

# NFPA® 37

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## Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

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2018



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## NFPA® 37

### Standard for the

## Installation and Use of Stationary Combustion Engines and Gas Turbines

### 2018 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 NFPA at its June Association Technical Meeting held June 4–7, 2017, in Boston, MA. It was issued by the Standards Council on August 17, 2017, with an effective date of September 6, 2017, and supersedes all previous editions.

This edition of NFPA 37 was approved as an American National Standard on September 6, 2017.

### Origin and Development of NFPA 37

This project was initiated in 1904 as “Rules and Requirements for the Construction and Installation of Gas and Gasolene [*sic*] Engines” by the Committee of Consulting Engineers of the National Board of Fire Underwriters. Editions of NBFU No. 37 were published in 1905 and 1910.

The project was turned over to the NFPA Committee on Explosives and Combustibles, who produced the 1915 edition by combining the 1910 edition of NFPA 37 with the 1908 edition of NBFU No. 37A, “Rules and Requirements for the Construction, Installation and Use of Coal Gas Producers (Pressure and Suction Systems).” The 1915 edition was designated NFPA 37 – 37A, *Installation and Use of Internal Combustion Engines (Gas, Gasolene [*sic*], Kerosene, Fuel Oil) also Coal Gas Producers (Pressure and Suction Systems)*. Responsibility for the project was later transferred to the Committee of Gases, which produced revised editions of NFPA 37 – 37A in 1922 and 1934.

In 1955, responsibility for the standard was transferred to the Committee on Internal Combustion Engines, which eliminated the provisions addressing coal gas producers. Revised editions of the document were issued in 1959, 1963, 1967, 1970, 1975, 1979, 1984, 1990, 1994, 1998, 2002, 2006, 2010, 2015, and 2018.

The 1998 edition incorporated the following major amendments:

- (1) Major restructuring of the document
- (2) Removal of the 7500 hp limitation in the scope of the standard
- (3) Clarification of the definition for an *engine enclosure* and addition of a definition for *engines for emergency use*
- (4) Clarification of requirements for fuel tanks and fuel supply for liquid-fueled engines
- (5) Inclusion of guidance for the installation of gas trains for gaseous-fueled engines
- (6) Addition of requirements for engine exhaust systems

The 2002 edition incorporated the following major amendments:

- (1) The entire document was revised and restructured to comply with the *Manual of Style for NFPA Technical Committee Documents*.
- (2) Definitions in Chapter 3 were reviewed for consistency with definitions in other NFPA documents, systematically aligned, and individually numbered.
- (3) Paragraph structuring was revised with the intent of one mandatory requirement per section, subsection, or paragraph.
- (4) Information that was considered explanatory or advisory was relocated to Annex A, Explanatory Material.
- (5) Exceptions were deleted or rephrased in mandatory text, unless the exception represented an allowance or required alternate procedure to a general rule when limited specific conditions exist.
- (6) New requirements were added for containment of fuel spills.

- (7) New requirements were added for spill prevention and containment through provisions for glass sight gauges or sight feeds for lubricating oil.

The 2006 edition incorporated the following major amendments:

- (1) New definitions were added for *gas train* and certain components thereof.
- (2) The requirements in 4.1.2.1 for engine rooms for engines located inside structures were revised.
- (3) New requirements were added to 4.1.2.2 for detached structures used specifically for housing engines or turbines and their appurtenances.
- (4) Spill control requirements in 4.1.3.2 were clarified.
- (5) A completely new and more comprehensive Section 5.2 describing the required components of the gas train was added, along with a diagram and appropriate annex text.
- (6) More comprehensive requirements were added to Sections 5.3 and 5.4 for gas regulators and manual shutoff valves, respectively, including appropriate and necessary annex text.

The 2010 edition incorporated the following major amendments:

- (1) Sections on Retroactivity (1.4) and Equivalency (1.5) were added.
- (2) Enhanced/new definitions were added for *automatic safety shutoff valve*, *automatic safety vent valve*, *vent valve*, and *secondary containment tank*.
- (3) Paragraph 4.1.1.5 was revised regarding allowable types of air filters for engine combustion air.
- (4) Subsection 4.1.4 was revised to clarify that either alternative to the minimum separation required between an engine and a structure can be used.
- (5) Section 5.2 was revised regarding the safety components required in a gas train.
- (6) A new subsection 5.4.4, Automatic Safety Shutoff Valves for Gas Turbines, was added to establish specific requirements for these safety components as applied to gas turbines that are distinct from those for internal combustion engines.
- (7) Paragraph 6.3.4.2 was revised to allow double-wall fuel storage tanks for roof-top installation.
- (8) New paragraph 6.8.3.1 was added to require a double block valve arrangement in liquid fuel lines as a fire and explosion mitigation measure.
- (9) Chapter 9, Control and Instrumentation, was completely revised to establish the minimum required protective control devices for engines and turbines; to present the requirements in a more logical sequence; to identify, for constantly attended installations, those devices that can safely be replaced by alarms and required procedures that must be in place to direct proper operator response; and to incorporate necessary explanatory information in the Annex.
- (10) Chapter 11, Fire Protection Features, was completely revised to present the requirements in a more logical sequence and to incorporate necessary explanatory information in the Annex.
- (11) The explanatory information in A.5.2 on calculating the fuel input rating was revised.

The 2015 edition incorporated the following major amendments:

- (1) Paragraph 4.1.1.5 was amended to reflect the fact that ANSI/UL 900 no longer differentiates classes of air filters and was extended to apply to turbine-mounted air filters.
- (2) Subsection 4.1.4 was revised for clarity.
- (3) Section 4.6, the general installation requirements for engines and turbines, was revised to require compliance with wind and seismic design criteria.
- (4) Subsection 5.2.1 was amended to specify the type of regulator required; to require a vent valve or valve proving system; to require a flame arrester where biogas fuels are used and air might be entrained in the gas stream; and to require a filter or strainer in the fuel line. New annex items A.5.2.1(5), A.5.2.1(6), and A.5.2.1(10) were added to give examples of the types of components that can be used to satisfy the respective requirements.
- (5) Subsection 5.2.2 was amended to allow the use of a proof-of-closure switch or a valve proving system as alternatives to a vent valve between the two automatic safety shutoff valves.
- (6) Subsection 5.3.1 was revised to more clearly state when a gas pressure regulator must vent to atmosphere.
- (7) Paragraph 5.3.1.2 was expanded by adding a regulator with a vent-limiting orifice to the devices that do not have to be vented outside.
- (8) By means of a Tentative Interim Amendment, subsection 6.6.3 was amended to more clearly set out the requirements for piping for fuel tanks and a new paragraph 6.6.3.4 was added to allow an exemption from the provisions of 6.6.3, where tanks are manually filled at the tanks fill port.
- (9) Paragraph 8.2.3.3 was revised to recognize the zone system of electrical area classification.
- (10) New subsection 9.3.3 was added to reinstate the requirement for a purge cycle in the start cycle for combustion gas turbines.
- (11) Paragraphs 11.4.4.1.1 and 11.4.4.2 were revised to clarify the performance criteria for total flooding gaseous agent suppression systems and local application gaseous agent suppression systems with respect to cool-down of the engine or turbine. Annexes to both paragraphs were revised to incorporate additional clarification and a new subsection 11.4.8 was added to address retrofit of existing fire suppression systems.

- (12) Annex A.4.1.4(2) was revised to provide a more extensive explanation of the calculation procedure used to evaluate a weatherproof engine enclosure for its ability to contain a fire.
- (13) Annex A.5.1 was strengthened by adding a reference to NFPA 56, *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems*, for use when commissioning of the gas supply.
- (14) A new annex A.9.3.2 was added to explain that 9.3.1 addresses emergency situations, while 9.3.2 addresses safety of the engine in normal operation.
- (15) Annex items A.11.4.4.1.1 and A.11.4.4.2 were expanded by providing necessary information to address fire suppression system design for thin-walled gas turbines (based on aircraft engine designs).

The 2018 edition incorporates the following major amendments:

- (1) In Chapter 3, definitions have been added for the terms *inlet gas pressure*, *line pressure regulator*, *overpressure protection device*, *rated pressure*, and *service regulator*. Also, the annex explanation for the definition of *enclosure* has been expanded to provide more detailed information.
- (2) Subsection 4.1.3, Engines Located on Roofs, has been revised to clarify the provisions related to the proximity of engines and weatherproof enclosures to combustible construction. An annex statement has been added to paragraph 4.1.3.2 to explain that the engine housing might be able to serve as spill containment.
- (3) Subsection 4.1.4, Engines Located Outdoors, has been revised to be consistent with subsection 4.1.3. Appropriate amendments have also been made to annex material.
- (4) A new subsection 5.1.5 and an extensive related annex explanation have been added to address proper anchoring of flexible connectors.
- (5) The annex text to paragraph 5.3.1.2 has been replaced with an extensive discussion of “lock-up” of pressure regulators, as addressed in ANSI Z21.80, *Line Pressure Regulators*.
- (6) In subsection 5.4.3, the allowable operating time for automatic safety shutoff valves (ASSVs) has been changed from 1 second to 2 seconds, to be consistent with ANSI Z21.21, *Automatic Valves for Gas Appliances*.
- (7) Section 5.6, Overpressure Protection, has been extensively revised to provide for protection for gas trains that operate between 2 psi and 125 psi, as these are not addressed in NFPA 54/ANSI Z223.1, *National Fuel Gas Code*.
- (8) The annex text to paragraph 8.2.3.1 has been extensively revised to address the concerns of products of combustion, particularly carbon monoxide, from the exhaust of stationary engines. Additional explanatory publications have been included.
- (9) A new requirement has been added in subsection 9.1.2 to require investigation of any situation that results in a trip of the high-pressure limit control prior to manual reset.

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**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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## NFPA 37

## Standard for the

## Installation and Use of Stationary Combustion Engines and Gas Turbines

2018 Edition

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**NOTICE:** An asterisk (\*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex B. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex B.

## Chapter 1 Administration

**1.1 Scope.** This standard establishes criteria for minimizing the hazards of fire during the installation and operation of stationary combustion engines and gas turbines.

**1.2 Purpose.** This standard provides minimum fire safety requirements for the installation and operation of stationary combustion engines and gas turbines.

**1.3 Application.**

**1.3.1\*** This standard applies to stationary combustion engines and gas turbines. This standard also applies to portable engines that remain connected for use in the same location for a period of one week or more.

**1.3.2** This standard applies to new installations and to those portions of existing equipment and installations that are modified.

**1.3.3** The effective date of application of this standard is not determined by NFPA. All questions related to applicability shall be directed to the authority having jurisdiction.

**1.4 Retroactivity.** The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

**1.4.1** Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

**1.4.2** In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

**1.4.3** The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction and only where it is clearly evident that a reasonable degree of safety is provided.

**1.5 Equivalency.** Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

**1.5.1** Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

**1.5.2\*** In determining the suitability of the equipment or component for use, the authority having jurisdiction shall consider the following:

- (1) The equipment or component is listed for the intended use.
- (2) The equipment or component meets the requirements of applicable standards through stamping or certification.
- (3) The equipment or component displays the mechanical strength and durability for the intended application.
- (4) The equipment or component is used in the same or a similar application as in this document.

**1.6 Units and Formulas.**

**1.6.1\*** Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI). These units are listed in Table 1.6.1 with conversion factors. Two units (liter and bar), outside of but recognized by SI, are commonly used in international fire protection.

**1.6.2** If a value for a measurement as given in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement. A given equivalent value shall be considered to be approximate.

**1.6.3** All pressures expressed in this document shall be gauge pressures unless specifically noted otherwise.

**Table 1.6.1 Units of Measurement**

| Name of Unit | Unit Symbol | Conversion Factor          |
|--------------|-------------|----------------------------|
| meter        | m           | 1 ft = 0.3048 m            |
| millimeter   | mm          | 1 in. = 25.4 mm            |
| liter        | L           | 1 gal = 3.785 L            |
| kilopascal   | kPa         | 1 psi = 6.89 kPa           |
| kilowatt     | kW          | 1 hp = 0.75 kW             |
| watt         | W           | 1 Btu/hr = 0.3 W           |
| pascal       | Pa          | 1 psi = 6894.757 Pa        |
| bar          | bar         | 1 psi = 0.0689 bar         |
| bar          | bar         | 1 bar = 10 <sup>5</sup> Pa |

## Chapter 2 Referenced Publications

**2.1 General.** The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

**2.2 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2018 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 edition.

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, 2015 edition.

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, 2015 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2016 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2017 edition.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2017 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2018 edition.

NFPA 54, *National Fuel Gas Code*, 2018 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2017 edition.

NFPA 70®, *National Electrical Code®*, 2017 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*, 2016 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, 2016 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems*, 2015 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2015 edition.

## 2.3 Other Publications.

**2.3.1 API Publications.** American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070.

API 620, *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*, 12th edition, 2013, with Addendum 1 (2014).

API 650, *Welded Tanks for Oil Storage*, 12th edition, with Errata 1 (2013), Errata 2 (2014), and Addendum 1 (2014).

**2.3.2 ASME Publications.** American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ANSI/ASME B31.3, *Process Piping*, 2014.

*Boiler and Pressure Vessel Code*, 2015.

**2.3.3 MSS Publications.** Manufacturers Standardization Society, 127 Park Street, NE, Vienna, VA 22180-4602.

MSS SP-58, *Pipe Hangers and Supports — Materials, Design, Manufacture, Selection, Application, and Installation*, 2009.

**2.3.4 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 900, *Standard for Air Filter Units*, 2015.

## 2.3.5 Other Publications.

*Merriam-Webster's Collegiate Dictionary*, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

## 2.4 References for Extracts in Mandatory Sections.

NFPA 30, *Flammable and Combustible Liquids Code*, 2018 edition.

NFPA 54, *National Fuel Gas Code*, 2018 edition.

NFPA 85, *Boiler and Combustion Systems Hazards Code*, 2015 edition.

## Chapter 3 Definitions

**3.1 General.** The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

## 3.2 NFPA Official Definitions.

**3.2.1\* Approved.** Acceptable to the authority having jurisdiction.

**3.2.2\* Authority Having Jurisdiction (AHJ).** An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

**3.2.3 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.

**3.2.4\* Listed.** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

**3.2.5 Shall.** Indicates a mandatory requirement.

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

**3.2.7 Standard.** An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to

indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

### 3.3 General Definitions.

**3.3.1 Class I Fuel.** For the purpose of this standard, any liquid fuel having a flash point below 37.8°C (100°F).

**3.3.2\* Enclosure.** A cover or housing intended to protect an engine and related equipment.

**3.3.3 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.

**3.3.3.1 Combustion Gas Turbine Engines.** An engine that produces shaft power utilizing the Brayton (joule) cycle, where atmospheric air is drawn in and compressed and the compressed air then flows into a combustion chamber where fuel is injected and continuous combustion occurs, resulting in high-pressure hot gas to the expansion section (turbine) where the heat energy is converted to rotating, mechanical energy.

**3.3.3.2\* Engines for Emergency Use.** Engines that operate under limited-use conditions to support critical operations in the protection of life, property, or both.

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

**3.3.3.4\* Reciprocating Engines.** An engine that uses a spark plug to ignite a fuel–air mixture (e.g., otto cycle engine) or an engine in which high-pressure compression raises the air temperature to the ignition temperature of the injected fuel (e.g., diesel cycle engine).

**3.3.4 Flue Gas Temperature.** The temperature 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.

**3.3.5 Gas Train.** The portion of the fuel gas supply piping starting with and including the equipment isolation valve and extending to the point at which the fuel enters the prime mover.

**3.3.6 Hazardous Location.** An area where flammable or combustible gases or liquids or combustible dusts or flyings usually exist.

**3.3.7\* Horsepower Rating (Reciprocating Engines).** The power of an engine measured at the flywheel or output shaft at standard SAE conditions of 752.1 mm Hg (29.61 in. Hg) barometer and at 25°C (77°F) inlet air temperature.

**3.3.8 Inlet Gas Pressure.** The pressure at the outlet of the equipment isolation valve.

**3.3.9 Line Pressure Regulator.** A pressure regulator placed in a gas line between the service regulator and the appliance [engine] regulator. [54, 2018]

**3.3.10 Overpressure Protection Device.** A pressure-limiting or pressure-relieving device that prevents the downstream pressure from exceeding its set point.

**3.3.11 Rated Pressure.** The maximum internal and external pressures that the materials, devices, or components are designed to contain or control.

**3.3.12 Remote Location.** A location suitably separated from the engine installation so as to be accessible during an engine fire.

**3.3.13 Service Regulator.** A pressure regulator installed by the serving gas supplier to reduce and limit the service line gas pressure to delivery pressure. [54, 2018]

**3.3.14 Spark Protected.** Electrical equipment enclosed in a tight case or protected by shields, screens, or insulation that contains sparks or prevents their emission.

### 3.3.15 Tank.

**3.3.15.1 Engine-Mounted Tank.** A fuel tank furnished and mounted on the engine or engine-frame by the engine manufacturer.

**3.3.15.2\* Fuel Tank.** A tank containing fuel for an engine(s).

**3.3.15.3 Secondary Containment Tank.** A tank that has an inner and outer wall with an interstitial space (annulus) between the walls and that has a means for monitoring the interstitial space for a leak. [30, 2018]

### 3.3.16 Valve.

**3.3.16.1\* Automatic Safety Shutoff Valve (ASSV).** A valve that, upon shutdown conditions, will automatically stop the flow of gas to the engine or turbine. (See 5.4.3 and 5.4.4.)

**3.3.16.2 Automatic Safety Vent Valve.** A valve that, upon closing of the automatic safety shutoff valves (ASSVs), automatically vents the volume of gas between the two ASSVs to atmosphere.

**3.3.16.3 Carburetion Valve.** A control valve that meets the functional requirements of an automatic safety shutoff valve (ASSV) by being capable of automatically stopping the flow of gas to the engine.

**3.3.16.4\* Equipment Isolation Valve.** The manually operated valve that isolates the balance of the gas train and the prime mover from the gas supply.

**3.3.16.5 Vent Valve.** A valve used to allow venting of air or gas from the system to the atmosphere. [85, 2015]

**3.3.17 Zero Governor Regulator.** A gas pressure regulator equipped with a counter spring beneath the valve that requires an external impulse signal such as top loading with pressure or generating vacuum in the downstream piping.

## Chapter 4 Engines — General Requirements

### 4.1 Engine Locations.

#### 4.1.1 General Requirements.

**4.1.1.1** Engines shall be situated so that they are readily accessible for maintenance, repair, and fire fighting.

**4.1.1.2\*** The air supply shall be designed to meet at least the minimum requirements for combustion, cooling, and ventilation and to prevent flue gas products from being drawn from stacks or flues of boilers or other combustion devices.

**4.1.1.3\*** Combustible materials shall not be stored in rooms or enclosures housing engines, other than those combustible materials required for day-to-day operations/maintenance. Such materials shall be stored properly.

**4.1.1.4** Engines fueled by a Class I fuel or by liquid-phase LP-Gas shall not be installed in rooms containing fired equipment or open flames.

**4.1.1.5** Combustion air filters mounted directly on engines or turbines shall be listed in accordance with ANSI/UL 900, *Standard for Air Filter Units*.

#### 4.1.2 Engines Located in Structures.

##### 4.1.2.1\* Engine Rooms.

**4.1.2.1.1** Engine rooms located within structures shall have interior walls, floors, and ceilings of at least 1-hour fire resistance rating, unless otherwise permitted by 4.1.2.1.2.

**4.1.2.1.2** The ceiling of rooms located on the top floor of a structure shall be permitted to be noncombustible or protected with an automatic fire suppression system.

**4.1.2.1.3\*** Engine rooms shall have ventilation that is adequate to prevent a hazardous accumulation of flammable vapors or gases, both when the engine is operating and when it is shut down.

**4.1.2.1.4** Engine rooms attached to structures shall comply with 4.1.2.2.1 and 4.1.2.2.3 except that the common wall shall have a fire resistance rating of at least 1 hour.

**4.1.2.1.5\*** Openings from an engine room to other sections of the structure shall be provided with automatic or self-closing fire doors or dampers corresponding to the rating of the walls in which they are located.

**4.1.2.1.6** Rooms containing engines utilizing a Class I fuel shall be located on an exterior wall, the construction of which shall provide ready accessibility for fire-fighting operations through the provision of doors, access openings, windows, louvers, or lightweight, noncombustible wall panels.

##### 4.1.2.2 Dedicated Detached Structures.

**4.1.2.2.1\*** Dedicated detached structures shall be of noncombustible or fire-resistive construction.

**4.1.2.2.2** Dedicated detached structures shall be located at least 1.5 m (5 ft) from openings in walls and at least 1.5 m (5 ft) from structures having combustible walls. A minimum separation shall not be required where any of the following conditions exist:

- (1) The exposing wall of the detached structure has a fire resistance rating of at least 1 hour.

- (2) The exposed wall of the adjacent structure has a fire resistance rating of at least 1 hour.
- (3) The detached structure is protected by an automatic fire protection system.

**4.1.2.2.3\*** Dedicated detached structures shall have ventilation designed to prevent a hazardous accumulation of flammable vapors or gases, both when the engine is operating and when it is shut down.

#### 4.1.3 Engines Located on Roofs.

**4.1.3.1** Engines and, if provided, their weatherproof housings that are installed on roofs of structures shall be located at least 1.5 m (5 ft) from openings in walls and at least 1.5 m (5 ft) from structures having combustible walls, except as provided in 4.1.3.1.1 or 4.1.3.1.2.

**4.1.3.1.1** A clearance less than 1.5 m (5 ft) shall be permitted where all portions of the structure that are closer than 1.5 m (5 ft) from the engine enclosure have a fire resistance rating of at least 1 hour.

**4.1.3.1.2\*** A clearance less than 1.5 m (5 ft) shall be permitted where it has been demonstrated through methods acceptable to the authority having jurisdiction that a fire within the enclosure will not ignite combustible structures.

**4.1.3.2\*** An oil containment system consisting of a curb or dike having a capacity at least equal to the total capacity of the lubricating oil system or the liquid fuel system, whichever is greater, shall be provided. This system shall also comply with applicable requirements of Chapter 6.

**4.1.3.3\*** The surface beneath the engine and beyond the engine and the oil containment dike shall be noncombustible to a minimum distance of 300 mm (12 in.).

#### 4.1.4 Engines Located Outdoors.

**4.1.4.1** Engines and, if provided, their weatherproof housings that are installed outdoors shall be located at least 1.5 m (5 ft) from openings in walls and at least 1.5 m (5 ft) from structures having combustible walls except as provided in 4.1.4.1.1 or 4.1.4.1.2.

**4.1.4.1.1** A clearance less than 1.5 m (5 ft) shall be permitted where all portions of structures that are closer than 1.5 m (5 ft) from the engine enclosure have a fire resistance rating of at least 1 hour.

**4.1.4.1.2\*** A clearance less than 1.5 m (5 ft) shall be permitted where it has been demonstrated through methods acceptable to the authority having jurisdiction that a fire within the enclosure will not ignite combustible structures.

**4.2\* Support of Engines.** Engines shall be supported in accordance with the manufacturer's instructions.

**4.3\* Hazardous Locations.** In hazardous locations, engines that neither compress a flammable gas nor pump a flammable liquid shall meet the following three criteria:

- (1) They shall be installed in an enclosure or room of fire-resistive construction.
- (2) They shall be ventilated from a nonhazardous outside area.
- (3) They shall have a defined emergency egress path(s) acceptable to the authority having jurisdiction.