aboveground Tanks for Flammable Liquids," and tanks constructed in accordance with API 650, *Welded Steel Tanks for Oil Storage*, shall be considered as meeting this provision.

6-1.3.2 Underground tanks and piping containing flammable liquids shall comply with all federal, state, and local regulations.

6-2 Fuel Tanks for Gasoline.

6-2.1 Only integral tanks shall be permitted inside or on roofs of structures.

6-2.2 An integral tank shall not exceed 25 gal (95 L) capacity, and not more than one tank shall be installed on each engine. The tank shall be securely mounted on the engine assembly, protected against vibration, physical damage, engine heat, and the heat of exhaust piping.

6-2.3 Tanks other than integral tanks shall be located underground or aboveground outside of structures.

6-2.4 Other requirements for day and supply tanks such as construction, minimum distance from any line of adjoining property that might be built upon, spacing, dikes, foundations, supports, depth and cover, anchorage, and

normal and emergency vents and testing shall be in accordance with the applicable provisions of NFPA 30, *Flammable and Combustible Liquids Code*.

6-3 Fuel Tanks for Diesel and Fuel Oils.

6-3.1 General. Not more than one integral tank shall be installed on each engine. It shall be securely mounted on the engine assembly, protected against vibration, physical damage, engine heat, and the heat of exhaust piping.

6-3.2 Fuel Tanks Inside Structures.

6-3.2.1 Day or supply tanks inside structures shall be securely mounted on substantial noncombustible supports.

6-3.2.2 Tanks Not Used for Emergency Purposes.

6-3.2.2.1 An unenclosed day tank (i.e., a tank not in a room by itself) located above the lowest story, cellar, or basement shall not exceed 60 gal (227 L) capacity and the total capacity of these tanks so located shall not exceed 60 gal (227 L).

6-3.2.2.2 An unenclosed day or supply tank located in the lowest story, cellar, or basement shall comply with 6-3.2.3.

6-3.2.3 Tanks Used for Emergency Purposes.

6-3.2.3.1 Unenclosed day tanks or supply tanks (i.e., tanks not in a room by themselves) supplying engines that drive generators, alternators, fire pumps, or other equipment used for emergency purposes shall not exceed 660 gal (2,498 L). Not more than one unenclosed 660-gal (2,498-L) capacity tank, or two or more unenclosed tanks with an aggregate capacity of not more than 660 gal (2,498 L), shall be connected to one engine. The aggregate capacity of all unenclosed day and supply tanks in a building shall not exceed 1,320 gal (4,996 L). Day and supply tanks with individual capacities larger than 660 gal (2,498 L) or those tanks that cause the unenclosed aggregate capacity to exceed 1,320 gal (4,996 L) in a building shall be enclosed in accordance with 6-3.5.

6-3.2.3.2 Unenclosed tanks larger than 60 gal (227 L) aggregate capacity used for emergency purposes described in 6-3.2.3.1 shall not be used for any other purpose.

6-3.2.3.3 Unenclosed day or supply tanks located above the lowest story, cellar, or basement shall have either a wall, curb, or dike having a capacity at least equal to that of the largest surrounded tank, or a wall, curb, or dike of lesser capacity equipped with an overflow or drainage system that shall be adequate in size and location to convey any spillage of fuel to a tank (inside or outside) or to a safe area outside the structure.

6-3.3 Fuel Tanks Outdoors (Aboveground or Underground) or Beneath a Structure.

6-3.3.1 Supply tanks located outside aboveground or underground, or beneath a structure, shall comply with the applicable provisions of NFPA 30, *Flammable and Combustible Liquids Code*.

6-3.4 Fuel Tanks on Roofs.

6-3.4.1 Day or supply tanks on roofs shall be securely mounted on substantial noncombustible supports.

6-3.4.2 Unenclosed day or supply tanks located on roofs shall have either a wall, curb, or dike having a capacity at least equal to that of the largest surrounded tank, or a wall, curb, or dike of lesser capacity equipped with an overflow or drainage system that shall be adequate in size and location to convey any spillage of fuel to a tank (inside or outside) or to a safe area outside the structure.

6-3.4.3 Day or supply tanks not used for emergency purposes shall meet the size limitations of 6-3.2.2.1. Day or supply tanks used for emergency purposes shall meet the size limitations of 6-3.2.3.1.

6-3.5 Rooms Housing Only Fuel Tanks.

6-3.5.1 Rooms containing only tanks shall be constructed of walls, floor, and top having a fire resistance rating of not less than 3 hours with the walls bonded to the floor. If the walls of such rooms extend to and are bonded to the underside of a concrete floor or roof above which has a fire resistance rating of not less than 3 hours, a separate top is not required for the room. At least 15 in. (381 mm) clearance shall be left around the tank for the purpose of inspection and repair.

6-3.5.2 Each tank room shall be provided with an opening that is closed by a self-closing Class A fire door if it opens inside a building. If a door opening goes outside, an appropriate door shall be provided based on exposure presented. Openings shall be protected by a ramp or sill high enough to contain the entire contents of the tank within the walls to the height corresponding to the level of oil that will be retained, and the sill shall be built to withstand the lateral pressure due to the liquid head, and walls and floor shall be waterproof. In lieu of this, a drain to a properly sized underground tank is permissible.

6-3.5.3 Provision shall be made for adequate ventilation of such rooms prior to entering for inspection or repair of tanks. Rooms shall be equipped with an open vent or an automatically operated vent, terminating outside the building. Vent openings and vent pipes shall be ample size to prevent abnormal pressure in the tank during filling.

6-4 Fuel Flow Control.

6-4.1 Liquid fuel supply systems, including drains from carburetors, shall be designed and installed to minimize as far as practicable the accidental discharge of fuel into the engine room or structure. Adequate alarms, float-controlled valves, or mechanical or remote-reading level gauges or protected sight glass gauges shall be installed to aid personnel in properly operating the fuel system. Stationary powered fuel pumps supplying integral or day tanks shall have "stop" controls sensitive to a tank's high liquid level.

6-4.2 Where supplied by pumps, day tanks or integral tanks shall be provided with an overflow line, a high level alarm, and a high level automatic shutoff. The overflow line shall be continuous piping to the supply tank without valves or traps. Its capacity shall exceed the delivery capacity of the supply lines it serves.

6-4.3 Overflows, vents, fuel piping, or fuel tanks shall not be located at or near engine air intake, exhaust piping, mufflers, or filters.

6-4.4 Where crude or residual oils are utilized as engine fuel, it is sometimes necessary to heat the fuel above the flash point for satisfactory handling and injection into the engine. This necessitates special storage, purifying, and heating systems. When fuel is heated, care shall be taken to maintain circulation through heaters regardless of engine fuel demand by means of constant recirculation to fuel tank, as well as to provide thermostatic control and suitable pressure and temperature gauges. Pressure relief valves and relief piping returns to supply tank shall be incorporated where necessary.

6-5 Filling.

6-5.1 Integral tanks for gasoline shall be filled by a closed piping system.

Exception: Filling by approved safety cans when the engine is shut down.

6-5.2 Integral tanks for diesel and fuel oils shall be filled by a closed piping system.

Exception: Filling from a container when the engine is shut down.

6-5.3 Piping for day and supply tanks shall be in accordance with NFPA 30, *Flammable and Combustible Liquids Code*.

6-6 Vent Piping. Vent piping shall be installed in accordance with NFPA 30, *Flammable and Combustible Liquids Code*.

6-7 Fuel Piping, Valves, and Fittings.

6-7.1 Piping shall be in accordance with Chapter 3 of NFPA 30, *Flammable and Combustible Liquids Code*, except that piping shall be steel or other metal and the provisions of 6-7.2 shall apply.

6-7.2 Piping systems shall be substantially supported and protected against physical damage and excessive stresses. The use of approved metallic or nonmetallic flexible connectors for protection against damage caused by settlement, vibration, expansion, contraction, or corrosion is acceptable. If flexible connectors are located so that they might be exposed to a fire of short duration, the approval shall consider the ability of the connectors to stand up under such conditions.

6-7.3 Sufficient valves shall be provided to control flow of liquid fuel in normal operation and to shut off the flow of fuel in the event of a pipe break.

6-7.4 Piping to aboveground supply tanks filled from tank cars or tank vehicles by centrifugal pumps shall be provided with check valves to prevent back flow.

6-8 Transfer of Liquid Fuel to Engines.

6-8.1 Liquid fuel shall feed to engines by pumps only, except that gravity feed is permitted from integral tanks.

6-8.2 Where engines are installed above the lowest story, cellar, or basement, or on roofs, the fuel supply shall be pumped to day or supply tanks in an approved manner.

Chapter 7 Exhaust Piping and Chimneys

7-1 Design and Construction.

7-1.1 Engine exhaust discharge systems shall be designed on the basis of flue gas temperatures (*see definition*).

7-1.2 Exhaust pipes shall be of wrought iron or steel, and of sufficient strength to withstand the service. Fittings of cast iron shall be acceptable.

7-1.3 Chimneys, where required, shall be constructed and installed in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*.

7-1.4* Provision shall be made in exhaust systems to prevent damage resulting from the ignition of unburned fuel.

7-1.5 Low points in exhaust systems shall be provided with suitable means for draining of condensate.

7-2 Installation.

7-2.1 Exhaust pipes shall be adequately supported and shall be connected to the engine or muffler so that emission of sparks, flame, or gas within the structure is prevented.

7-2.2 Where necessary, a flexible connector shall be provided in the exhaust pipe from the engine to minimize the possibility of a break in the engine exhaust system because of engine vibration or heat expansion. This connection shall not permit the release of dangerous quantities of gas into the engine room.

7-2.3 Exhaust pipes, except as permitted in 7-3.4, shall terminate outside the structure at a point where the hot gases or sparks will be discharged harmlessly and not be directed against combustible material or structures, or into atmospheres containing flammable gases or vapors or combustible dusts. Exhaust pipes shall not terminate under loading platforms or structures, or near ventilation air inlets.

7-2.4 Where necessary, exhaust systems shall be guarded to prevent personnel burns.

7-3 Clearance from Combustible Material for Low Heat Appliances [Flue Gas Temperatures Less than 1000°F (538°C)].

7-3.1 Exhaust pipes shall be installed with clearances of at least 9 in. (229 mm) to combustible material, except as provided in 7-3.2 and 7-3.3.

7-3.2 Exhaust pipes passing directly through combustible roofs shall be guarded at the point of passage by ventilated metal thimbles that extend not less than 9 in. (229 mm) above and not less than 9 in. (229 mm) below roof construction and are at least 6 in. (152 mm) in diameter larger than the exhaust pipe.

7-3.3 Exhaust pipes passing directly through combustible walls or partitions shall be guarded at the point of passage by one of the following methods:

(a) Metal ventilated thimbles not less than 12 in. (305 mm) larger in diameter than the exhaust pipe; or

(b) Metal or burned fire clay thimbles built in brickwork or other approved fireproofing materials providing not less than 8 in. (203 mm) of insulation between the thimble and combustible material.

7-3.4 Exhaust pipes shall be connected to or pass inside of a metal, masonry, or factory-built chimney where the exhaust gases go through a floor, ceiling, attic, or concealed space. Where an exhaust pipe is connected to a chimney, a muffler, when necessary, shall be installed between the engine and the point where the exhaust pipe enters the chimney. If other fuel-burning appliances are vented into the same chimney,

the engine exhaust pipe shall extend up into the chimney beyond any other flue connection.

7-4 Clearance from Combustible Material for Medium or High Heat Appliances [Flue Gas Temperatures Greater than 1000°F (538°C)].

7-4.1 Exhaust systems from medium or high heat appliances shall be given special consideration as to clearances from combustible materials and as to design of exhaust, and shall comply with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*.

Chapter 8 Lubricating Oil

8-1 Crankcase or Oil Reservoir Protection.

8-1.1 Crankcases or oil reservoirs shall be vented in accordance with manufacturer recommendations and with federal, state, and local regulations.

8-1.2 On engines where crankcase explosions can be a hazard, adequate explosion escape openings shall be provided, or suitable means used to maintain a nonflammable atmosphere in the crankcase.

8-1.3 Auxiliary reservoir oil supply chambers, if used, shall be vented either through separate vents or a common venting system.

8-1.4 Engines designed to operate with a negative pressure in the crankcase, and equipped with a separate lubricating oil sump, shall be provided with adequate-sized check valves in the venting system from the sump.

8-2 **Lubricating Oil Piping.** Lubricating oil piping shall be in accordance with the provisions of 6-7.1, 6-7.2, and 6-7.3.

8-3 **Safeguards for Gauging Devices.** Glass gauges or sight feeds for lubricating oil, the breakage of which will permit the escape of oil, shall be protected against physical damage.

Chapter 9 Instructions

9-1 **Operating Instructions.** Instructions for starting, stopping, operation, and routine maintenance shall be supplied with each engine and, where feasible, shall be conspicuously posted on or near the equipment.

9-2 **Emergency Instructions.** Where a fuel shutoff valve is used, a diagram with shutoff instructions shall be conspicuously posted on or near the valve, a safe distance from the engine or other potential fire location (*see 5-4 and 6-4*).

Chapter 10 Fire Protection

10-1 **General.** Fire protection shall be provided in accordance with the requirements of NFPA 101®, *Life Safety Code*®.

10-2 Fire Extinguishers.

10-2.1 For liquid-fueled engines, excluding LP-Gas in the liquid phase, approved portable fire extinguishers of appropriate size, type, and number shall be provided, as specified in NFPA 10, *Standard for Portable Fire Extinguishers*.

10-2.2* For gas-fueled engines, including LP-Gas in the liquid phase, approved portable fire extinguishers of appropriate size, type, and number shall be provided.

Chapter 11 Referenced Publications

11-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

11-1.1 **NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 10, *Standard for Portable Fire Extinguishers*, 1990 edition.

NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps*, 1993 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 1993 edition.

NFPA 54, *National Fuel Gas Code*, 1992 edition.

NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*, 1992 edition.

NFPA 70, *National Electrical Code*, 1993 edition.

NFPA 99, *Standard for Health Care Facilities*, 1993 edition.

NFPA 101, *Life Safety Code*, 1994 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, 1992 edition.

11-1.2 Other Publications.

11-1.2.1 **API Publication.** American Petroleum Institute, 2101 L Street NW, Washington, DC 20037.

API 650-1980, *Welded Steel Tanks for Oil Storage*.

11-1.2.2 **ASME Publications.** American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

ANSI/ASME *Boiler and Pressure Vessel Code*

ANSI/ASME B31.1-1983, *Power Piping*.

ANSI B133.6-1978, *Procurement Standard for Gas Turbine Ratings and Performance*.

11-1.2.3 **SAE Publication.** Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

SAE J1349-June 1985, *Engine Power Test Code — Spark Ignition and Diesel*.

Appendix A Explanatory Material

This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

A-3-1.1.2.3 Openings in the engine room should preferably be in outside walls.

A-7-1.4 Normally, this is accomplished by built-in strength in the system but also can be accomplished by use of devices such as relief valves, rupture discs, or their equivalent.

A-10-2.2 Personnel should be instructed about the danger of extinguishing a gas fire by means other than shutting off the fuel.

Appendix B Referenced Publications

B-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

B-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 68, *Guide for Venting of Deflagrations*, 1994 edition.

NFPA 220, *Standard on Types of Building Construction*, 1992 edition.

NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants*, 1992 edition.

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The NFPA Codes and Standards Development Process

Since 1896, one of the primary purposes of the NFPA has been to develop and update the standards covering all areas of fire safety.

Calls for Proposals

The code adoption process takes place twice each year and begins with a call for proposals from the public to amend existing codes and standards or to develop the content of new fire safety documents.

Report on Proposals

Upon receipt of public proposals, the technical committee members meet to review, consider, and act on the proposals. The public proposals – together with the committee action on each proposal and committee-generated proposals – are published in the NFPA's Report on Proposals (ROP). The ROP is then subject to public review and comment.

Report on Comments

These public comments are considered and acted upon by the appropriate technical committees. All public comments – together with the committee action on each comment – are published as the Committee's supplementary report in the NFPA's Report on Comments (ROC).

The committee's report and supplementary report are then presented for adoption and open debate at either of NFPA's semi-annual meetings held throughout the United States and Canada.

Association Action

The Association meeting may, subject to review and issuance by the NFPA Standards Council, (a) adopt a report as published, (b) adopt a report as amended, contingent upon subsequent approval by the committee, (c) return a report to committee for further study, and (d) return a portion of a report to committee.

Standards Council Action

The Standards Council will make a judgement on whether or not to issue an NFPA document based upon the entire record before the Council, including the vote taken at the Association meeting on the technical committee's report.

Voting Procedures

Voting at an NFPA Annual or Fall Meeting is restricted to members of record for 180 days prior to the opening of the first general session of the meeting, except that individuals who join the Association at an Annual or Fall Meeting are entitled to vote at the next Fall or Annual Meeting.

"Members" are defined by Article 3.2 of the Bylaws as individuals, firms, corporations, trade or professional associations, institutes, fire departments, fire brigades, and other public or private agencies desiring to advance the purposes of the Association. Each member shall have one vote in the affairs of the Association. Under Article 4.5 of the Bylaws, the vote of such a member shall be cast by that member individually or by an employee designated in writing by the member of record who has registered for the meeting. Such a designated person shall not be eligible to represent more than one voting privilege on each issue, nor cast more than one vote on each issue.

Any member who wishes to designate an employee to cast that member's vote at an Association meeting in place of that member must provide that employee with written authorization to represent the member at the meeting. The authorization must be on company letterhead signed by the member of record, with the membership number indicated, and the authorization must be recorded with the President of NFPA or his designee before the start of the opening general session of the Meeting. That employee, irrespective of his or her own personal membership status, shall be privileged to cast only one vote on each issue before the Association.

Sequence of Events Leading to Publication of an NFPA Committee Document

Call for proposals to amend existing document or for recommendations on new document.



Committee meets to act on proposals, to develop its own proposals, and to prepare its report.



Committee votes on proposals by letter ballot. If two-thirds approve, report goes forward.
Lacking two-thirds approval, report returns to committee.



Report is published for public review and comment. (Report on Proposals - ROP)



Committee meets to act on each public comment received.



Committee votes on comments by letter ballot. If two-thirds approve, supplementary report goes forward. Lacking two-thirds approval, supplementary report returns to committee.



Supplementary report is published for public review. (Report on Comments - ROC).



NFPA membership meets (Annual or Fall Meeting) and acts on committee report (ROP and ROC).



Committee votes on any amendments to report approved at NFPA Annual or Fall Meeting.



Complaints to Standards Council on Association action must be filed
within 20 days of the NFPA Annual or Fall Meeting.



Standards Council decides, based on all evidence, whether or not to issue standard
or to take other action, including hearing any complaints.



Appeals to Board of Directors on Standards Council action must be filed
within 20 days of Council action.

FORM FOR PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Mail to: Secretary, Standards Council

National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02269-9101

Fax No. 617-770-3500

Note: All proposals must be received by 5:00 p.m. EST/EDST on the published proposal-closing date.

If you need further information on the standards-making process, please contact the Standards Administration Department at 617-984-7249.

Date 9/18/93 Name John B. Smith Tel. No. 617-555-1212

Company

Street Address 9 Seattle St., Seattle, WA 02255

Please Indicate Organization Represented (if any) Fire Marshals Assn. of North America

1. a) NFPA Document Title National Fire Alarm Code NFPA No. & Year NFPA 72, 1993 ed.

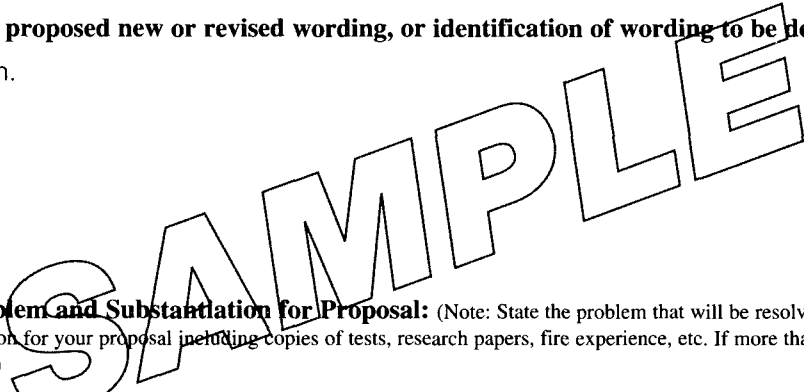
b) Section/Paragraph 1-5.8.1 (Exception No.1)

- 2. Proposal recommends: (Check one) [] new text [] revised text [x] deleted text

FOR OFFICE USE ONLY
Log #
Date Rec'd

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted):

Delete exception.



4. Statement of Problem and Substantiation for Proposal: (Note: State the problem that will be resolved by your recommendation; give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

A properly installed and maintained system should be free of ground faults. The occurrence of one or more ground faults should be required to cause a "trouble" signal because it indicates a condition that could contribute to future malfunction of the system. Ground fault protection has been widely available on these systems for years and its cost is negligible. Requiring it on all systems will promote better installations, maintenance and reliability.

5. [x] This Proposal is original material. (Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought, or research and, to the best of his/her knowledge, is not copied from another source.)

[] This Proposal is not original material; its source (if known) is as follows:

Note 1: Type or print legibly in black ink.

Note 2: If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

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John B. Smith
Signature (Required)

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Date _____ Name _____ Tel. No. _____

Company _____

Street Address _____

Please Indicate Organization Represented (if any) _____

1. a) NFPA Document Title _____ NFPA No. & Year _____

b) Section/Paragraph _____

- 2. Proposal Recommends: (Check one) new text
- revised text
- deleted text

FOR OFFICE USE ONLY
Log # _____
Date Rec'd _____

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted):

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Signature (Required)

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