

NFPA[®] 37

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

2010 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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NFPA® 37

Standard for the

Installation and Use of Stationary Combustion Engines and Gas Turbines

2010 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. It was issued by the Standards Council on October 27, 2009, with an effective date of December 5, 2009, and supersedes all previous editions.

This edition of NFPA 37 was approved as an American National Standard on December 5, 2009.

A tentative interim amendment (TIA) to 11.4.4.1.1 and 11.4.4.2 was issued on October 27, 2009. For further information on tentative interim amendments, see Section 5 of the NFPA Regulations Governing Committee Projects available at: <http://www.nfpa.org/assets/files/PDF/CodesStandards/TIAErrataFI/TIARegs.pdf>.

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 NFPA were published in 1905 and 1910.

The project was turned over to the NFPA Committee on Explosives and Combustibles, which expanded the 1915 edition to include coal gas producers, and was retitled as NFPA 37 and 37A, *Installation and Use of Internal Combustion Engines (Gas, Gasolene [*sic*], Kerosene, Fuel Oil) also Coal Gas Producers (Pressure and Suction Systems)*.

Project responsibility was transferred to the Committee of Gases, which revised the subsequent editions issued in 1922 and 1934. In 1955, responsibility for the standard was transferred to the Committee on Internal Combustion Engines, which eliminated the requirements addressing coal gas producers.

Revised editions of the document were issued in 1959, 1963, 1967, 1970, 1975, 1979, 1984, 1990, 1994, 1998, and 2002.

For the 1998 edition, the following significant changes were made: (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; and (6) addition of requirements for engine exhaust systems.

The 2002 edition included format and technical revisions. The 2000 edition of the *Manual of Style for NFPA Technical Committee Documents* was applied in this document’s restructure and format. Introductory material in Chapter 1 was formatted for consistency among all NFPA documents. Referenced publications that applied to the document were relocated to Chapter 2, resulting in the renumbering of chapters. Informational references remained in the last annex. Appendices were designated as annexes. Definitions in Chapter 3 were reviewed for consistency with definitions in other NFPA documents, systematically aligned, and individually numbered. Paragraph structuring was revised with the intent of one mandatory requirement per section, subsection, or paragraph. Information that often accompanied many of the requirements was moved to Annex A, Explanatory Material. 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 existed. The format appearance and structure provided continuity among NFPA documents, clarity of mandatory text, and greater ease in locating specific mandatory text.

The significant content changes in the 2002 edition concerned spill prevention and containment through provisions for glass sight gauges or sight feeds for lubricating oil, and fuel spill containment requirements.

The 2006 edition included the following major changes:

- (1) New definition of “gas train” and certain components thereof
- (2) Revised requirements in 4.1.2.1 for engine rooms for engines located inside structures
- (3) New requirements in 4.1.2.2 for detached structures used specifically for housing engines or turbines and their appurtenances
- (4) Clarification of spill control requirements in 4.1.3.2
- (5) A completely new and more comprehensive Section 5.2 describing all required components of the gas train, including a diagram and appropriate annex text
- (6) More comprehensive requirements in Sections 5.3 and 5.4 for gas regulators and manual shutoff valves, respectively, including appropriate and necessary annex text

The 2010 edition includes the following major changes:

- (1) Addition of Section 1.4, Retroactivity, and Section 1.5, Equivalency
- (2) Enhanced or new definitions for automatic safety shutoff valve (ASSV), automatic safety vent valve, vent valve, and secondary containment tank
- (3) Revision of 4.1.1.5 regarding allowable types of air filters for engine combustion air
- (4) Revision of 4.1.4 to clarify that either alternative to the minimum separation required between an engine and a structure can be used
- (5) Amendments to Section 5.2 regarding the safety components required in a gas train
- (6) New subsection 5.4.4, Automatic Safety Shutoff Valves for Gas Turbines, which establishes specific requirements for these safety components as applied to gas turbines that are distinct from those for internal combustion engines
- (7) Revision of 6.3.4.2 to allow double-wall fuel storage tanks for roof-top installation
- (8) New 6.8.3.1 to require a double block valve arrangement in liquid fuel lines as a fire and explosion mitigation measure
- (9) Complete revision of Chapter 9, Control and Instrumentation, 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 the procedures that need to be in place to direct proper operator response; to incorporate necessary explanatory information in Annex A
- (10) Complete revision of Chapter 11, Fire Protection Features, to present the requirements in a more logical sequence and to incorporate necessary explanatory information in Annex A
- (11) Enhanced explanatory information in A.5.2 on calculating the fuel input rating



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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 that explanatory material on the paragraph can be found in Annex A.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

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.

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 ⁵ 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*, 2010 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2010 edition.

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, 2008 edition.

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, 2009 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2010 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2007 edition.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2009 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2008 edition.

NFPA 54, *National Fuel Gas Code*, 2009 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2008 edition.

NFPA 70®, *National Electrical Code®*, 2008 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*, 2010 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, 2010 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems*, 2010 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2008 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*, 11th edition, February 2008.

API 650, *Welded Tanks for Oil Storage*, 11th edition, June 2007.

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

ANSI/ASME Boiler and Pressure Vessel Code, 2007.

ANSI/ASME B31.3, *Process Piping*, 2002.

2.3.3 MSS Publications. Manufacturers Standardization Society of the Valve and Fittings Industry Inc., 127 Park Street NE, Vienna, VA 22180.

MSS SP-69, *Pipe Hangers and Supports — Selection and Application*, 2003.

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

UL 900, *Standard for Air Filter Units*, 2004 edition, with revisions through November 2007.

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*, 2008 edition.

NFPA 85, *Boiler and Combustion Systems Hazards Code*, 2007 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.

3.3 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 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 (Combustion Gas Turbines). The ANSI standard rated power of an engine at the output shaft at 1.01325 bar (14.7 psia) atmospheric pressure, at 15°C (59°F), and at a relative humidity of 60 percent.

3.3.8* 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.

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

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

3.3.11 Tank.

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

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

3.3.11.3 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, 2008]

3.3.12 Valve.

3.3.12.1* 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.)

3.3.12.2 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.

3.3.12.3 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.

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

3.3.12.5 Vent Valve. A valve used to allow venting of air or gas from the system to the atmosphere. [85, 2007]

3.3.13 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 For reciprocating engines fueled with a Class I liquid or with a flammable gas, combustion air filters shall be listed as Class 1 when tested in accordance with UL 900, *Standard for Air Filter Units*. For all other applications, air filters for engine combustion shall be listed as Class 1 or Class 2 when tested in accordance with UL 900.

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 their weatherproof housings, if provided, 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. A minimum separation shall not be required where the following conditions exist:

- (1) The adjacent wall of the structure has a fire resistance rating of at least 1 hour.
- (2)*The weatherproof enclosure is constructed of noncombustible materials and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure.

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. Engines, and their weatherproof housings if provided, 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. A minimum separation shall not be required where either of the following conditions exist:

- (1) The adjacent wall of the structure has a fire resistance rating of at least 1 hour.
- (2)*The weatherproof enclosure is constructed of noncombustible materials and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure.

4.2 Foundations. Engines shall be supported on foundations or secured to a noncombustible framework.

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 of fire-resistive construction.

- (2) They shall be ventilated from a nonhazardous outside area.
- (3) They shall have outside access only.

4.4 Engines Handling Hazardous Materials (Other Than Their Own Fuel Supply).

4.4.1 The use of an engine-driven unit to compress a flammable gas or to pump a flammable liquid shall be permitted provided the combination unit or groups of such combined units are isolated from areas not having a similar hazard.

4.4.2* Isolation shall be permitted to be achieved by either locating the unit outdoors or employing indoor structural separation in accordance with 4.1.2, except as modified by all of the following:

- (1) Provision shall be made for the venting of an explosion.
- (2) Rooms containing combustion engines located within structures shall have interior walls, floors, and ceilings of at least 2-hour fire resistance rating.
- (3) The rooms or structures described in 4.4.2(2) shall be ventilated in an approved manner from a nonhazardous area.

4.4.3 Engine Accessories for Hazardous Locations.

4.4.3.1 Each spark-ignition engine comprising part of a unit that compresses a flammable gas or pumps a flammable liquid shall have magnetos or distributors and coils of the spark-protected type. All leads shall be positively attached.

4.4.3.2 Ventilation openings in such devices shall be protected by a fire screen unless the device is purged, pressurized, or otherwise protected in an approved manner.

4.4.3.3 Ignition wires shall be positively attached at each end by use of the outer sheath of the insulation.

4.4.3.4 Spark plugs shall be fully shielded against flashover. Fully radio-shielded spark plugs or spark plugs provided with insulating boots shall be permitted.

4.4.3.5 Flame-arresting equipment shall be attached to the engine air intake to avoid blowoff or rupture. A mechanically attached air filter shall be permitted to meet this requirement.

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

4.4.3.7 Fan belts shall be electrically conductive (nonsparking).

4.5 Electrical Installations.

4.5.1 Electrical installations in rooms containing engines shall comply with *NFPA 70, National Electrical Code*.

4.5.2 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, lubricating oil, or hydraulic fluid.

4.5.3 Engine Wiring. Wire and insulation materials shall have all of the following characteristics:

- (1) Capacity to remain flexible over typical engine operating temperature ranges
- (2) Capacity to have the minimum possible absorption of oils, fuels, and other fluids commonly found on or near the engine
- (3) Rated for continuous use at the maximum range of temperatures that will occur where installed

4.5.3.1 Wiring shall be protected by either fuses or circuit breakers in accordance with its ampacity.

