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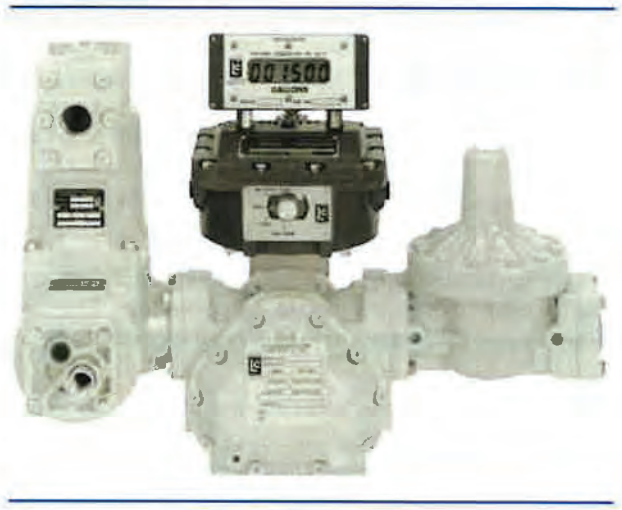


EXHIBIT 5.58 *Positive Displacement Liquid Meter. (Courtesy of Liquid Controls LLC)*

Paragraph 5.17.5.3 was added in the 2008 edition to provide requirements for liquid meters. The design of a liquid meter installation must take into account the vibration typically experienced on cargo tank motor vehicles to avoid potential failure of the meter housing or liquid piping. Where vibration is anticipated, flexible connectors can be used. A definition of *flexible connector* was added to the 2008 edition:

> **3.3.25 Flexible Connector.** A short [not exceeding 60 in. (1.52 m) overall length] piping system component that is fabricated from a flexible material and equipped with connections at both ends.

Note that flexible connectors are limited in length to 5 ft (1.52 m). This prohibits the use of hose to make connections any longer than 5 ft.

5.17.6 Engines.

Engines used to drive portable pumps and compressors shall be equipped with exhaust system spark arresters and shielded ignition systems.

◀ **FAQ**
Are internal combustion engines acceptable to drive portable compressors?

Internal combustion engines have been used safely to drive portable pumps, as shown in Exhibit 5.59, as well as portable compressors. This requirement is included in the code to provide specific guidance for the selection of portable engines for these uses.

The use of portable internal combustion engines has resulted in a disproportionate number of interpretation requests. These sometimes follow a local prohibition by enforcement officials on the use of internal combustion engines, because of the belief that "explosion-proof" motors or engines must be used. This confusion is understandable because Table 6.22.2.2, Electrical Area Classification, Part F, requires that the area within 15 ft (4.6 m) of an outdoor pump or vapor compressor be a Class I, Division 2 area. The following information is relevant in applying Table 6.22.2.2:

- Table 6.22.2.2 applies only to fixed electrical equipment and wiring and not to portable equipment.
- Internal combustion engines that are in good working order and are equipped with the required accessories are not a source of ignition. LP-Gas releases have occurred without causing ignition where cars have driven into, stalled, and coasted out of vapor clouds of LP-Gas that have been accidentally released [25].

The fact that these devices are portable indicates that, in many cases, they will be operated by an internal combustion engine. Subsection 5.17.6 requires the same level of protection for internal combustion engines driving portable pumps as for operating compressors.

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 501

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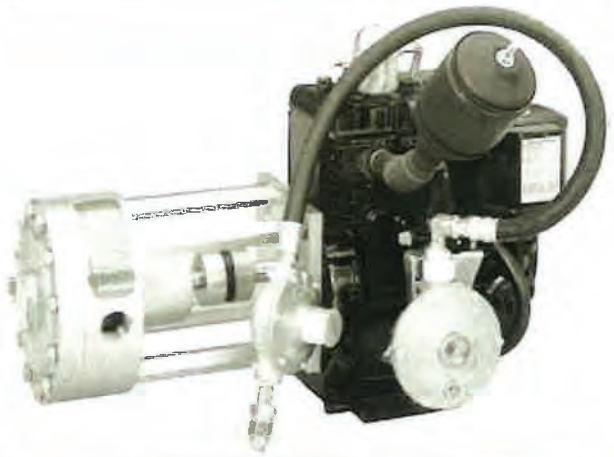


EXHIBIT 5.59 *Portable LP-Gas–Fueled Engine-Driven Pump. (Courtesy of Smith Precision Products Company, Inc.)*



EXHIBIT 5.60 *Sight Flow Indicator with Backflow Check Valve. (Courtesy of Engineered Controls International, Inc.)*

5.17.7 Sight Flow Indicators.

Where installed, sight flow indicators shall either be the simple observation type or be combined with a backflow check valve.

Sight flow indicators are used when it is necessary to visually verify the flow of liquid LP-Gas through a piping system. (See Exhibits 5.60 and 5.61.) These indicators are found at cargo tank vehicle and railroad tank car loading and unloading facilities.

5.18 Reserved

5.19 Reserved



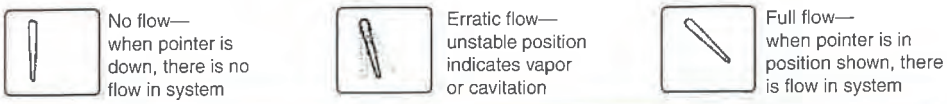


EXHIBIT 5.61 *Flow Indicator with Backflow Check Valve. (Courtesy of Fisher Controls Intl, LLC)*

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 502

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5.20 Appliances

In the United States, Canada, and other economically developed countries, there are standards for LP-Gas and natural gas appliances. In many instances, private or governmental listing agencies have achieved an increasing level of safety for these appliances by evaluating them against these standards or through the exercise of their judgment. Because of these requirements, it has been unnecessary to provide detailed technical coverage in NFPA 58. Such coverage could create correlation problems. Therefore, NFPA 58 coverage has been limited to the following situations:

- Equipment not addressed in separate standards. The coverage may be due either to a small number or limited use of appliances or to the use of appliances in an environment under the control of specialists. Neither situation warrants the level of activity necessary to develop a separate standard.
- Coverage needed as an interim measure. It takes a considerable period of time to develop a separate standard, and frequently such a standard cannot be promulgated unless the use of the appliance is at least permitted by NFPA 58.

In such instances, although NFPA 58 serves a useful function, the technical committee must be careful to amend the code as necessary when a separate, specific code or standard is developed. Such amendment could include deletion of provisions in NFPA 58. In general, a specific appliance standard should govern in recognition of its more complete and intensive coverage, provided the code has suitable status. Many of the appliances addressed in Section 5.20 are actually installed under circumstances that place them under the scope of NFPA 54, rather than NFPA 58, in accordance with 1.3.2(6) of NFPA 58.

5.20.1 New residential, commercial, and industrial LP-Gas consuming appliances shall be approved.

The manufacturing of most residential and commercial LP-Gas appliances is covered by specific codes and standards. The largest of these documents are the ANSI Z21/83 series of standards promulgated by the ANSI Z21/83 Committee on Performance and Installation of Gas-Burning Appliances and Related Accessories [26]. (A partial list of current ANSI Z21/83 standards is included at the end of this chapter.) Underwriters Laboratories Inc. (UL) also develops some product standards. Most authorities having jurisdiction accept appliances listed to these standards, as well as to UL requirements. UL requirements are found in published UL standards and outlines of investigations. Outlines of investigations contain requirements used by UL to investigate products prior to their publication in a UL standard.

The requirement for approval does not include listing. The decision is that of the authority having jurisdiction, and many authorities usually prefer, or even require, listed appliances and equipment whenever they are available. Refer to 3.2.1 for the definition of *approved* and to 3.2.5 for the definition of *listed*.

Some appliance manufacturers have their appliances listed by organizations acceptable to most authorities having jurisdiction. One of these organizations is CSA America Inc. In addition, many LP-Gas appliances and equipment are listed by UL and other organizations. In the industrial area, FM Global listings are frequently found for industrial heat-processing equipment.

5.20.2 Any appliance originally manufactured for operation with a gaseous fuel other than LP-Gas shall not be used with LP-Gas unless it is converted to use LP-Gas and is tested for performance with LP-Gas before being placed into use.

◀ **FAQ**
Can a natural gas appliance be used with LP-Gas?

Most appliances are produced to operate on one fuel gas only, but can be converted to operate on another fuel gas. The conversion of a natural gas appliance to LP-Gas, for example, is not a complex operation, but it must be done safely by a qualified, trained individual. When

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 503

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in doubt about such cases, check with the manufacturer or the listing laboratory. The appliance manufacturer may offer conversion parts for the appliance to use another fuel gas.

Some appliances are designed to operate on more than one fuel. These appliances are easily converted by turning a knob or lever. One example of such an appliance is a water heater designed for installation in manufactured housing. Other appliances must be converted in accordance with the appliance manufacturer's instructions to operate safely on LP-Gas.

5.20.3 Unattended heaters used inside buildings for animal or poultry production or care shall be equipped with approved automatic devices to shut off the flow of gas to the main burners and to pilots, if used, in the event of flame extinguishment or combustion failure.

5.20.4 Approved automatic devices to shut off the flow of gas to the main burners and pilots shall not be required in structures without enclosing walls with the approval of the authority having jurisdiction.

The provisions in 5.20.3 and 5.20.4 are examples of the use of NFPA 58 to fill a gap created by the absence of a specific code. (See the commentary following 5.20.1.) The use of unattended heaters inside a building used for animal or poultry production can be a hazard if the flame is extinguished and a flame safety device is not part of the appliance, because the released gas can be ignited. Because buildings used for animals in warmer climates may not have enclosing walls, NFPA 58 does not mandate the safety device with portable heaters used in these buildings, although the code requires local officials to approve such installations.

5.20.5 Appliances using vaporizing burners shall comply with 5.21.5.

5.20.6* Appliances used in mobile homes and recreational vehicles shall be approved for such service.

A.5.20.6 See NFPA 1192, *Standard on Recreational Vehicles*, for additional requirements where used on recreational vehicles.

At present, recreational vehicles are covered by NFPA 1192, *Standard on Recreational Vehicles* [9], and this requirement is consistent with the requirements of NFPA 501, *Standard on Manufactured Housing* [27]. New manufactured homes sold in the United States are covered under federal regulations issued by the Department of Housing and Urban Development (HUD). The HUD regulations apply only to the manufacture of such homes. This provision applies to appliances installed in manufactured homes after the original manufacture and sale.

5.20.7* LP-Gas appliances used on commercial vehicles shall be approved for the service.

(A) Gas-fired heating appliances and water heaters shall be equipped with automatic devices designed to shut off the flow of gas to the main burner and the pilot in the event the pilot flame is extinguished.

(B) Catalytic heating appliances shall be equipped with an approved automatic device to shut off the flow of gas in the event of combustion failure.

(C) Gas-fired heating appliances and water heaters to be used in vehicles intended for human occupancy shall be designed for complete separation of the combustion system and the living space.



(D) If the separation between the combustion system and the living space is not integral with the appliance, it shall be provided in accordance with installation requirements in 6.23.7.5.

A.5.20.7 Combustion air inlets and flue gas outlets should be included in the listing of the appliance.

The requirements of 5.20.7(A) and (B) are basic gas safety requirements.

Where gas appliances are used in vehicles intended for people, there are concerns about proper removal of the products of combustion and the possibility of carbon monoxide pro-

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 504

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duction. The requirements of 5.20.7(C) and (D) are intended to ensure proper appliance operation, to remove the products of combustion from vehicles, and to prevent production of carbon monoxide. Carbon monoxide alarms are not required by NFPA 58, but they are required by NFPA 1192 for recreational vehicles with gas appliances.

5.21 Vaporizers, Tank Heaters, Vaporizing Burners, and Gas–Air Mixers

◀ **FAQ**
What is the difference between a vaporizer and a tank heater?

This section addresses equipment that is used for providing an external heat source to assist in the vaporization of LP-Gas. LP-Gas cannot be burned by an appliance while it is a liquid. It must be converted to a vapor in order to be utilized. Any liquid will vaporize at its boiling point if heat is added to it. The amount of heat required per unit of propane is known as the *latent heat of vaporization*. From Table B.1.2(a), propane requires about 773 Btu of energy to vaporize one gallon of liquid.

In a typical propane fuel distribution system, the latent heat of vaporization is provided by the surroundings of the tank: for aboveground tanks, it is the surrounding air; for belowground tanks, the surrounding soil. As soon as vapor is removed from the tank, the pressure inside the container drops and the liquid begins to boil to try to achieve equilibrium between the vapor pressure of the liquid at its temperature and the vapor pressure in the container. In order to vaporize, however, the liquid must be provided with heat energy. In those locations where the surrounding air or soil is too cold to provide sufficient heat to the liquid through the walls of the container, an external source of heat, such as a vaporizer, tank heater, or vaporizing burner, can be used.

A vaporizer is a piece of equipment that is really a heat exchanger. It transfers heat from an external source, such as a flame or electric resistance heating element to liquid LP-Gas as it passes through the vaporizer. Liquid enters the vaporizer at one point, and vapor leaves it at another point. A tank heater, on the other hand, never contacts liquid LP-Gas. A tank heater provides a source of heat energy to the walls of an LP-Gas container, which in turn transfer the heat into the liquid within the container. The source of heat can be an electric resistance heating element or a gas fired burner. See 3.3.75 for definitions of various types of vaporizers.

5.21.1 Reserved.

5.21.2 Indirect Vaporizers.

5.21.2.1 Indirect vaporizers shall be constructed in accordance with the applicable provision of the ASME Code for a MAWP of 250 psig (1.7 MPag) and shall be permanently and legibly marked with the following:

(1) The marking required by the ASME Code
(2) The maximum allowable working pressure and temperature for which designed
(3) The name of the manufacturer

Indirect vaporizers are heat exchangers that transfer heat from a "working" fluid heated outside the vaporizer to the liquid LP-Gas. The working fluid can be air, water or other fluid, steam, or other heated liquid. Indirect vaporizers must be built in accordance with the ASME *Boiler and Pressure Vessel Code* [1] to a MAWP of 250 psig (1.7 MPag). This pressure is the same as that required by the ASME Code for most propane containers. If the vaporizer is designed to be fed by a pump, the MAWP must be equal to or greater than the maximum pump discharge pressure.

5.21.2.2 Indirect vaporizers that have an inside diameter of 6 in. (152 mm) or less are exempt from the ASME Code and shall not be required to be marked. They shall be constructed for a MAWP of 250 psig (1.7 MPag).

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 505

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Small indirect vaporizers that have an inside diameter of 6 in. (152 mm) or less must also be designed for an operating pressure of 250 psig (1.7 MPag), but need not be inspected by an ASME-approved inspector or marked with the code marking. This requirement is consistent with the ASME *Boiler and Pressure Vessel Code*, which is not applicable to pressure vessels with an inside diameter of 6 in. (152 mm).

5.21.2.3 Indirect vaporizers shall be provided with an automatic means to prevent the passage of liquid through the vaporizer to the vapor discharge piping.

Liquid cannot be allowed to leave a vaporizer through the vapor discharge piping at any time during normal operation or a malfunction of the vaporizer. If the vaporizer is sized and functioning properly, liquid will not be present in the vapor outlet. The requirement is intended to protect against a vaporizer malfunction in which the heat source of the vaporizer fails or the unit becomes overloaded. The hazard of liquid being present in the vapor piping is that none of the vapor control equipment, such as regulators, control valves, and burners, is designed to handle liquid. Liquid passing through vapor regulators will flash to vapor and can result in significantly increased flame size that can present a fire hazard. In addition, if liquid water is present anywhere downstream of the vaporizer, it can be frozen to form ice by the vaporizing liquid, which can then plug a regulator.

5.21.2.4 Indirect vaporizers, including atmospheric-type vaporizers using heat from the surrounding air or the ground and of more than 1 qt (0.9 L) capacity shall be equipped with a spring-loaded pressure relief valve providing a relieving capacity in accordance with 5.21.9. Fusible plug devices shall not be used.



EXHIBIT 5.62 *Direct-Fired Vaporizer. (Courtesy of Ransome Manufacturing)*

The prohibition of fusible plugs (instead of spring-loaded pressure relief valves) is included because fusible plugs (and rupture discs) cannot re-close and will allow the entire contents of the system to be discharged into the atmosphere in case of overpressure. Spring-loaded pressure relief valves can minimize the quantity of vapor discharged because they close after the pressure returns to a normal level.

5.21.2.5 Indirect atmospheric-type vaporizers of less than 1 qt (0.9 L) capacity shall not be required to be equipped with pressure relief valves but shall be installed in accordance with 6.21.2.11.

Vaporizers with an internal capacity less than 1 qt (0.9 L) are not required to be provided with a relief valve, but must be installed in accordance with 6.21.2.11 and Table 6.21.3.6 (which is referenced in 6.21.2.11). The table provides minimum separation distances between direct-fired vaporizers and specific exposures that may present a source of ignition.

5.21.3 Direct-Fired Vaporizers.

5.21.3.1 Design and construction of direct-fired vaporizers shall be in accordance with the applicable requirements of the ASME Code for the working conditions to which the vaporizer will be subjected, and the vaporizer shall be permanently and legibly marked with the following:

(1) The markings required by the ASME Code
(2) The maximum vaporizing capacity in gallons per hour
(3) The rated heat input in British thermal units per hour (Btu/hr)
(4) The name or symbol of the manufacturer

All direct-fired vaporizers must be constructed in accordance with the ASME Code, which includes inspection and marking. (See Exhibits 5.62 and 5.63.) The term *markings* required by the code refers directly to the markings required by the ASME Code. The term *outside surface* used in the marking requirements of the ASME Code does not refer to the surface of the outside of the cabinet or enclosure. The outside surface is that surface that can be in contact

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 506

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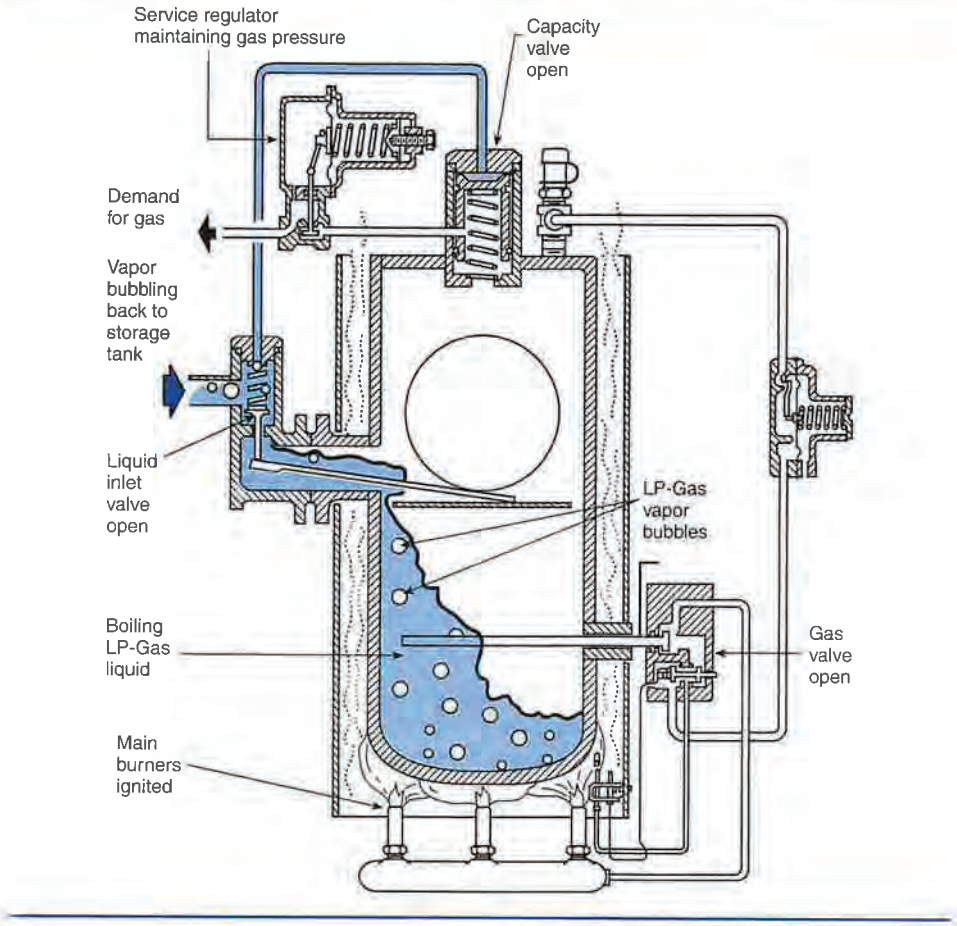


EXHIBIT 5.63 *Direct-Fired Vaporizer Operating on Demand. (Courtesy of National Propane Gas Association)*

with LP-Gas on the inside and the atmosphere on the outside, which could add to the vaporization rate of the vaporizer if subjected to fire outside the vaporizer. The outside surface includes the heat exchange surface plus the top of the vessel.

5.21.3.2 Direct-fired vaporizers shall be equipped with a spring-loaded pressure relief valve that provides a relieving capacity in accordance with 5.21.9.

5.21.3.3 The relief valve shall be located so as not to be subject to temperatures in excess of 140°F (60°C). Fusible plug devices shall not be used.

The relief valve must be located or protected in such a manner that it will not be subjected to a temperature above 140°F (60°C). This requirement is included because a direct-fired unit contains a burner that can create high temperatures from the products of combustion, and excessive temperature near a relief valve could destroy the seats and damage the mechanism inside of the relief valve.

The prohibition against fusible plugs and rupture discs addresses the same concerns as the similar provisions for indirect vaporizers. [See the commentary on 5.21.2.4.]

5.21.3.4 Direct-fired vaporizers shall be provided with automatic means to prevent the passage of liquid from the vaporizer to its vapor discharge piping.

5.21.3.5 A means for manually turning off the gas to the main burner and pilot shall be provided.

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 507

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5.21.3.6 Direct-fired vaporizers shall be equipped with an automatic safety device to shut off the flow of gas to the main burner if the pilot light is extinguished.

5.21.3.7 If the pilot flow exceeds 2000 Btu/hr (2 MJ/hr), the safety device shall also shut off the flow of gas to the pilot.

5.21.3.8 Direct-fired vaporizers shall be equipped with a limit control to prevent the heater from raising the product pressure above the design pressure of the vaporizer equipment, and to prevent raising the pressure within the storage container above the pressure specified in the first column of Table 5.2.4.2 that corresponds with the design pressure of the container (or its ASME Code equivalent). *(See notes to Table 5.2.4.2.)*

Paragraph 5.21.3.6 reiterates the requirement for a 100 percent shutoff for the gas burner. This requirement is not unique to a direct-fired vaporizer burner.

Although 5.21.3.8 implies that the limit control should be a pressure-operated device, temperature-sensing devices are also commonly used for this purpose. Controlling the temperature of the vapor output of the vaporizer is a practical method of preventing the burner from overheating the vapor. The vaporizer cannot produce a vapor pressure higher than that provided to the liquid inlet of the vaporizer. If the pressure in the vaporizer were to exceed the inlet pressure, the flow of liquid into the vaporizer would stop and would be reversed into the supply container.

This provision to limit the pressure within the storage container was intended to protect a type of system seldom used today, one in which liquid is fed by gravity from a storage container into a vaporizer and vapor is returned from the vaporizer back into the top of the tank. Vapor is removed from the tank through a pressure regulator into the distribution system. With this type of system, it is theoretically possible, in extremely hot weather, for a vaporizer connected in this manner to raise the pressure in the container. A severe increase in pressure, of course, would cause the container pressure relief valves to operate, discharging vapor that, because of the presence of the direct-fired vaporizer, would almost certainly become ignited. Again, temperature controls in the vaporizer prevent this type of malfunction from taking place. Accordingly, a temperature control is the only practical type of control to satisfy this requirement.

5.21.4 Direct Gas-Fired Tank Heaters.

5.21.4.1 Direct gas-fired tank heaters shall be designed exclusively for outdoor aboveground use and so that there is no direct flame impingement upon the container.

5.21.4.2 Tank heaters shall be approved and shall be permanently and legibly marked with the following:

(1) The rated input to the burner in British thermal units per hour
(2) The maximum vaporizing capacity in gallons per hour
(3) The name or symbol of the manufacturer

5.21.4.3 The tank heater shall be designed so that it can be removed for inspection of the entire container.

5.21.4.4 The fuel gas supply connection to the tank heater shall originate in the vapor space of the container being heated and shall be provided with a manually operated shutoff valve at the heater.

5.21.4.5 The heater control system shall be equipped with an automatic safety shutoff valve of the manual-reset type arranged to shut off the flow of gas to both the main and pilot burners if the pilot flame is extinguished.

5.21.4.6 Where installed on a container exceeding 1000 gal (3.8 m^3) water capacity, the heater control system shall include a valve to automatically shut off the flow of gas to both the main and pilot burners if the container becomes empty of liquid.

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 508

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5.21.4.7 Direct gas-fired tank heaters shall be equipped with a limit control to prevent the heater from raising the pressure in the storage container to more than 75 percent of the pressure shown in the first column of Table 5.2.4.2 that corresponds with the MAWP of the container (or its ASME *Boiler and Pressure Vessel Code* equivalent).

Direct gas-fired tank heaters are no longer widely used, but there is no reason to prohibit them. These heaters attach to the bottom of the container to heat the container shell at the point of contact, thereby heating the liquid product inside. In order to avoid the loss of container strength, however, no flame impingement on the container itself can occur. Most of these units were constructed so that they can be easily removed to inspect for possible corrosion of the container at the point of installation. Direct gas-fired tank heaters must be engineered so that there will be automatic means to prevent overheating the product in the container, to shut off the heater in case the container empties, and to shut off the gas flow to the heater in case the pilot light goes out. The need for direct-fired tank heaters exists only in very cold climates, where temperatures can go below about – 40°F (– 40°C). Below this temperature, container pressure will be negative and no gas will flow from the container.

5.21.5 Vaporizing Burners.

Vaporizing burners are a form of direct-fired vaporizers where the vaporizing burner is actually part of the appliance. The vapor is produced by heating liquid propane in a heat exchanger in the burner. Only a small portion of the heat is used to vaporize the liquid, and the appliance delivers the remainder as useful heat energy. Vaporizing burners are used where large quantities of vapor are required — for example, for crop dryers and for smaller applications such as for roofing equipment and portable weed burners. The need for a separate vaporizer and pressure controls is eliminated by the use of a vaporizing burner, with corresponding cost savings. The minimum design pressure must be 250 psig (1.7 MPag), which is the same as that of the container. The coils and jackets must be made of ferrous metals or high-temperature alloys because of the high temperature created by the flame.

The vaporizing burner shown in Exhibit 5.64 operates by delivering liquid through a tube (shown in the cutaway), which is encased in a shell with a concentric space between them. The liquid then reverses direction and proceeds back between the tube and the shell in a spiral flow pattern induced by the wire. This spiral flow pattern creates turbulence and enhances heat transfer from the flame impinging on the outside of the shell to the vaporizing liquid. The vapor created is then consumed in the burner that encloses the area outside of the concentric shell and tube.



EXHIBIT 5.64 *Vaporizing Burner. (Courtesy of Flame Engineering)*

5.21.5.1 Vaporizing burners shall be constructed with a pressure rating of 250 psig (1.7 MPag) with a safety factor of 5 to 1.

5.21.5.2 The vaporizing burner or the appliance in which it is installed shall be permanently and legibly marked with the following:

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 509

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(1) The maximum burner input in British thermal units per hour
(2) The name or symbol of the manufacturer

5.21.5.3 Vaporizing coils or jackets shall be made of ferrous metals or high-temperature alloys.

5.21.5.4 The vaporizing section shall be protected by a relief valve, located where it will not be subject to temperatures in excess of 140°F (60°C), and with a pressure setting sufficient to protect the components involved but not lower than 250 psig (1.7 MPag).

5.21.5.5 The relief valve discharge shall be directed upward and away from the component parts of the vaporizing burner. Fusible plug devices shall not be used.

5.21.5.6 A valve shall be provided to turn off the gas supply to the main burner and the pilot.

5.21.5.7 Vaporizing burners shall be provided with an automatic safety device to shut off the flow of gas to the main burner and pilot in the event the pilot is extinguished.

5.21.5.8* Dehydrators and dryers utilizing vaporizing burners shall be equipped with automatic devices both upstream and downstream of the vaporizing section. These devices shall be installed and connected to shut off in the event of excessive temperature, flame failure, and, if applicable, insufficient air-flow.

A.5.21.5.8 See NFPA 61, *Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*, for ignition and combustion controls applicable to vaporizing burners associated with grain dryers.

The intent of 5.21.5.8 is to provide safety devices installed at the specified locations that will automatically shut down the dehydrator or dryer (used to dry grain in agricultural applications) in order to avoid unsafe situations that could lead to overheating of the equipment.

5.21.5.9 Pressure-regulating and control equipment shall be so located or so protected to prevent its exposure to temperatures above 140°F (60°C), unless designed and recommended for use at a higher temperature by the manufacturer.

5.21.5.10 Pressure-regulating and control equipment located downstream of the vaporizing section shall be designed to withstand the maximum discharge temperature of hot vapor.

Because liquid is fed to the vaporizing burner, a hydrostatic relief valve in the burner is required to protect the piping when the burner is shut off and the liquid is trapped in the burner and piping. Without a hydrostatic relief valve, an increase in the temperature of the liquid would create a pressure that could burst the heater or the attached piping. Vaporizing burners are often used for temporary heating during construction or emergencies and are left unattended. As a result, the careful use of automatic equipment is extremely important. The units are also used as agricultural product dehydrators and dryers and should be properly equipped with automatic devices on both the inlet and the outlet of the vaporizer section of the burner. Because these units are generally portable, extreme care must be taken in their placement and to ensure that fuel connections are not subjected to mechanical damage.

5.21.6 Waterbath Vaporizers.

The waterbath vaporizer differs from a direct-fired vaporizer because there is no flame impingement on the vaporizer chamber itself. The flame is directed into the water under pressure, creating a boiling, swirling effect. This turbulence results in excellent heat transfer to the water. The liquid propane is circulated in pipes in the water chamber and is heated by the turbulent hot water.

Waterbath vaporizers are used where a very high vaporization requirement exists. The use of waterbath vaporizers in LP-Gas systems under the scope of NFPA 58 is not common.

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 510

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Waterbath vaporizers are more commonly found in larger systems under the scope of NFPA 59, *Utility LP-Gas Plant Code* [28].

5.21.6.1 The vaporizing chamber, tubing, pipe coils, or other heat exchange surface containing the LP-Gas to be vaporized, hereinafter referred to as heat exchanger, shall be constructed in accordance with the applicable provisions of the ASME Code for a MAWP of 250 psig (1.7 MPag) and shall be permanently and legibly marked with the following:

(1) The marking required by the ASME Code
(2) The MAWP and temperature for which the heat exchanger is designed
(3) The name or symbol of the manufacturer

A waterbath vaporizer is a cross between a direct-fired vaporizer and an indirect-fired vaporizer. The portion of such a unit that contains and vaporizes the LP-Gas must be built in accordance with the provisions of the ASME Code for a minimum pressure of 250 psig (1.7 MPag) and be marked as required in 5.21.6.1. Again, vaporizers less than 6 in. (152 mm) in diameter are exempt from the ASME Code but must be constructed to a minimum MAWP of 250 psig (1.7 MPag). (See also the commentary following Section 5.21.) The same automatic safety controls used with indirect-fired and direct-fired vaporizers to prevent liquid passing into the vapor discharge piping must be provided. The immersion heater that provides heat to the waterbath must not be in contact with the LP-Gas heat exchanger surface in order to avoid overheating it. It also must be equipped with an automatic shutoff device to prevent overheating of the liquid waterbath, should the level of the waterbath liquid fall below the top of the heat exchanger.

5.21.6.2 Heat exchangers for waterbath vaporizers that have an inside diameter of 6 in. (150 mm) or less are exempt from the ASME Code and shall not be required to be marked.

5.21.6.3 Heat exchangers for waterbath vaporizers shall be provided with automatic control to prevent the passage of liquid through the heat exchanger to the vapor discharge piping. This control shall be integral with the vaporizer.

5.21.6.4 Heat exchangers for waterbath vaporizers shall be equipped with a spring-loaded pressure relief valve that provides a relieving capacity in accordance with 5.21.9. Fusible plug devices shall not be used.

5.21.6.5 Waterbath sections of waterbath vaporizers shall be designed to prevent a pressure from exceeding the design pressure.

5.21.6.6 The immersion heater that provides heat to the waterbath shall be installed so as not to contact the heat exchanger and shall be permitted to be electric or gas-fired.

Paragraph 5.21.6.6 states that the immersion heater that heats the waterbath is permitted to be electric or gas-fired. The intent is not to prevent any other form of heat source; however, the only two that seem practical are electric or gas-fired immersion heaters.

5.21.6.7 A control to limit the temperature of the waterbath shall be provided.

5.21.6.8 Gas-fired immersion heaters shall be equipped with an automatic safety device to shut off the flow of gas to the main burner and pilot in the event of flame failure.

5.21.6.9 Gas-fired immersion heaters with an input of 400,000 Btu/hr (422 MJ/hr) or more shall be equipped with an electronic flame safeguard and with programming to provide for prepurge prior to ignition, proof of pilot before the main burner valve opens, and full shutdown of the main gas valve and pilot upon flame failure.

5.21.6.10 The heat source shall be shut off if the level of the heat transfer medium falls below the top of the heat exchanger.

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 511

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5.21.7 Reserved.

5.21.8 Gas–Air Mixers.

Gas–air mixers are devices used to "pre-mix" air into LP-Gas so that it can be used as a direct replacement for natural gas. Mixers are used most often in "stand-by" systems, which provide an alternate source of fuel to a facility when the primary source (natural gas) is not available. The concept of this system is to mix air with LP-Gas such that the concentration of the propane–air mix is still greater than the higher limit of flammability. The mixture is then distributed through the piping system to the fuel-burning equipment. As the mixture enters the appliance, it is mixed further with air to bring it within the flammability range.

The entire subsection on gas–air mixtures (5.21.8) contains requirements that are intended to prevent both flammable gas–air mixtures from entering the system and air from entering the gas distribution line.

5.21.8.1 Gas–air mixers shall be designed for the air, vapor, and mixture pressures to which they are subjected.

5.21.8.2 Gas–air mixers that are capable of producing combustible mixtures shall be equipped with safety interlocks on both the LP-Gas and air supply lines to shut down the system if combustible limits are approached.

5.21.8.3 In addition to the interlocks required in 5.21.8.2, a method shall be provided to prevent air from accidentally entering gas distribution lines without LP-Gas being present. Gas mixing control valves installed in the air and LP-Gas supply lines that fail closed when actuated by safety trip devices shall meet this requirement.

5.21.8.4 Check valves shall be installed in the air and LP-Gas supply lines close to the mixer to minimize the possibility of backflow of gas into the air supply lines or of air into the LP-Gas system. Gas-mixing control valves installed in the air and LP-Gas supply lines that fail closed when actuated by safety trip devices shall meet this requirement.

5.21.8.5 Gas–air mixers that utilize the kinetic energy of the LP-Gas vapor to entrain air from the atmosphere and are so designed that maximum air entrained is less than 85 percent of the mixture shall comply with the following:

(1) Be exempt from the interlock provisions in 5.21.8.2 through 5.21.8.4
(2) Be equipped with a check valve at the air intake to prevent the escape of gas to atmosphere when shut down

5.21.8.6 Gas–air mixers of this type receiving air from a blower, compressor, or any source of air other than directly from the atmosphere shall prevent air without LP-Gas, or mixtures of air and LP-Gas within the flammable range, from entering the gas distribution system accidentally.

The flammable limits for propane in air are approximately 2.15 percent to 9.6 percent. A venturi-type blender or mixer uses the kinetic energy of the LP-Gas vapor to entrain air from the atmosphere. Venturi mixers should be designed so that the maximum air entrained is less than 85 percent of the mixed gas formed. The mixture of 85 percent or less air with the remainder of 15 percent or more LP-Gas is not flammable (a flammable mixture is between 90.4 percent and 97.85 percent air), and the interlock provisions of 5.21.8.2 are specifically excluded, as are 5.21.8.3 and 5.21.8.4. A check valve at each air inlet venturi prevents any LP-Gas from escaping into the atmosphere when the system is not operating.

To prevent malfunction, most venturi mixers have high and low vapor pressure interlocks, high and low mixed LP-Gas–air pressure interlocks, and a low incoming vapor temperature interlock. The latter interlock prevents any LP-Gas liquid from entering the gas–air mixer. To prevent any possible vapor condensation problems, the mixer should be located as close as possible to the vaporizer, and the mixer vapor inlet connection should be sloped back

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 512

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toward the vaporizer vapor outlet connection. If this is not practical, a drip leg with heater should be installed or the piping can be heated to prevent low temperatures by wrapping electric tracer heater cable around such piping. Unless ambient temperatures are very low, insulating the piping may be sufficient to prevent too low a temperature of the gas vapor.

Usually venturi mixers employing atmospheric air have an output mixture pressure of less than 3 psig (21 kPag) in order to produce a viable mixed gas. For mixer pressures greater than 3 psig (21 kPag), air under pressure must be supplied to the venturi mixer from an external source, such as a plant air system or an air compressor. For this external air supply system, a method must be provided on the venturi mixer to prevent 100 percent air or a flammable LP-Gas–air mixture from being supplied to the user's gas distribution piping. This prevention is usually accomplished through special controls and low air pressure interlocks that will shut down the mixer in the event of a malfunction.

Consideration also should be given to the method of installation of the downstream piping for the LP-Gas–air mixture from the mixer to the plant utilization point, relative to possible recondensation of the LP-Gas–air mixture. For most cases, when commercial propane is the LP-Gas–air feedstock and the LP-Gas–air mixture is at or below 100 psig (690 kPag), there would be no recondensation of propane in the mix until the mixed gas temperature is lowered to 20°F (–7°C) or colder. But if commercial butane is the LP-Gas–air feedstock, considerable care must be taken in the mixed gas piping design. At a mixed gas pressure of 10 psig (69 kPag), butane will start to condense at about 20°F (–7°C).

Thus, for higher mixed gas send-out pressures, condensation of butane will occur at higher temperatures; for example, at 50 psig (345 kPag), the condensation temperature is about 60°F (15.6°C). Heat for the butane–air mix gas line must thus be provided in the form of heat tracing or insulation to guard against possible butane condensation.

The venturi-type gas–air mixer uses the kinetic energy of LP-Gas vapor to entrain air from the atmosphere to provide a desired LP-Gas–air mixture. Each venturi includes a solenoid valve on the gas inlet side of the venturi. A controller monitors the outlet manifold pressure of the mixer and energizes each individual solenoid valve to provide a constant flow to the process at the required pressure. The air inlet of the venturi includes a backflow check valve to prevent the escape of LP-Gas to the atmosphere. In addition, the controller is interlocked with a low-vapor inlet temperature switch and high- and low-pressure switches on the gas inlet at gas–air outlet manifolds.

Exhibit 5.65 shows a high-pressure [greater than 3 psig (21 kPag)] variable-orifice type of gas–air mixer with inlet air and gas control trains located in a room complying with Chapter 10. Both the air and gas control trains include pressure regulators, check valves, shutoff

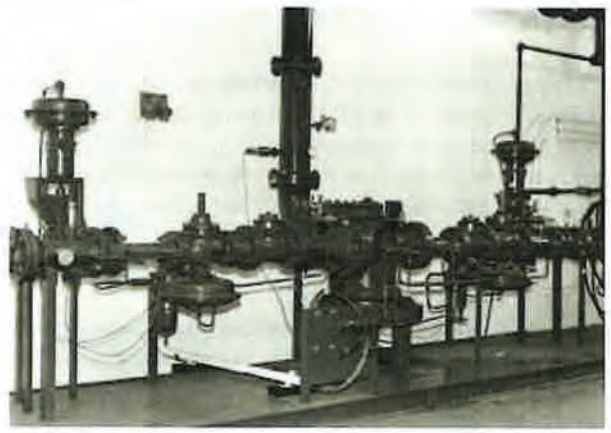


EXHIBIT 5.65 *High-Pressure Orifice Gas–Air Mixer. (Courtesy of Al-Gas SDI)*

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 513

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valves, safety shutoff valves, temperature and pressure indicators, and high-low pressure switches. Process air for the mixer may be furnished from an air compressor in a separate room or from the plant air system. Air and gas pressures are both regulated to equal pressures on the inlet to the mixer. The variable orifice in the mixing valve will open and close, depending on flow, to provide a constant Btu value. The propane–air mixture is then distributed within the plant process piping.

5.21.9 Vaporizer Pressure Relief Valve.

The minimum rate of discharge in cubic feet of air per minute for pressure relief valves for LP-Gas vaporizers, either of the indirect type or direct-fired, shall comply with 5.21.9(A) through 5.21.9(C).

(A) Based on conservative heat transfer calculations (assuming that the vaporizing chamber is liquid full), the maximum vapor generating capacity (rate) shall be determined when maximum heat is available. That vapor rate shall be converted to an equivalent air rate.

The phrase "conservative heat transfer calculations" is explained by the statement in parenthesis. This calculation is considered conservative because the maximum vapor rate occurs when propane is in contact with the entire surface of the vaporizer and maximum heat is available.

Pressure relief valves and all other safety devices are designed for the worst-case condition, which is fire exposure over the entire surface of the vessel. In the event of fire exposure to a vaporizer, the pressure relief valve must be sized to handle vapor produced as a result of the liquid heating by both the normal heat source and the fire exposure.

Subsection 5.21.9 provides three separate criteria for sizing pressure relief valves for use on vaporizers. The size of the pressure relief valve must comply with each criterion that is applicable to the specific vaporizer.

(B) If the vaporizer is direct fired or if a substantial exterior surface is in contact with the LP-Gas, the sum of the vaporizer surface and the LP-Gas wetted exterior surface shall be used in conjunction with Table 5.7.2.5 to determine the required relief valve capacity.

(C) The minimum rate of discharge in cubic feet of air per minute for pressure relief valves for LP-Gas vaporizers, of either the indirect type or direct fire type, shall be at least 150 percent of the rated vaporizing capacity.

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Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 514

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Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 515

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Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 516

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NFPA 58 Index

A

Acceptance of equipment and systems, 4.1
Actuated liquid withdrawal excess-flow valve, 5.7.4.1, 5.7.8.1
  Definition, 3.3.1
Adoption of code, Annex J
American Society of Mechanical Engineers *see* ASME
Ammonia contamination, 4.5, A.4.5
Anodeless risers, 5.9.5(E), 6.9.4.3
  Definition, 3.3.2
ANSI (definition), 3.3.3
API-ASME codes
  Compliance with, 5.2.1.1, 11.3.1.1, A.5.2.1.1
  Development of, D.1.2
API-ASME containers (or tanks), Annex D
  Definition, 3.3.5
  Design of, D.2.2 to D.2.4, D.3
  Filling, 7.4.3.1(4)
  Requalification for service, 5.2.1.2(B), 11.3.1.4
API (definition), 3.3.4; *see also* API-ASME codes; API-ASME containers (or tanks)
Appliances, LP-Gas, 5.20, A.5.20.6, A.5.20.7
  Approval, 5.20.1
  Conversion to LP-Gas, 5.20.2
  Installation of, 6.20
    Buildings, 6.19.2, 6.19.8, A.6.19.2.5, A.6.19.2.7
    Non-engine fuel systems, 6.23.7, A.6.23.7.6
    Patio heaters, 6.20.2
    Portable appliances, hose for, 6.20.3
    Vehicles, 6.23.7, A.6.23.7.6
  Pipe sizing between second-stage regulator and appliance, Table 15.1(c), Table 15.1(e), Table 15.1(g), Table 15.1(j), Table 15.1(l)
Application of code, 1.3, A.1.3.1(4) to A.1.3.2(8)
Approved (definition), 3.2.1, A.3.2.1
Appurtenances, container *see* Container appurtenances
ASME (definition), 3.3.6; *see also* API-ASME codes; ASME code; ASME containers
ASME code
  Compliance with, 5.2.1.1, 11.3.1.1, 11.3.1.2, A.5.2.1.1
  Definition, 3.3.7
  Development of, D.1.2
ASME containers, Annex D; *see also* API-ASME containers (or tanks)
  Appurtenances and connections, Table 5.7.4.1, 5.7.4.1(A), 5.7.4.2, 5.7.8.1, 5.7.8.4 to 5.7.8.6, 6.8.3.3, 6.26.3
  Definition, 3.3.8
  Design, D.2.1, D.2.3, D.2.4, D.3
  Engine fuel systems, 11.3.1.4(B), 11.3.2, 11.3.4, 11.4.1.7, 11.4.1.8
  Filling, 7.4.3.1(4), 7.4.3.2(C)
  Gauges, 5.7.5.4, 5.7.5.7
  Inlet and outlet connections, 5.7.8.5
  Installation, 6.6.3, 6.6.4, 6.6.6, 6.6.7.2(3), 6.23.3.2, 6.26, A.6.6.6.1
  Marking, 5.2.8.3, 5.2.8.3(C), 5.2.8.5, A.5.2.8.3
  Maximum allowable working pressure *see* Maximum allowable working pressure (MAWP)
  Non-engine fuel systems, 6.23.3.1
  Openings, 5.2.5, A.5.2.5.3 to A.5.2.5.7
  Pressure relief devices/valves, 5.7.2.1, 5.7.2.5 to 5.7.2.7, 5.7.4.1(A), 6.23.4.1, E.2
  Protection, 6.25.3, A.6.25.3
  Requalification for service, 5.2.1.2(B), 5.2.1.3, 11.3.1.4(B)
  Separation distances, 6.3.2 to 6.3.4, Table 6.3.9, 6.3.12
  Service pressure, 5.2.4.2
  Spacing, Fig. I.1(b), Fig. I.1(c)
  Specifications, Table 4.1.1
  Supports, 5.2.7.1
  Tank heaters, 6.21.4.1, 6.21.4.2
  Transfer into, 6.26.5.1, 6.26.5.2
  Transportation of, 9.3.4, 9.6.2.1
  Vehicles, on, 6.23.3.2, 6.26.5.1
ASTM (definition), 3.3.9
Attached structures, LP-gas distribution facilities, 10.3, A.10.3.2.6
Authority having jurisdiction (definition), 3.2.2, A.3.2.2

B

Backflow check valves, Table 5.7.4.1, 5.7.4.2(H), 5.7.4.5, 5.7.7.1, 5.7.7.2, 5.7.8.1, 5.12.3, 5.17.7, 6.12.3 to 6.12.5, 6.12.8, 6.12.9, 6.26.3.5, 6.26.4.1, 7.3.2.2(C), A.6.12.8
  Cargo tank vehicles, 9.4.2.4, 9.4.3.4
  Engine fuel systems, 11.4.1.4, 11.4.1.14, 11.9.1.8
  Railroad tank car end of hose, 7.2.3.7(2)
  Refrigerated containers, 12.1.1.5
Backflow prevention device, 6.21.2.9
Balconies, LP-Gas systems on, 6.19.11.2
Bleeder valves *see* Valves
Bonding, 6.22.1.3, 13.3.5, 13.3.6
Breakaway devices, 6.24.4.2, 7.2.3.8(8), 11.7.5.2
Buildings/structures
  Bulk plants *see* Bulk plants
  Containers in, 6.19, A.6.19.2.7 to A.6.19.10.3
    Gas discharge from, 6.8.1.5
    Location, 6.2.2
    Storage of portable containers, 8.2.1.3 to 8.2.1.5, 8.3
    Venting of cylinders, 7.3.2.2
  Educational and institutional occupancies in, 6.19.7, Table 8.3.1(a)
  Flame effects before a proximate audience in, 6.19.10, 6.19.10.3
  Gas distribution facilities *see* Bulk plants
  Heating *see* Heaters and heating systems
  Industrial occupancies in *see* Industrial occupancies (plants)
  LP-Gas systems in, 6.19, A.6.19.2.7 to A.6.19.10.3
  Piping systems in, 6.9.1.1(4), 6.9.1.2, 6.9.1.3, 6.19.1.2(E), 6.19.2, 6.19.12, A.6.9.1.1(4), A.6.9.1.2, A.6.19.2.5, A.6.19.2.7
  Public, frequented by, Table 8.3.1(a), Table 8.3.1(b), 8.3.2, 9.7.3.1, 9.7.3.2, 9.7.3.5, 11.12.4.3(2), 11.13.2.3(B)
  Separation distances, 6.3
  Transfer operations, 6.5.1, 6.5.4.1, 6.5.4.3, 6.19.1.5, A.6.5.1
  Under construction or renovation, 6.19.4, 6.19.5, 8.4.3

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 517

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Vaporizers in, 6.21.2, 6.21.3, 6.21.8.2 to 6.21.8.4
Vehicles used in, 11.12.4.2, 11.12.4.3; *see also* Parking and garaging of vehicles
Bulk plants
Buildings or structures housing, Chap. 10
Attached, 10.3.1
Construction of, 10.2.1
Rooms within, 10.3.2, A.10.3.2.6
Separate, 10.2
Container connections and appurtenances, 5.7.4.1, Table 5.7.4.2, 5.7.4.3
Definition, 3.3.10, A.3.3.10
Fire protection, 6.25.4.2
Lighting at, 6.18.5
LP-Gas system installation, 6.18, A.6.18.2.5
Liquid transfer facilities, 6.18.2, A.6.18.2.5
Operations and maintenance, Chap. 14
Stationary containers, transportation of, 9.6.2.2
Burning vaporizing *see* Vaporizers

C

Cabinet heaters, 5.20.8, 5.20.9
Canadian Transport Commission, A.5.2.1.1
Carburetion equipment, 11.5
Cargo tanks, 9.3.3.8, 9.4.2, D.2.4.1, D.2.4.4; *see also* Cargo tank vehicles
Appurtenances
Installation, 6.8.3.3
Protection, 5.2.6.2
Attachment to trailer or semitrailer, 5.2.7.2(B)
Definition, 3.3.11
Filling, 7.4.3.1(3)
Liquid level gauging devices, 5.7.5.7
Valves, 9.4.2.3, 9.4.2.4, 9.4.3, A.9.4.3.5
Cargo tank vehicles, 6.18.2.3, 6.19.1.5, Table 6.22.2.2, 6.26.4.1, 9.1.1(2), 9.4, A.9.4.3.5, A.9.4.7; *see also* Cargo tanks
Electrical equipment on, 6.22.2.6, 9.2
Filling, 7.2.3.8
Servicing and repair, 9.7.3.7
Unloading, 7.2.3.3
Carts, farm *see* Movable fuel storage tenders
CGA (definition), 3.3.12
Charging *see* Filling
Code
Definition, 3.2.3, A.3.2.3
Sample ordinance, Annex J
Coils, heating or cooling, 5.2.1.9
Components *see* Equipment
Compressors, 5.17.3, 5.17.6
Installation, 6.17.3
Mounted on vehicle, 9.4.1.2, 9.4.4.1
Operating controls or disconnect switches, 6.18.2.4
Portable, 5.17.3.4, 6.17.3.3, 6.17.3.5, 11.14.1.5
Vapor, Table 6.22.2.2
Connections
Bleed, 13.3.2
Engine fuel systems, 11.3.6, 11.7.5.2(I)
Hose, 5.9.6
LP-Gas system piping, 6.18.2.7
Pipeaway system, 11.7.5.2(I)
Connectors
Flexible *see* Flexible connectors
Quick, 5.9.6
Container appurtenances, 5.2.1.2(C), 5.7, A.5.7.1.2 to A.5.7.5.3
ASME containers, 6.26.3
Bulk plants, 5.7.4.1, Table 5.7.4.2, 5.7.4.3
Definition, 3.3.14
Engine fuel systems *see* Engine fuel systems
Fabrication, 5.7.1, A.5.7.1.2
Installation, 5.7.8, 6.7
Leaks, 5.2.3.3, 9.3.2.6, 9.3.3.5
Non-engine fuel systems, 6.23.3.1(F)
Protection
Physical damage, against, 5.2.6, 6.9.3.14, 9.3.3.4, 9.4.5, 9.6.2.2, 9.6.2.4, 9.6.2.5
Weather exposure, against, 6.8.1.4, 6.9.3.4, 6.9.3.5
Requirements for, 5.7.4, Table 5.7.4.1
Service pressure, 5.7.1.3
Container assembly (definition), 3.3.15
Containers, 5.2, A.5.2.1.1 to A.5.2.8.3; *see also* Cylinders
API-ASME *see* API-ASME containers (or tanks)
ASME *see* ASME containers
With attached supports, 5.2.7
Buildings, containers in *see* Buildings/structures
Capacity, 7.4.2, 11.3.5, A.7.4.2.2, A.7.4.2.4, Annex F; *see also* Water capacity, of containers
Corrosion and corrosion protection, 5.2.1.4, 5.2.3.3, 6.6.1(I), 6.6.6.1(H), 6.6.6.3(4), 6.16, A.6.16
Definition, 3.3.13
Demonstration use, 6.19.9, A.6.19.9.3
Design, 5.2.1.1, 11.3.1, A.5.2.1.1, A.11.3.1, D.2
Design pressure *see* Design pressure
DOT *see* DOT containers
Engine fuel systems *see* Engine fuel systems
Evacuating, 7.2.2, A.7.2.2.5
Fabrication, 5.2.1.1, 5.2.4 to 5.2.7, A.5.2.1.1, A.5.2.5.3 to A.5.2.5.7
Filling *see* Filling
Flotation due to flooding, anchoring to prevent, 6.6.1.6
Heater-cylinder units, 6.19.4.5 to 6.19.4.10
Horizontal *see* Horizontal containers
Impoundment, 6.4.5.3, 6.4.5.4, A.6.4.5.3
Industrial trucks *see* Industrial trucks
Installation, 6.6, 6.19.2, 6.19.11, 11.7, A.6.6.1.4 to A.6.6.6.3(4)
Insulation system *see* Insulation system
Leaks, 5.2.3.3, 9.3.2.6, 9.3.3.5
Liquid level gauges, 5.7.5, A.5.7.5.3
Location, 6.2, 6.3, 6.4.4.5, 6.4.5.4 to 6.4.5.10, 6.4.5.12, 11.7.3, A.6.4.5.8, Annex I
Marking *see* Marking
Mounded *see* Mounded containers
Nonrefillable, 7.2.2.8, 8.3.2.4
Openings, 5.2.5, 5.7.7.1, A.5.2.5.3 to A.5.2.5.7
Overfilling, 7.4.4, A.7.4.4; *see also* Overfilling prevention devices (OPD)
Painting, 6.6.1.4, A.6.6.1.4
Portable *see* Portable containers
Portable storage *see* Portable storage containers
Protection, 6.6.1.2, 6.25.3, 8.4.2, 8.4.3, 8.5, 9.3.2.6 to 9.3.2.9, 9.3.3.5, 9.3.3.6, 9.6.2.2, 11.7.1.2, A.6.25.3, A.8.4.2.1, A.8.4.2.2, A.8.5
Refrigerated *see* Refrigerated containers
Reinstallation or reuse, 5.2.1.2, 5.2.1.3, 11.3.1.4, 11.3.1.6
Removal from service *see* Removal from service
Repairs, 5.2.1.5, 5.2.3.1, 11.3.3
Roofs, on *see* Roofs
Service pressure *see* Service pressure
Small, 6.19.9, A.6.19.9.3
Storage containers, 6.4.1; *see also* Portable storage containers
Storage of containers *see* Cylinders, Storage of
Testing, 5.2.1.1, A.5.2.1.1, Annex H
DOT cylinder requalification, C.3.2
Refrigerated containers, 12.6
Training use, 6.19.9, A.6.19.9.3
Transfer operations *see* Transfer, LP-Gas liquid
Transportation of *see* Transportation of LP-Gas
Underground *see* Underground containers
Vehicles, on *see* Vehicles, containers on/in
Vertical, 5.2.4.3, 5.2.7.1, 6.6.4
Water capacity *see* Water capacity, of containers
Welding, 5.2.1.6
Cooling, of portable containers, 5.2.1.9

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 518

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Corrosion and corrosion protection, 5.2.1.4, 5.2.3.3, 5.2.8.3(A), 6.16, A.6.16
Engine fuel systems, 11.3.3.1, 11.3.7, 11.9.1.9, A.11.3.7
Piping systems, 6.9.3.11
Underground and mounded containers, 6.6.6.1(H), 6.6.6.1(I), 6.6.6.3(4), 6.16.1, Annex K
CSST, maximum capacity of, Table 15.1(m), Table 15.1(n)
Cutting *see* Welding
Cylinders, 5.2.2, A.5.2.2.1; *see also* Containers
Appurtenances and connections
Installation, 6.9.3.2
Physical damage protection, 5.2.6.1
Requirements, Table 5.7.4.1
Composite, 5.2.1.1(C), 5.2.1.2(D), 5.7.2.3, 5.7.3.5, A.5.7.3.5
Buildings, on roofs, or on balconies, systems in, 6.19.1.1(3), 6.19.1.2(C)
Engine fuel systems, 11.3.1.4(D)
Definition, 3.3.16
Design, construction, and requalification of, Annex C
Filling, 7.4.3.1
Flame effects before a proximate audience, use for, 6.19.10.3, A.6.19.10
Industrial trucks, 11.12.2, 11.12.4.2 to 11.12.4.4
Installation, 6.6.2, 6.19.1.1, 6.19.3
Liquid level gauging devices, 5.7.5.6
Location, 6.2.2, 6.3.7, 6.3.8, Table 6.3.9, 8.2.1, 8.3.3.2, 8.3.4.2, 8.4.1.1 to 8.4.1.3, Fig. I.1(a)
Marking, 5.2.8.1, 5.2.8.2, 5.2.8.4, 5.7.5.5, 5.7.5.6, 6.4.5.11, A.5.2.8.2
Non-engine fuel systems, 6.23.3.1
Nonrefillable, 7.2.2.8
Overfilling, 7.4.4, A.7.4.4; *see also* Overfilling prevention devices (OPD)
Pressure relief devices, 5.7.2.2, E.1
Regulators, 6.8.1.2
Removal from service *see* Removal from service
Requalification for service, 5.2.1.2(A), 5.2.2.2, 5.2.3
Service pressure, 5.2.4.1, 5.2.4.5, 7.2.2.9(1)
Specifications, Table 4.1.1, Annex C
Storage of, Chap. 8
Within buildings, 6.19.1.3, 8.2.1.3 to 8.2.1.5, 8.3
Empty containers, 8.1.1, 8.2.1.4
Fire protection, 8.5, A.8.5
Outside buildings, 8.4, A.8.4.1 to A.8.4.2.2
Protection of containers, 8.2.1
Outside buildings, 8.4.2, 8.4.3, A.8.4.2.1, A.8.4.2.2
Valves, 8.2.1.2, 8.2.2
Transportation of, 6.19.1.4, 6.19.3.6, 9.3.1, 9.3.2
Use in buildings or on roofs or balconies, 6.19.1.2, 6.19.2, 6.19.4 to 6.19.11, A.6.19.2.5, A.6.19.2.7
Venting, 7.3.2.2

D

Definitions, Chap.3
Demonstrations, containers used in, 6.19.9, A.6.19.9.3
Department of Transportation *see* DOT
Design certification (definition), 3.3.17
Design pressure, 7.2.2.9
Refrigerated containers, 12.1.2.1
Vaporizers, 11.5.2.4, 11.5.2.7
Design temperature *see* Temperature, design
Detector, LP-Gas, 13.2.3.2
Devices *see* specific type, such as Dispensers
Diameter (definition), 3.3.18
Dikes *see* Impoundment
Direct gas-fired tank heaters, 5.21.4, 6.21.4.5
Definition, 3.3.19
Dispensers, vehicle fuel *see* Vehicle fuel dispensers
Dispensing stations, 5.2.1.8, 6.24, 8.4.1.2(5)
Container storage at, 8.1.1
Definition, 3.3.20
Protection
Physical damage, against, 6.24.3.12
Tampering, against, 6.24.3.7
Distributing plants *see* Bulk plants
Docks *see* Marine shipping and receiving
DOT
Cargo tank vehicle specifications, 9.4.3.1, 9.4.3.4
Compliance with regulations, 5.2.1.1, 9.3.2.10, 9.3.3.7, A.5.2.1.1, D.2.4
Containers *see* DOT containers
Definition, 3.3.21
DOT containers, 5.2.7.3, 9.3.1, 11.3.1.1, 11.3.1.4; *see also* Cylinders
Connection and appurtenance requirements, Table 5.7.4.1
Portable containers of more than 1000 lb (454 kg) water capacity, 9.3.3.2
Pressure relief valves, 5.7.2.2, 5.7.2.4
Requalification for service, 5.2.2.2, 5.2.3, 11.3.1.4(A)

E

Educational occupancies, 6.19.7, Table 8.3.1(a)
Electrical equipment
Cargo tank vehicles, 9.4.4.4
Ignition source control, 6.22.2, Table 6.22.2.2, A.6.22.2.2, A.6.22.2.3
Installation, 6.18.3
Marine terminals, 13.2.1.9, 13.2.1.10, 13.2.2, 13.2.3.3
Emergency shutoff valves *see* Valves
Enforcement of code, 1.7
Engine fuel systems, 6.19.1.5, 9.1.2(4), Chap. 11, A.9.1.2(4)
Carburetion equipment, 11.5
Container appurtenances, 5.7.4.1(E), 11.4, 11.7, 11.8.1.2, 11.8.1.3, A.11.8.1.2
Containers, 5.2.4.4, 6.2.2, 11.3, 11.7, A.11.3.1, A.11.3.7
Conversion to LP-Gas, 11.7.3.7
Floor maintenance machines, 11.13
As ignition sources, 7.2.3.2(A)
Not mounted on vehicles, 11.14
Portable engines, 6.2.2, 11.14.1.1
Trucks powered by LP-Gas, 11.12
Valves, 11.4.1.3 to 11.4.1.10
Engines, pump/compressor, 5.17.6
Equipment
Agricultural, 7.2.3.5, A.7.2.35(A)
Carburetion *see* Carburetion equipment
Electrical *see* Electrical equipment
Industrial, 7.2.3.5, A.7.2.35(A)
LP-Gas *see* LP-Gas equipment
Equivalency to code, 1.5
Evacuation *see* Filling
Excess-flow valves *see* Valves
Exhaust systems, cargo vehicle, 9.4.9
Extinguishers, portable fire, 6.23.8, 6.25.4.2, 7.2.3.8(4), 8.5, 9.3.5, 9.4.7, 13.2.1.13, 14.3.3.4, A.8.5, A.9.4.7

F

Facilities
Bulk/gas distribution *see* Bulk plants
Liquid transfer, installation of, 6.18.2, A.6.18.2.5
Fail-safe product control, redundant, 6.26.4
Farm carts *see* Movable fuel storage tenders
Fences, 6.4.7, 6.18.4.2, A.6.4.7
Filling, Table 6.22.2.2, 7.2.2, 7.4.2.2, 7.4.2.3, 8.4.1.4, 14.2.2.3, A.7.2.2.5; *see also* Transfer, LP-Gas liquid
Alternate method, F.5.2
Ignition sources, 6.22.3.1, 6.22.3.2
Nonstationary installations, 6.5.4
Quantity of LP-Gas, 7.4, A.7.4.2.2 to A.7.4.4
Stationary installations, 6.3.10, 6.5.2
Volumetric *see* Volumetric method filling
Weight *see* Weight method filling
Fire blankets, 13.2.3.5
Fire protection, 6.23.8, 6.25, A.6.25.2 to A.6.25.5.1
Containers, 6.19.11.1, 8.5, A.8.5

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 519

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Definition, 3.3.23, A.3.3.23
Maintenance of fire protection equipment, 14.3.3
Roofs, on, 6.19.11.1
Special, 6.25.5, A.6.25.5.1
Storage within buildings, 8.3.2.1
Fire walls, 6.4.7, A.6.4.7
Fittings, 5.9, A.5.9.5
Cargo tank vehicles, 9.4.3, A.9.4.3.5
Engine fuel systems, 11.6.2
Installation, 6.9.3, 6.9.4, A.6.9.3.1, A.6.9.4.5
Materials, 5.9.4
Polyethylene and polyamide pipe and tubing, 5.9.5, A.5.9.5
Protection of, 9.6.2.2
Fixed piping system (definition), 3.3.24; *see also* Piping and piping systems
Flame effects before a proximate audience, 6.19.10, 6.19.10.3
Flames, open *see* Open flames
Flexible connectors, 5.9.6, 6.19.2.6
Cargo tank vehicles, 9.4.3, A.9.4.3.5
Definition, 3.3.25
Flexible hose connectors, 6.8.1.2, 6.9.6.2
Flexible metallic connectors, 6.8.1.1, 6.8.1.2, 6.9.6.2
Definition, 3.3.25.2
Installation, 6.9.6.1
Non-engine fuel systems, 6.23.5.1
Regulator installation, 6.8.1.1
Floor maintenance machines, 11.13
Flow indicators, 5.17.1.3(B), 5.17.7
Food service appliances, 6.19.9.4
Emergency use in buildings, 6.19.8
Storage of butane nonrefillable containers, 8.3.2.3
Forklift trucks *see* Industrial trucks
Fuel systems, engine *see* Engine fuel systems
Fusible plug devices, 5.7.2.13, 5.21.2.4, 5.21.3.3, 5.21.5.5, 5.21.6.4, 11.4.1.7(A), 11.5.2.5

G

Gallon. U.S. Standard (definition), 3.3.26
Garaging of vehicles *see* Parking and garaging of vehicles
Gas
Definition, 3.3.27
Liquefied petroleum *see* LP-Gas
Gas–air mixers, 5.21.8, Table 6.22.2.2
Definition, 3.3.28, A.3.3.28
Installation, 6.21.8
Gas distribution facilities *see* Bulk plants
Gaskets, 5.7.1.4, 6.9.3.5, 12.3.3.4 to 12.3.3.6
Gas tank heaters *see* Direct gas-fired tank heaters
Gas vaporization *see* Vaporizers
Gauges, 9.7.3.5, 11.3.6.4
Bleeding of product, 5.7.5.10
Fixed liquid level, 5.7.5.10, 7.3.1(1)
Definition, 3.3.29.1
Fixed maximum liquid level, 5.2.5.7, 5.7.3.1 to 5.7.3.3, Table 5.7.4.1, 5.7.4.4, 5.7.5.2 to 5.7.5.4, 5.7.5.6, 5.7.5.7, 6.26.5.1, 6.26.5.2, A.5.2.5.7, A.5.7.3.2, A.5.7.5.3, F.5.3
Definition, 3.3.29.2
Engine fuel systems, 11.4.1.5, 11.4.1.6, 11.12.2.3
Liquid transfer from containers, 7.4.3.2
Vent location, 6.3.10
Float (magnetic), Table 5.7.4.1, 5.7.4.4, 5.7.5.2, 5.7.5.8, 6.26.5.2, 11.4.1.11
Definition, 3.3.29.3
Liquid level, 5.7.5, 5.7.8.1, 5.7.8.5(B), 12.4.1, A.5.7.5.3
Pressure *see* Pressure gauges
Protection of, 5.7.8.2
Rotary, 5.7.4.4, 5.7.5.2, 5.7.5.8, 5.7.5.10, 7.3.1(1)
Definition, 3.3.20.5
Slip tube, 5.7.4.4, 5.7.5.2, 5.7.5.10, 7.3.1(1)
Definition, 3.3.29.6, A.3.3.29.6
Temperature, 5.7.4.4
Variable liquid level, 5.7.1.2, 5.7.5.2, 5.7.5.8, 5.7.5.9, 7.4.3.2, 7.4.3.3, A.5.7.1.2
General requirements, Chap. 4
GPA (definition), 3.3.30
Grounding, 6.9.3.15, 6.22.1.3

H

Heater-cylinder units, 6.19.4.5 to 6.19.4.10
Heaters and heating systems
Buildings or structures, 10.2.3, 10.3.1.5, 10.3.2.8
Portable, 6.19.2.7, 6.19.2.8, A.6.19.2.7
Temporary/emergency, 6.19.2.7, 6.19.2.8, 6.19.6.2, 6.19.6.3, 6.19.8, A.6.19.2.7
Patio heaters, 6.20.2
In storage containers, 5.2.1.9
Tank heaters, 5.21.4, 6.21.4
Unattended, 5.20.3
On vehicles, 5.20.7, 6.23.7.3 to 6.23.7.6, A.5.20.7, A.6.23.7.6
Water, 5.20.7, A.5.20.7
High-liquid-level alarm/cutoff devices, 12.4.1.3 to 12.4.1.8
Horizontal containers, 5.7.3.6, 6.6.3
Horizontal filling, 5.7.5.6(B)
Hose, 5.9.6
Buildings, use in, 6.19.2.6, 6.19.12.2(H)
Cargo tank vehicles, 9.4.2.3, 9.4.3, 9.4.4.5, A.9.4.3.5
Delivery, 9.7.3.3, 9.7.3.4, 9.7.3.6
Dispensing, 6.24.3.5, 6.24.3.6, 6.24.3.13, 6.24.4.1
Engine fuel systems, 11.6.3, 11.12.3
Hydrostatic relief valve installation, 6.13
Inspection, 7.2.4
Installation, 6.20.3, 11.9
Low emission transfer, 6.26.5.2
Physical damage, protection against, 6.20.3.8
Protection, 6.18.2.6
Transfer, 6.5.1.4, 6.18.2.6, 6.18.2.7, 7.2.2.12, 7.2.3.7, 7.2.4
Trucks, 11.12.3
Vehicle engines, 11.7.5.2
Hose connections, 5.9.6, 6.19.2.6
Hydrostatic relief valves, 5.13, 6.13, 6.19.12.2(I), 6.23.5.1(L), 6.24.3.6, 11.9.2

I

ICC, 5.2.1.1(B), 11.3.1.3, A.5.2.1.1, Annex C, D.2.4
Definition, 3.3.31
Ignition sources *see* Sources of ignition
Impoundment, 6.4.5.3, 6.4.5.4, 6.4.6, 12.5, A.6.4.6
Refrigerated containers, 12.7.3
Incident reports, Small LP-Gas systems (SLGS), 14.4.3, A.14.4.3.1
Industrial occupancies (plants)
Buildings housing, 6.19.6
Container connections and appurtenances, 5.7.4.1, Table 5.7.4.2, 5.7.4.3, 6.8.1.4(B)
Definition, 3.3.33
Fire protection, 6.25.4.2
Indirect-fired vaporizers, 6.21.2.8
LP-Gas system installations, 6.18, A.6.18.2.5
Operations and maintenance, Chap. 14
Storage of LP-gas in, Table 8.3.1(b)
Industrial trucks, 5.7.3.6, 6.2.2, 11.3.2.2, 11.12, 11.13.2.1
Overfilling prevention devices (OPD), use of, 5.7.4.1(E)
Pressure relief valves, 5.7.2.13
Inspections
Corrosion protection, underground tanks, K.3
Hose, 7.2.4
Marine shipping and receiving, prior to transfer at, 13.4, A.13.4.1
Refrigerated containers, 12.6
Installation, LP-Gas systems, Chap. 6
Appliances, 6.19.2, 6.20, 6.23.7
Balconies, exterior, 6.19.11.2
Buildings, 6.19, A.6.19.2.7 to A.6.19.10.3
Bulk plants, 6.18, A.6.18.2.5
Container appurtenances, 6.7

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 520

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Containers *see* Containers
Dispensers and dispensing stations, vehicle fuel, 6.24
Engine fuel systems, Chap. 11
Equipment, 6.17, 6.22.2, 6.23.6, A.6.22.2.2, A.6.22.2.3
Fire protection, 6.25, A.6.25.2 to A.6.25.5.1
Ignition source control, 6.22, A.6.22.1.2 to A.6.22.2.3
Industrial plants, 6.18, A.6.18.2.5
Multicontainer, 6.3.6, 6.3.11, 6.4.2, 6.4.3
Nonstationary, 6.5.4
Notification of, 4.3
Piping systems *see* Piping and piping systems
Plans, submission of, 4.3.1
Regulators, 6.8.1, 6.8.2, A.6.8.2(H)
Roofs, 6.19.11.1
Stationary *see* Stationary (fixed or permanent) installations
Temporary, 4.3.2, 6.6.5, 6.19.8
Transfer facilities, 6.18.2, A.6.18.2.5
Underground containers *see* Underground containers
Vaporizers, 6.21, 6.22.3.2
Vehicles, 6.23, Chap. 11, A.6.23.1, A.6.23.7.6
Institutional occupancies, 6.19.7
Insulation system, 5.2.8.3(B), 6.25.5.1, A.6.25.5.1, Annex H
Internal valves *see* Valves
Isolation valves, 13.3.2

J

Joints, 5.9.5, 6.9.3.5, 9.4.3.2, A.5.9.5

K

Kettles, portable tar, 6.19.2.8, 6.23.3.5
kPa (definition), 3.3.34
kPag (definition), 3.3.35

L

Labeled (definition), 3.2.4
Labeling *see* Marking
Life safety, 6.25.2.2
Marine shipping and receiving facilities, 13.2.1.6, 13.2.1.7, 13.2.1.13, 13.2.3.5
Small LP-Gas systems (SLGS), 14.4.2 to 14.4.9, 14.4.12, 14.4.13, A.14.4.3.1, A.14.4.7
Lighting
Bulk/industrial plant, 6.18.5
Marine terminals, 13.2.1.9, 13.2.1.10
Transfer operations, 7.2.3.2(B)
Vehicles, 9.2
Lightning protection, 6.22.1.2
Liquefied petroleum gases *see* LP-Gas
Liquid meters, 6.17.5, 9.4.4.5(A)
Liquid transfer *see* Transfer, LP-Gas liquid
Liquid volume tables, computations, and graphs, Annex F; *see also* Volumetric method filling (loading)
Listed (definition), 3.2.5, A.3.2.5
Loading *see* Filling
Low emission transfer, 6.5.4.4, 6.24.4.3, 6.26.5, 11.4.1.6
Definition, 3.3.37, A.3.3.37
LP-Gas
Definition, 3.3.36
Odorization, 4.2, 5.2.8.5, A.4.2.1, A.4.2.3
Properties of, Annex B
Refrigerated *see* Refrigerated containers
LP-Gas equipment, 5.17, Chap. 5
Acceptance of, 4.1
Building installations, 6.19.3
Fabrication, 5.17.1.3
Installation, 6.17, 6.22.2, 6.23.6, A.6.22.2.2, A.6.22.2.3
Protection of, 9.4.5
Vehicle installations, 6.23.6, 9.4.4, 11.10, 11.13.1.1
LP-Gas systems
Acceptance of, 4.1, Table 4.1.1
Definition, 3.3.38
Installation *see* Installation, LP-Gas systems
Location, Chap. 6
Protection against tampering, 6.18.4
Small LP-Gas systems (SLGS), 14.4, A.14.4

M

Maintenance, Chap. 14
Manholes, 5.7.8.4
Manufactured home installations, 6.8.2(A)
Marine shipping and receiving, Table 6.22.2.2, Chap. 13
Design and construction, 13.2.1, A.13.2.1.1
General cargo, 13.2.1.2
Inspections prior to transfer, 13.4, A.13.4.1
Operations and maintenance, Chap. 14
Pipelines, 13.3, A.13.3.1
Transfer procedures, 13.2.3, 14.2.1, A.14.2.1
Valving and connections, 13.3.2
Marking
Bleeder valves, 11.4.1.6
Container, 5.2.1.1, 5.2.8, 11.3.1.1, 11.3.4, 11.7.1.4, A.5.2.1.1, A.5.2.8.2, A.5.2.8.3
Container connections, 5.7.8.5
Cylinders, 6.4.5.11
Direct gas-fired tank heaters, 5.21.4.2
Fixed liquid level gauges, 5.7.5.4
Floor maintenance machinery, 11.13.2.3(A)
Pressure relief valves, 5.7.2.9, 11.3.6.3, 11.3.6.4, 11.4.1.9
Refrigerated containers, 12.2
Vaporizers, 5.21.2.1, 5.21.3.1, 5.21.6.1
Vaporizing burners, 5.21.5.2
Variable liquid level gauges, 5.7.5.7, 5.7.5.8
Vehicles, 9.4.6, 11.11, A.11.11.2.2; *see also* Placards
Maximum allowable working pressure (MAWP)
ASME containers, 5.2.4.2, 5.2.4.3(B), 5.2.4.4, 6.23.3.1
Engine fuel and mobile containers, 11.3.2
Filling and evacuating containers, 7.2.2.9(2)
Carburetion equipment, 11.5.1
Definition, 3.3.39
Vaporizers, 11.5.2.3
Mercantile occupancies, Table 8.3.1(b)
Metal parts, pressure-containing, 5.17
Meters, 5.17.1.3(C)
Liquid, 6.17.5.1, 6.17.5.2, 9.4.4.5(A)
Small LP-Gas systems (SLGS), 14.4.1.2
Minimum design metal temperature (definition), 3.3.40; *see also* Temperature, design
Minimum requirements, 4.6, A.4.6
Mixers, gas–air *see* Gas–air mixers
Mobile containers, 5.2.4.4, 6.23.3; *see also* Vehicles, containers on/in
Definition, 3.3.41
Maximum allowable working pressure (MAWP), 11.3.2
Mobile homes, appliances in, 5.20.6, 6.8.2(A), A.5.20.6
Mobile units
Portable units, general provisions for, 11.13
Safety precautions for, 6.23.8
Monitor nozzles, 6.25.6.3
Mounded containers, 6.6.6.3, 6.25.5.3, Annex K
Corrosion and corrosion protection, 6.6.6.3(4), 6.16.1, Annex K
Definition, 3.3.42
Flotation due to flooding, anchoring to prevent, 6.6.1.6
Location, 6.4.4
Marking, 5.2.8.3(B)
Pressure relief devices/valves, 5.7.2.8
Separation distances, Table 6.3.1, 6.3.4, 6.26.2
Movable fuel storage tenders, 9.3.4, 9.5
Definition, 3.3.43, A.3.3.43
Supports, 5.2.7.2, 5.2.7.2(D)
MPa (definition), 3.3.45

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 521

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MPag (definition), 3.3.45
Multipurpose passenger vehicles (definition), 3.3.46

N

NFPA (definition), 3.3.47
Nozzles, monitor, 6.25.6.3
NPGA (definition), 3.3.48

O

Odorization of LP-Gas, 4.2, 5.2.8.5, 14.4.5, A.4.2.1, A.4.2.3
One call notification center, 14.4.2.1, 14.4.2.2
Open flames, 6.9.3.6, 6.22.2.5, 6.22.3.1, 6.22.3.3, 6.22.3.4, 7.2.3.2(B), 7.2.3.5(B), 11.15
Operating pressure *see* Working pressure
Operations, Chap. 14; *see also* Transfer, LP-Gas liquid
  Small LP-Gas systems (SLGS), 14.4.10
Overfilling, 7.4.4, A.7.4.4
Overfilling prevention devices (OPD), 5.7.3, Table 5.7.4.1, 5.7.4.1(E), 5.7.4.1(G), 6.26.5.2(F), 7.4.4.1, 11.4.1.13 to 11.4.1.15, A.5.7.3.2
Overpressure shutoff devices/valves, 5.8.1.1, 5.8.1.2, 5.8.1.11, 6.8.2(E), 6.8.2(F)
  Definition, 3.3.50

P

Painting
  Cargo tank vehicles, 9.4.6
  Containers, 5.2.3.3, 6.6.1.4, A.6.6.1.4
  Engine fuel containers, 11.3.7
Parking and garaging of vehicles, 6.23.9, 7.2.3.4, 8.3.3.4, 9.7, 11.15, 13.2.1.4
Passenger-carrying vehicles, 6.23.3.1, 6.23.3.4(I), 6.23.7, 11.3.2.2, A.6.23.7.6
  Multipurpose passenger vehicles (definition), 3.3.46
Patio heaters, 6.20.2
Permanent installation *see* Stationary (fixed or permanent) installations
Permitted (definition), 3.3.52
Personnel
  LP-Gas liquid transfer, 7.2.1, 7.2.2.1, 7.2.3.8(5)
  Marine facilities, 13.2.1.6, 13.2.1.7, 13.2.1.13, 13.2.3.5
  Qualifications, 4.4, 14.4.10, A.4.4
  Safety, planning for, 6.25.2.2; *see also* Life safety
Piers *see* Marine shipping and receiving
Pipeaway system, 11.7.5.2
Pipelines, marine terminal, 13.3, A.13.3.1
Piping and piping systems, 5.9, 6.9, Table 6.22.2.2, A.5.9.5, A.6.9.1.1(4) to A.6.9.6.2
  Aboveground, 6.9.3.10, 6.9.3.11
  Buildings, liquid into *see* Buildings/structures
  Cargo tank vehicles, 9.1.1, 9.4.3, 9.4.5, A.9.1.1(3), A.9.4.3.5
  Definition, 3.3.53
  Discharge, 6.7.4, 6.8.1.5, 6.8.3.7, 6.8.3.11 to 6.8.3.15, 6.9.3.4
  Dispensers, 6.24.3.5, 6.24.3.6
  Fittings *see* Fittings
  Hydrostatic relief valve installation *see* Hydrostatic relief valves
  Installation, 6.9.3 to 6.9.5, 6.19.2, 6.21.8.1, A.6.9.3.1, A.6.9.4.5
  Joints *see* Joints
  Materials, 5.9.1.1, 5.9.3
  Non-engine fuel systems, 6.23.5
  Polyethylene and polyamide, 5.8.3.2, 5.9.5, 5.12.6, 6.9.1.1(3), 6.9.4, 6.9.5, 14.4.11.2, A.5.9.5, A.6.9.4.5
    Tables for sizing, Table 15.1(o) to Table 15.1(q)
  Protection of, 6.9.3.10, 6.9.3.11, 6.9.3.14, 9.4.5
  Refrigerated containers, 12.3.3
  Regulator venting, 5.8.3, A.5.8.3
  Service limitations, 6.9.1, A.6.9.1.1(4), A.6.9.1.2
  Sizing
    Tables for sizing, Chap. 15
    Vapor piping systems, 6.9.2
  Small LP-Gas systems (SLGS), 14.4.2, 14.4.4, 14.4.11
  Testing, 6.14, 11.9.1.10
  Underground *see* Underground piping
  Valves *see* Valves
  Vehicle engines, 11.6, 11.9
Placards, 9.3.2.10, 9.3.3.7, 9.4.6.2
Plants
  Bulk/distributing *see* Bulk plants
  Industrial *see* Industrial occupancies (plants)
Plugs, 5.7.7.1, 11.4.1.12, 11.5.2.6; *see also* Fusible plug devices
Point of transfer, 6.5.3, 6.5.4, 6.18.2.1, 6.18.2.2, 7.2.3.2, 7.2.3.5(A), 7.2.3.8(7), A.7.2.3.5(A)
  Cargo tank vehicles/railroad tank car, 6.18.2.3, 6.26.4.1, 9.4.10(2)
  Definition, 3.3.54
  Pier or dock, 13.2.1.2
  Tank heater location and, 6.21.4.5
Portable appliances
  Hose for, 6.20.3
  Regulators for, 6.8.1.7, 6.8.2(C)
Portable containers; *see also* Cylinders; Portable storage containers
  Appurtenances, protection against physical damage of, 5.2.6
  Definition, 3.3.55, A.3.3.55
  Indoors, 6.19, A.6.19.2.7 to A.6.19.10.3
  Installation, 6.6.5
  Location, 6.2, 6.19, A.6.19.2.7 to A.6.19.10.3
  Non-engine fuel systems, 6.23.3.1
  Outlet seals, 7.2.2.5, 7.2.2.6, A.7.2.2.5
  Regulators on, 6.8.1.2, 6.8.1.4(B), 6.8.1.7
  On roofs, 6.19.11.1
  Separation distances, 6.3.1
  Transportation of LP-Gas in, 9.3
Portable engines *see* Engine fuel systems
Portable multicontainer systems, 5.7.8.3
Portable (skid) tanks, 5.2.7.2, 5.2.7.3, D.2.4.1, D.2.4.4
  Container appurtenances, 6.9.3.3
  Definition, 3.3.57
  Filling, 7.4.3.1(3)
Portable storage containers
  Container appurtenances, 6.9.3.3
  Definition, 3.3.56, A.3.3.56
  Installation, 6.6.5
  Supports, 5.2.7.2
Powder coating, engine fuel containers, 11.3.7
Pressure-containing metal parts, 5.17
Pressure gauges, 5.2.5.5, 5.7.4.4, 5.7.6, 5.7.8.5(B), 5.7.8.6, A.5.2.5.5
Pressure relief devices/valves, 5.7.2, 5.7.8.1, 6.8.1.1, 6.8.1.2, 6.9.3.4, Annex E
  Connections, 5.2.5.6, 11.3.6
  Definitions, 3.3.58, 3.3.74.5, A.3.3.74.5.1 to A.3.3.74.5.4
  External, 5.7.4.1(A), Table 5.7.4.1, 5.7.4.4
    Definition, 3.3.74.5.1
  Fire exposure sizing, 12.8.4
  Flush-type full internal, Table 5.7.4.1, 5.7.4.4, 11.4.1.7, 11.4.1.10
    Definition, 3.3.74.5.2, A.3.3.74.5.2
  Full internal, Table 5.7.4.1
    Definition, 3.3.74.5.3, A.3.3.74.5.3
  Installation, 6.8.3
  Internal spring-type, Table 5.7.4.1, 5.7.4.1(A), 5.7.4.4, 5.21.2.4, 5.21.3.2, 5.21.3.3, 5.21.6.4
    Definition, 3.3.74.5.4, A.3.3.74.5.4
  Marking, 5.7.2.9
  Position of, 6.3.7, 6.3.9, 6.3.10, 6.6.1.1, 6.9.3.3, 8.2.1.2, 9.6.2.5

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 522

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Vaporizers, 6.21.3.3
Vehicular transportation, for, 9.3.3.6
Protection, 11.7.5.2(J)
Refrigerated containers, 12.8
Regulator, 5.8.1.1, 5.8.1.2, 5.8.1.5 to 5.8.1.8, 5.8.1.11
Testing, E.2.3
Vaporizer, 5.21.9, 6.21.2.3
Vaporizing burners, 5.21.5.4, 5.21.5.5
Vehicles, 6.23.4.1, 9.5.2.5, 9.6.2.5, 11.4.1.7, 11.4.1.9, 11.7.5, 11.12.2.4, 11.12.2.6, 11.12.4.4
Psia (definition), 3.3.60
Psi (definition), 3.3.59
Psig (definition), 3.3.61
Pumps, 5.17.2, 5.17.6, 6.17.2, 6.18.2.4, Table 6.22.2.2, 6.24.3.4, 7.3.1(5), 9.4.1.2, 9.4.4, 11.14.1.5, 12.5.8.1
Purging, 7.3.1(6), 7.3.2, 9.7.3.7, 12.3.3.3, 13.4.6

Q

Quick connectors, 5.9.6
Definition, 3.3.62

R

Railroad tank cars *see* Tank cars
Recreational vehicles, 6.23.3.1
Appliances in, 5.20.6, 6.8.2(A), A.5.20.6
Engine fuel containers, 11.3.2.2
Redundant fail-safe product control, 6.26.4
References, Chap. 2, Annex L
Refrigerated containers, 6.4.6, Table 6.22.2.2, Chap. 12, 14.2.1.4, A.6.4.6
Construction and design, 12.1
Foundations, 12.3.4, A.12.3.4.2
Impoundment, 12.5
Inspections and tests, 12.6
Instruments and controls, 12.4
Marking, 12.2
Pressure and vacuum control, 12.4.2
Relief devices, 12.8
Siting, 12.7
Transfer of refrigerated product, 7.2.2.10
Refrigerated LP-Gas (definition), 3.3.63
Regulators, 5.8, 6.8, 6.19.2.2, A.5.8.3, A.6.8.2(H)
Automatic changeover (definition), 3.3.64.1, A.3.3.64.1
Carburetion equipment, 11.5.3.2
Engines not on vehicles, 11.14.1.4
Fabrication, 5.17.1.3
First-stage, 5.8.1.6, 5.8.1.7, 5.8.1.9, 6.8.1.1, 6.8.1.3, 6.8.2(D), 6.9.2.1
Definition, 3.3.64.2
Pipe sizing between first- and second-stage regulators, Table 15.1(a), Table 15.1(d), Table 15.1(f), Table 15.1(h), Table 15.1(k), Table 15.1(o), Table 15.1(p)
High-pressure, 5.8.1.3, 5.8.1.5, 5.8.1.8, 6.8.1.1, 6.8.1.3, 6.8.2, A.6.8.2(H)
Definition, 3.3.64.3
Hose use with, 6.20.3.1
Installation, 6.8.1, 6.8.1.1, 6.8.1.2, 6.8.2, A.6.8.2(H)
Integral 2-psi service (definition), 3.3.64.4
Integral two-stage, 5.8.1.2 to 5.8.1.5, 6.8.2, A.6.8.2(H)
Definition, 3.3.64.5
Line pressure, 6.8.1.8, 6.8.2(H), A.6.8.2(H)
Definition, 3.3.64.6
Pipe sizing between 2-psi service and line pressure regulator, Table 15.1(b), Table 15.1(i)
Non-engine fuel systems, 6.23.4.2
Protection, 5.7.8.2, 6.8.1.4
Second-stage, 5.8.1.2, 6.8.1.1, 6.8.1.2, 6.8.2(D)
Definition, 3.3.64.7
Pipe sizing between first- and second-stage regulators, Table 15.1(a), Table 15.1(d), Table 15.1(f), Table 15.1(h), Table 15.1(j), Table 15.1(k), Table 15.1(o), Table 15.1(p)
Pipe sizing between second-stage regulator and appliance, Table 15.1(c), Table 15.1(e), Table 15.1(g), Table 15.1(l)
Pipe sizing between second-stage regulator and building, Table 15.1(q)
Selection of, 6.8.2, A.6.8.2(H)
Single-stage, 5.8.1.1, 6.8.1.7, 6.8.2, A.6.8.2(H)
Definition, 3.3.64.8
Pipe sizing between first- and second-stage regulators, Table 15.1(j)
Small LP-Gas systems (SLGS), 14.4.1.2
2 psi regulator system, 6.8.2, A.6.8.2(H)
Definition, 3.3.64.9
2 psi service, 5.8.1.11, 6.8.2(H), A.6.8.2(H)
Definition, 3.3.64.10
Pipe sizing between 2 psi service and line pressure regulator, Table 15.1(b), Table 15.1(i)
Two-stage regulator system, 5.8.1.8, 6.8.2, A.6.8.2(H)
Definition, 3.3.64.11
Vaporizing burners, 5.21.5.9, 5.21.5.10
Vehicles, 9.4.4.5, 11.10.1.2
Venting, pipe for, 5.8.3, A.5.8.3
Remote shutoff controls, 5.7.4.2, 5.12.4, 6.10, 6.11.4, 6.11.5, 6.18.2.4(C), 6.24.3.8 to 6.24.3.11, 6.26.3.3, 6.26.4.3, 7.3.1(8), 9.4.3.4, A.6.10(3)
Removal from service, 5.2.1.4, 11.3.3.1
Residential buildings, storage within, Table 8.3.1(a), 8.3.2, 8.3.5
Retroactivity of code, 1.4
Roofs
Containers on, 4.3.1, 6.6.7, 6.19.11, 8.2.1.5
Fire protection for containers on, 6.25.3.1
LP-Gas systems on, 6.19.11
Rooms, within structures, 8.3.4, 10.3.2, A.10.3.2.6

S

Safety, operational, 7.2, A.4.6, A.6.1.3, A.7.2.2.5, A.7.2.3.5(A)
Safety, personnel *see* Life safety
SCFM, 5.7.2.6, 5.7.2.9
Definition, 3.3.70
Scope of code, 1.1, A.1.1
Security provision, 6.18.4
Seismic loading
ASME containers, 5.2.4.3(D)
Refrigerated containers, 12.3.2
Semitrailers, 5.2.7.2(B), 9.5
Separation
Container pressure relief valve and building openings, 6.3.7, 6.3.9, Table 6.3.9, 6.3.10
Containers, 6.3, 6.4.4.5, 6.4.5.4 to 6.4.5.10, 6.4.5.12, 6.26.2, A.6.4.5.8
Cylinders in storage, 8.3.3.2, 8.3.4.2, 8.4.1.1 to 8.4.1.3
Refrigerated containers, 12.7
Tank heaters, 6.21.4.1, Table 6.21.4.1
Transfer points, 6.5.3, Table 6.5.3
Vaporizers, 6.21.2.11, 6.21.3.6, Table 6.21.3.6
Vaporizing burners and containers, 6.21.5.2, Table 6.21.5.2
Service head adapter (definition), 3.3.65
Service pressure, 5.2.4, 7.2.2.9, A.5.2.4.4
Container appurtenances, 5.7.1.3
Fittings, 11.6.2.2, 11.6.2.3
Pipe, tubing fittings, and valves, 5.9.1.4, 5.9.4.1, Table 5.9.4.1, 5.12.2
Pressure-containing metal parts, 5.17.1.2
Recreational vehicles, cylinders on, 6.23.3.1(B)
Small LP-Gas systems (SLGS), 14.4.11.3
Shutoff valves *see* Valves
Sight flow glasses, 5.17.7
Skid (portable) tanks *see* Portable (skid) tanks
Small LP-Gas systems (SLGS), 14.4, A.14.4
Application, 14.4.1

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 523

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Construction records, maps and operating history, 14.4.6
Consumer education, 14.4.13
Damage prevention, 14.4.2
Incident reporting, 14.4.3, A.14.4.3.1
Interruption of service, 14.4.9
Key valve maintenance, 14.4.7, A.14.4.7
Leaks
Response to reports of, 14.4.9
Survey, 14.4.12
Testing, 14.4.8
Odorization, 14.4.5
Operator qualification and covered tasks, 14.4.10
Piping system service limitations, 14.4.4, 14.4.11
Smoking, 7.2.3.2(B), 9.4.10
Snowfall, heavy, 6.15
Sources of ignition, 6.3.10
Control, 6.18.6, 6.22, 7.2.3.2, 7.2.3.8, A.6.22.1.2 to A.6.22.2.3
Definition, 3.3.67
Garaging of vehicles, 11.15
Piers, 13.2.1.9 to 13.2.1.12
Point of discharge, distance from, 6.8.1.6
Special buildings, storage within, 8.3.4
Special protection, 6.25.5, A.6.25.5.1
Definition, 3.3.68, A.3.3.68
Sprinkler systems, 6.19.11.1, 8.3.2.1
Standard cubic foot (SCF) (definition), 3.3.69
Stationary engines, 11.14
Stationary (fixed or permanent) installations, 4.3.1
Containers in, 6.5.2
Definition, 3.3.71
Regulator installation, 6.8.1.1
Tank supports, 5.2.7.1
Storage, refrigerated *see* Refrigerated containers
Storage occupancies, Table 8.3.1(b)
Storage of cylinders *see* Cylinders
Strainers, 5.17.1.3(B), 6.17.4
Structures *see* Buildings/structures
Swivel-type piping, 6.12.2 to 6.12.6, 6.18.2.6, 7.2.3.7

T

Tank cars, 6.12.11, 6.18.2.3, 6.18.2.6, Table 6.22.2.2, 6.26.4.1, 7.2.3.6 to 7.2.3.8
Tank heaters, 5.21.4, 6.21.4
Tanks *see* API-ASME containers (or tanks); ASME containers; Cargo tanks; Containers; Portable (skid) tanks
Tar kettles, 6.19.2.8, 6.23.3.5
Temperature, design
Minimum design metal temperature (definition), 3.3.40
Refrigerated containers, 12.1.2
Temperature gauge, 5.7.4.4, 12.4.1.9
Temporary container installations, 4.3.2, 6.6.5, 6.19.8; *see also* Portable containers
Tenders, movable fuel storage *see* Movable fuel storage tenders
Tests
Containers *see* Containers
Hose assembly pressure test, 5.9.6.5
Hose stream resistance, H.4
Insulation, container, Annex H
Piping and piping systems, 6.14, 11.9.1.10
Pressure relief devices/valves, E.2.3
Thermal insulation, H.3
Tractors, 6.23.5.2, 11.9.1.11
Trailers, 5.2.7.2(D), 9.1.1(2), 9.5
Attachment of tank to, 5.2.7.2(B)
Fuel connection to tractor, 6.23.5.2, 11.9.1.11
Training, 4.4, 6.19.9, 11.2, A.4.4, A.6.19.9.3
Transfer, LP-Gas liquid, 6.19.1.5, Chap. 7
Arrangement of systems, 7.2.3, A.7.2.3.5(A)
Cargo tank vehicles, 7.2.3.3 to 7.2.3.5, 7.2.3.8, 9.1.1(3), 9.4, A.7.2.3.5(A), A.9.1.1(3), A.9.4.3.5, A.9.4.7
Containers, 7.2.2, 7.4, A.7.2.2.5, A.7.4.2.2 to A.7.4.4
Nonstationary installations, 6.5.4
Stationary installations, 6.5.2
Facilities, installation of, 6.18.2, A.6.18.2.5
Ignition source control, 7.2.3.2
Location, 6.5, A.6.5.1
Low emission transfer *see* Low emission transfer
Marine terminals, Chap. 13
Notification of intent for transfer, 4.3.3
Operations, 7.2.3, 14.2.1, A.7.2.3.5(A), A.14.2.1
Personnel, 4.4, 7.2.1, 7.2.2.1, 7.2.3.8(5), A.4.4
Safety, 7.2, A.7.2.2.5, A.7.2.3.5(A)
Venting, 7.3
Transfer personnel, 7.2.3.8(5)
Transfer point *see* Point of transfer
Transportation of LP-Gas, 6.19.1.5, Chap. 9
Cylinders, 6.19.1.4, 6.19.3.6, 9.3.1, 9.3.2
Extinguishers, portable fire, 9.3.5, 9.4.7, A.9.4.7
Movable fuel storage tenders *see* Movable fuel storage tenders
Parking and garaging of vehicles, 9.7
Portable containers, 9.3
Qualification of personnel, 4.4, A.4.4
Stationary containers, 9.6
Trailers and semitrailers, 9.5
Trucks, A.9.1.1(3)
Industrial (forklift) *see* Industrial trucks
Piers or docks, on, 13.2.1.3
Tubing, 5.9.1, 5.9.3.2
Cargo tank vehicles, 9.4.3.1 to 9.4.3.3
Copper, 5.9.3.2
Engine fuel systems, 11.6.1.1
Pipe sizing, Table 15.1(f) to Table 15.1(j)
Use in buildings of, 6.19.12.2(B)
Wall thickness of, Annex G
Engine fuel systems, 11.6.1, 11.6.2
Fittings, 5.9.4, 5.9.5, A.5.9.5
Installation, 6.9.3 to 6.9.5, A.6.9.3.1, A.6.9.4.5
Non-engine fuel systems, 6.23.5.1(A)
Regulator venting, 5.8.3, A.5.8.3
Sizing tables, Chap. 15
Two-stage regulator system *see* Regulators

U

UL (definition), 3.3.72
Underground containers, 6.25.5.4, D.3, Fig. I.1(c)
Access, 6.3.11
Connections, 5.7.8.4
Corrosion and corrosion protection, 6.6.1(I), 6.6.6.1(H), 6.16.1, Annex K
Filling, 7.4.3.2(A)
Flotation due to high water table, anchoring to prevent, see 6.6.1.6
Installation, 5.7.8.4, 6.6.6.1, 6.6.6.2, A.6.6.6.1, Annex K
Container appurtenances, 6.7
Location, 6.4.4
Manholes, domes, or housings, 5.7.8.4
Marking, 5.2.8.3(B)
Pressure relief devices/valves, 5.7.2.8, 5.7.4.1(A)
Separation distances, Table 6.3.1, 6.3.4, 6.4.5.7, 6.26.2
Underground piping, 6.9.1.1(3)(b), 6.9.3.12 to 6.9.3.14
Small LP-Gas systems (SLGS), 14.4.2
Universal cylinders (definition), 3.3.73
Unloading *see* Filling

V

Vacuum controls, 12.4.2
Vacuum relief devices, 12.8
Valves, 5.9, A.5.9.5

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 524

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Backflow check *see* Backflow check valves
Bleeder valves, 7.3.1(3), 11.4.1.5, 11.4.1.6
Bypass, 9.4.4.3
Cargo tank vehicles, 9.4.2.3, 9.4.2.4, 9.4.3, 9.4.4.3, 9.7.3.4 to 9.7.3.6, A.9.4.3.5
Check, 5.21.8.4, 5.21.8.5, 13.3.3
Container, 5.7.4, Table 5.7.4.1
Emergency shutoff, 5.7.4.2, 5.12.3, 5.12.4, 6.12, 6.18.2.6, 6.26.4.1, 6.26.4.2, 7.3.1(8), 12.1.1.5, A.4.6, A.6.1.3, A.6.12.8
Appliances, 5.20.7, 6.23.7.4, A.5.20.7
Definition, 3.3.74.1
Railroad tank car end of hose, 7.2.3.7
Remote shutoff actuation, 6.10, 6.24.3.8 to 6.24.3.10, A.6.10(3)
Engine fuel systems, 11.4.1.3 to 11.4.1.10, 11.4.1.14, 11.7.2.1, 11.7.2.2, 11.7.4.3
Excess-flow, 5.7.4.1, Table 5.7.4.1, 5.7.4.2, 5.7.4.5, 5.7.7.1, 5.7.7.2, 5.7.8.1, 5.12.3, 6.23.7.3, 11.4.1.3
Actuated liquid withdrawal, 5.7.8.1
Definition, 3.3.1
Buildings, piping systems in, 6.19.12.2
Cargo tank vehicles, 9.4.3.4, 9.4.4.5(B)
Definition, 3.3.74.2
Dispensers, 6.24.3.5, 6.24.3.8, 6.24.3.11
Internal (definition), 3.3.74.3
Hydrostatic relief, 5.13, 6.13, 6.19.12.2(I)
Internal, 5.7.4.2, 5.7.4.5, 5.7.7.1, 5.7.7.2, 5.7.8.1, 6.11, 6.26.3.1 to 6.26.3.4, 6.26.4.2, 7.3.1(8), 9.4.2.3, 9.4.2.4, 9.4.4.3, 11.4.1.3, 11.4.1.7, 11.4.1.10, 12.1.1.5
Definition, 3.3.74.4, A.3.3.74.4
Excess-flow (definition), 3.3.74.3
Flush-type full internal pressure relief *see* Pressure relief devices/valves
Remote shutoff actuation, 6.10, 6.24.3.8 to 6.24.3.10, A.6.10(3)
Spring-type pressure relief *see* Pressure relief devices/valves
Isolation, 13.3.2
Liquid, 5.7.4.1
Materials, 5.12
Outlet, 7.2.2.5, 7.2.2.6, 8.2.2.2, 8.2.2.3, A.7.2.2.5
In polyamide and polyethylene piping systems, 6.9.5
Power operated, 13.3.2.1, 13.3.2.2
Pressure relief *see* Pressure relief devices/valves
Protection of, 5.7.8.2, 5.7.8.3, 6.23.3.4(E), 8.2.1.2, 8.2.2, 9.3.2.4, 9.3.3.4, 9.6.2.2, 9.6.2.4
Shutoff, 5.7.2.9, 5.7.4.1, 5.7.4.2, 5.7.8.1, 5.21.5.6, 5.21.5.8, 6.10, 6.11.5, 6.12, 6.13, 11.15(3), Table 5.7.4.2
Small LP-Gas systems (SLGS) key valve maintenance, 14.4.7, A.14.4.7
Vapor, Table 5.7.4.1, 6.8.1.1, 13.3.2.1
Vaporizers, 5.21, Table 6.22.2.2, 6.22.2.5, A.5.21.5.8
Burner *see* Vaporizing burners
Definition, 3.3.75
Direct-fired, 5.21.3, 5.21.9, 6.21.6.2
Definition, 3.3.75.1
Gas-air mixers used with, 6.21.8.4
Installation, 6.21.3, 6.22.3.2
Electric
Definition, 3.3.75.2
Direct immersion, 6.21.7
Definition, 3.3.75.2.1
Indirect, 6.21.7
Definition, 3.3.75.2.2
Installation, 6.21.7
Indirect (indirect-fired), 5.21.2, 5.21.9, 6.21.6.1, 6.21.7
Definition, 3.3.75.3
Gas-air mixers used with, 6.21.8.3
Installation, 6.21.2, 6.22.3.2
Installation, 6.21, 6.22.3.2
Operating procedures, 14.2.1.3
Piping systems feeding, 6.9.1.1(4), 6.9.1.3
Regulator installation, 6.8.1, 6.8.2
Vehicle engines, 11.5.2
Waterbath (immersion-type), 5.21.6
Definition, 3.3.75.4
Installation, 6.21.6
Vaporizing burners, 5.20.5, 5.21.5, A.5.21.5.8
Definition, 3.3.76
Installation, 6.21.5
Vapor meters, 6.17.5.1, 6.17.5.3
Vapor piping systems *see* Piping and piping systems
Vapor service valves, 6.8.1.1
Vehicle dispensing stations *see* Dispensing stations
Vehicle fuel dispensers, Table 6.22.2.2, 6.24
Definition, 3.3.77
Vehicles
Appliance installation, 6.23.7, A.6.23.7.6
Containers on/in *see* Vehicles, containers on/in
Engine fuel systems *see* Engine fuel systems
Equipment installation, 6.23.6
Garaging of *see* Parking and garaging of vehicles
Industrial trucks *see* Industrial trucks
Interiors, 11.8, A.11.8.1.2
Marking/placarding, 9.3.2.10, 9.3.3.7, 9.4.6.2, 11.11, A.11.11.2.2
Movable fuel storage tenders or farm carts *see* Movable fuel storage tenders
Multipurpose passenger (definition), 3.3.46
Non-engine fuel system installation, 6.23, A.6.23.1, A.6.23.7.6
Parking, 6.23.9, 9.7
Passenger-carrying *see* Passenger-carrying vehicles
Piers or docks, vehicles on, 13.2.1.3
Precautions, general, 6.23.8
Safety provisions, 9.4.10
Servicing and repair, 6.23.9, 9.7.3.6, 9.7.3.7
Trailers and semitrailers, 9.5
Transportation LP-Gas, Chap. 9
Vehicles, containers on/in, 11.8, A.11.8.1.2
Cargo tank vehicles, 9.3.3.8, 9.4.2
Fuel dispensers *see* Vehicle fuel dispensers
Leakage, 9.7.3.5, 9.7.3.6
Location, 6.2.2
Non-engine fuel systems, 6.23.3
Parking of, 11.12.4.3
Transfer of liquid into, 6.5.1, A.6.5.1
Ventilation, building, 9.7.3.5, 10.2.2, 10.3.1.5, 10.3.2.8
Venting, regulator, pipe for, 5.8.3, A.5.8.3
Venting gas to atmosphere, 6.5.4.2, 6.6.6.1(G), 6.9.3.3, 6.9.3.7, 6.23.3.3, 7.3, 8.3.4.3
Vents, fixed maximum liquid level gauge, 6.3.10
Vertical filling, 5.7.5.6(B)
Volume, liquid, Annex F
Volumetric method filling (loading), 5.2.5.7, 5.7.5.3, 7.4.2.1, 7.4.2.3, Table 7.4.2.3(a) to Table 7.4.2.3(c), 7.4.3, A.5.2.5.7, A.5.7.5.3, A.7.4.2.3

W

Walls, fire, 6.4.7, A.6.4.7
Warning signs/labels
Appliances, 6.23.7.10
ASME containers, 5.2.8.5
Cylinders, 5.2.8.4
Emergency remote shutdown stations, 6.11.5
Marine shipping and receiving, prior to transfer at, 13.2.1.5, 13.2.3.1
Tank cars, filling of, 7.2.3.6(1)

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 525

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Water capacity, of containers, 5.2.1.7, 5.2.1.8, Table 7.4.2.2
Definition, 3.3.79
Portable containers of more than 1000 lb (454 kg) water capacity, 9.3.3
Stationary installations, 4.3.1
Storage of containers, 8.3.2.3, 8.3.3.1
Vehicles, containers installed on, 11.3.5
Water heaters, 5.20.7, A.5.20.7
Water spray fixed systems, 6.25.6
Weight method filling, 7.4.2.1, 7.4.2.2, Table 7.4.2.2, 7.4.2.3, A.7.4.2.2
Definition, 3.3.22.2
Welding, 5.2.1.6, 5.7.3.6, 6.6.1.3, 6.9.3.2, 6.22.3.3, 7.2.3.2(C), 11.3.3.3, 11.7.4.2, 13.2.1.11
Wharves *see* Marine shipping and receiving
Wheel chocks, 7.2.3.6(2), 9.4.8
Wind loading
ASME containers, 5.2.4.3(C)
Refrigerated containers, 12.3.1
Wiring, electrical, 6.22.2, 9.2, 13.2.2, A.6.22.2.2, A.6.22.2.3
Working pressure; *see also* Maximum allowable working pressure (MAWP)
Hose, 5.9.6.5, 11.6.3

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 526

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Commentary Index

A

Absolute pressure, 3.3.61

Absolute vapor pressure
- Refrigerated containers, 12.1.2.1

Active cathodic protection systems, A.6.6.6.1(H), 6.16.2

Actuated liquid withdrawal excess-flow valves, A.5.2.5.4, 5.7.4.1(D), 9.6.2.2, Exhibit 5.9, Exhibit 5.10
- Defined, 3.3.1
- New-style, 5.7.4.1(D)
- Old-style, 5.7.4.1(D)

Aerosol filling plants, 1.3.2(4)

Aerosol-packaging industry, 10.1.1

Aerosol product manufacturing facilities, 1.3.2(4)

Aggregate storage, 6.25.3.1

Agricultural installations
- Hose, 5.9.6.4(D)
- Hose pressure, 6.19.2.6
- Piping, 5.9.1.2
- Portable containers in stationary installations, 6.6.3.7
- Safety precautions, 7.2.3.5(B)

Air-gas valve carburetors, Exhibit 11.5

Air intakes
- Separating cylinders from, 6.19.11.1(B)

Alloys
- Brazing, 5.9.4.1
- Melting points for, Commentary Table 6.4

Alternate vehicle fuels, 6.24

Aluminum components, 5.17.1.3(C), 5.17.1.3(E)

Aluminum construction cylinders (DOT 4E), A.5.2.1.1, 5.2.1.2(D)

Aluminum cylinders, 11.3.1.4(D)

American Gas Association, A.4.2.3, 6.22.3.4

American National Standard, 12.3.1.2

American National Standards Institute (ANSI), 3.3.3

American Petroleum Institute (API), 1.3.1(3), 3.3.4, A.5.2.1.1, 6.22.3.4

American Society for Testing and Materials (ASTM), 3.3.9

American Society of Civil Engineers, 12.3.1.2

American Society of Mechanical Engineer (ASME)
- Defined, 3.3.6

American Welding Society, 6.22.3.4

Ammonia, A.4.5, 4.5.2

Anchorage, 6.19.3.5
- Of ASME containers, 6.6.1.6
- Of cylinders, 6.6.1.6
- Of dispensing units, 6.24.3.12
- In plant transport unloading areas, 6.12

Anhydrous ammonia, 4.2.5, A.4.5

Annex K, Burial and Corrosion Protection for Underground and Mounded ASME Containers, A.6.6.6.1

Anodeless risers, 6.9.4.3(B)
- Defined, 3.3.2
- Permitted use of, A.5.9.5(E)

Anodes
- Sacrificial, A.5.9.5(E), 6.16.2

ANSI/CSA Z21, ***Outdoor Cooking Gas Appliances,*** 7.2.2.6

ANSI/UL 125, ***Standard for Valves for Anhydrous Ammonia and LP-Gas (Other than Safety Relief),*** 5.7.4.1, 5.12.1(C)

ANSI/UL 913, ***Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III Division 1, Hazardous (Classified) Locations,*** 13.2.3.3

ANSI Z21/83 Committee on Performance and Installation of Gas-Burning Appliances and Related Accessories, 5.20.1

ANSI Z21.80/CSA 6.22, ***Standard for Line Pressure Regulators,*** 6.8.1.8

API 607, ***Fire Test for Soft-Seated Quarter Turn Ball Valves,*** 5.7.4.2(I)(2)

API 620, ***Design and Construction of Large Welded, Low-Pressure Storage Tanks,*** 12.1.1.1, 12.1.1.3, 12.1.1.4, 12.2.2.2, 12.4.2.2, Chapter 12

API 2510, ***Design and Construction of Liquefied Petroleum Gas (LPG) Installations,*** 1.3.1(3), 1.3.2(2), Chapter 12

API 2510A, ***Fire Protection Considerations for the Design and Operation of Liquefied Petroleum Gas (LPG) Storage Facilities,*** 1.3.2(2)

API-ASME Code, A.5.2.1.1, 5.2.1.1(B)

API-ASME containers (tanks)
- Defined, 3.3.5
- Judging suitability of, 5.2.1.1(B)

API RP 520, ***Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries,*** 6.7.2.15

API RP 521, ***Guide for Pressure-Relieving and Depressuring Systems,*** 6.3.10

Appliances. *See also* portable appliances
- Coverage, 5.20
- Fuel type conversion, 5.20.2
- Gas input for, Commentary Table 15.1
- Manufacturing approvals, 5.20.1
- Multi-fuel, 5.20.2

Approved
- Defined, A.3.2.1

Appurtenances. *See* container appurtenances; engine fuel container appurtenances

ASCE 7, ***Minimum Design Loads for Buildings and Other Structures,*** 12.3.1.2, 12.3.2.2

ASME B 31.3, *Process Piping Code,* A.6.9.3.1, 6.19.2.5, 12.3.3.1

ASME B31.8, ***Gas Transportation and Distribution Piping Systems,*** A.1.3.1(4)

ASME ***Boiler and Pressure Vessel Code,*** A.5.2.1.1, 5.2.1.1(A), 5.2.1.1(B), 5.2.1.2(B), 5.2.1.6, 5.2.4.2, 5.2.4.3(E), 5.2.7.2(D), A.5.2.8.3, 5.21.2.1, 5.21.2.2, 5.21.3.1, 6.9.3.2, 9.4.4, 11.1.3, 11.4.1.9, 12.1.1.1, 12.1.2.1
- ASME container pressure relief valves, 5.7.2.6
- Container nameplates, A.5.2.8.3
- Design margin (safety factors), A.5.2.1.1

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 527

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Pressure relief valves, 5.7.2.4(A)
U-68 specifications, A.5.2.1.1, 5.2.1.3, 5.2.4.2
U-69 specifications, A.5.2.1.1, 5.2.1.3, 5.2.4.2
U-200 specifications, A.5.2.1.1
U-201 specifications, A.5.2.1.1
ASME bulk tanks, 6.19.2.1
ASME containers, 3.3.57, 3.3.58, Chapter 5. *See also* containers; vertical ASME containers
Actuated liquid withdrawal excess-flow valves, A.5.2.5.4, 9.6.2.2
Alternate installation provisions, 6.26
Anchoring, 6.6.1.6
Approval of systems using, 4.1.1
Appurtenance requirements, 5.7.4.1
On building roofs, 6.5.1.3, 6.6.7, 6.6.7.2
Capacities, A.5.2.1.1
Corrosion protection painting, A.6.6.1.4
Defined, 8.1
Dented, bulging, gouged, or corroded, 5.2.1.4
Determining suitability of, 5.2.1.1(B), 7.2.2.2, 7.2.2.7
Filling into the vapor space, A.5.2.5.3
Fire protection, 6.25, 6.25.3.1
Fusible plugs, 5.7.2.12
Horizontal installation of, 6.6.3.1
Hydrostatic pressure testing, 5.2.1.2(B)
Installation exceptions, 6.6.3.4
Installation on noncombustible foundations, 6.6.3.1, Exhibit 6.12
LP-Gas capacity of, 7.4.2.1
Marking for underground use, 6.6.6.1
Maximum allowable working pressure (MAWP) for, 5.2.4.2, 5.13.1
Nondestructive test methods, 5.2.1.2(B)
NOT ODORIZED marking, 5.2.8.5, Exhibit 5.18
Openings, 5.2.5.1
Overfilling, 6.6.3.2, 6.6.3.3, 6.6.7.2
Performance regulatory approach, A.5.2.1.1
Performance requirements, 6.6.3.3
Portable, 9.3.2.1
Prescriptive regulatory approach, A.5.2.1.1
Pressure relief valve manifolds, 5.7.2.5, Exhibit 5.27
Pressure relief valves, 5.7.2.1, 5.7.2.4(A), 5.7.2.6, 6.3.11, 6.7.2.3, Exhibit 5.21, Exhibit 5.22
Propane capacity, 3.3.79
Removing from service, 5.2.1.4
Requirements, A.5.2.1.1
Saddles, 6.6.3.1, Exhibit 6.13
Seismic considerations, 6.6.7.2
Served by single pressure regulator, Exhibit 6.23
Special transportation permits, 9.6.1.2
Temporary installations, 5.2.7.2
U-68 containers, A.5.2.1.1, 5.2.1.3, 5.2.4.2
U-69 containers, A.5.2.1.1, 5.2.1.3, 5.2.4.2
Underground installations, 6.6.6.1, Exhibit 6.16, Exhibit 6.17, Exhibit 6.18
Verification of fitness, A.5.2.1.1
Vertical installations, 5.2.4.3(E), 5.2.7.1(C), 6.6.4.1, 6.6.4.3, 6.6.4.5, Exhibit 6.15
Water capacity, 3.3.79
ASME engine fuel containers
Criterion for, 11.3.1.4(D)
Damaged, 11.3.3.1
Design pressure, 11.3.2.2
Double backflow check valves, 11.4.1.14
Engine fuel, 11.3.2.2
Labeling requirements, 11.3.4(B)
Nameplates, 11.3.4(B)
Overfilling, 11.4.1.13
Overfilling prevention devices (OPD), 11.4.1.13, 11.4.1.15
Pressure relief valves, 11.4.1.7(B)
Shutoff valves, 11.4.1.8
Solenoid-actuated valves, 11.4.1.8
Welding, 11.3.3.3
ASME pressure vessels, 7.2.2.9
ASME refrigerated containers, 12.1.1.1
ASME tanks
Volumetric filling method, 7.4.1
Assembly occupancies
Defined, 6.20.2.3
Patio heaters in, 6.20.2.3
ASTM B 86, *Standard Specifications for Zinc-Alloy Die Casting*, 5.17.1.3(E)
ASTM D-1835, *Standard Specifications for Liquefied Petroleum Gases*, 3.3.36
ASTM D-2513, *Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings*, A.5.9.5, 6.9.4
ASTM E-119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, 5.2.7.1(C)
Atmospheric heat source indirect vaporizers, 6.21.2.11, 6.21.2.12
Atmospheric-type regulators, 11.13.2.1
Austenitic stainless steels, 12.1.1.4
Authority having jurisdiction (AHJ)
Code enforcement and, Chapter 1
Container installations and, 6.3.11
Defined, A.3.2.2
Fire safety analysis and, 6.25.3.3
Pressure vessels, A.5.2.1.1
Stationary installation plans submitted to, 4.3.1
Automatic changeover regulators, 6.8.1.4, Exhbit 3.12, Exhibit 6.24
Automatic pump bypass, 6.16.2.3(D), Exhibit 6.34
AWS Z49.1, *Safety in Welding, Cutting and Allied Processes*, A.1.3.2(5)

B

Backflow check valves, 5.7.8.1(A), 6.26.3.5
Flammable mixtures and, 7.3.2.2(C)
Operation of, 5.7.4.5(4), Exhibit 5.36
In plant transport unloading areas, 6.12
In tank cars, 6.12.1
In tank car unloading stations, 6.12
Back pressure relief valves, 12.8.1.2
Balconies
Cylinders on, 6.19.1.2(B), Exhibit 6.43
Permanent cylinder installations, 6.19.11
Bartlesville Energy Research Center, A.4.2.3
Battelle Memorial Institute, A.4.5, 6.3.10
"Bill stuffers," 14.4.13.1
BLEVEs (Boiling Liquid Expanding Vapor Explosions), A.3.3.68, 6.3.1
Enclosures and, A.6.4.7
Pressure relief devices and, 6.7.2.2
Special protection and, 6.25.5
Training on, 6.25.2.2
Water spray systems and, 6.25.5.2
"BLEVE Update," 6.25.2.2
Blower-type heaters, 6.19.4.6
Bobtail drivers
Determining suitability of ASME containers, 7.2.2.2
Training, A.4.4
Bobtails, 3.3.11, 3.3.54, Exhibit 9.2
Excess-flow valves and, 5.7.8.1(H)
Internal valves, 9.4.2.4
Liquid outlets, 9.4.2.4
Piping systems, 9.4, Exhibit 9.7, Exhibit 9.8
Propane use by, A.9.1.2(4)
Rooftop containers filled from, 6.6.7
Boilers
As heat source for vaporizers, 6.21.2.9
Preventing explosions in, 6.21.2.6
Boiling Liquid Expanding Vapor Explosions (BLEVEs). *See* BLEVEs (Boiling Liquid Expanding Vapor Explosions)
Boiling point, A.6.4.5.3
Bottom connections
For mounded containers, A.6.6.6.3(1)
Branch lines, 5.7.8.1(H)
Brass fittings, A.4.5
Brass valves, 9.4.3.9
Brazing, 5.9.4.1, 6.9.3.5
Brush fires, 6.4.5.2

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 528

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Building extensions
Separation distance, 6.3.11
Building openings
Cylinder installations and, 6.3.7
Defined, 6.3.7
Distance from pressure relief valves to, 6.3.9
Building renovation
Equivalency requirements for, 6.19.4.10
During hours when public is present, 6.19.5.2
Buildings
Air intakes, separating cylinders from, 6.19.11.1(B)
Atmospheric heat source indirect vaporizers used in, 6.21.2.11
Container installations inside, 6.19
Cylinder installations inside, 6.19, 6.19.1.2(B), 6.19.2.1
Cylinder installations underneath, 6.3.8
Cylinder storage within, 8.3
Cylinder use for food preparation, 6.19.9.1
Cylinder use for temporary exhibitions and demonstrations, 6.19.9.1
Gas manufacturing, 6.3.5
Important, 6.3.1
Manifold cylinders adjacent to, 6.3.6, Exhibit 6.3
Piping liquid LP-Gas into, 6.19.12.1, 6.19.12.2(J)
Point of transfer in, 6.5.4.1, 6.5.4.3
Polyamide and polyethylene piping prohibited in, 6.9.1.1
Rooftop ASME containers, 6.5.1.3, 6.6.7, 6.6.7.2
Routing delivery hoses through, 6.5.1.4
Separation distances from, 6.3.3, 8.4.1.1
Venting of gas within, 6.5.4.2
Bulk containers, A.5.2.1.1. *See also* ASME containers
Appurtenance requirements, 5.7.4.1
History of, A.5.2.1.1
Water capacity of, 5.7.4.2
Bulkheads
Dispensing stations, 7.2.3.4
Bulk plants, Exhibit 3.2, Exhibit 3.3, Exhibit 6.37
Container and piping details, Exhibit 6.38
Cylinder filling buildings at, 6.3.5
Defined, A.3.3.10
Fire safety analysis, 6.25.3.2
General use containers, 5.2.1.6
Liquid transfer operations, 6.17.5.3
Maintenance procedures, A.14.3
Operating procedures, 14.2.1
Points of transfer at, 3.3.54, Exhbit 3.9
Public refilling points, 7.2.3.1
Remote shutdown, A.6.10(3)
Burst disks, 5.7.2.4(A)
Butane
Diking, 6.4.5.12
Flash point and, A.6.4.5.3
Warning labels, 5.2.8.4
Butane containers
Propane or propane/butane mixture in, 7.2.1.3
Butane cylinders
Nonrefillable, inside use of, 6.19.9.1
Pressure relief devices, 5.7.2.3
Restaurant storage of, 8.3, 8.3.2.3
Butane-fueled portable cooking appliances, A.6.19.9.3, 6.19.9.4, Exhibit 6.40
Bypass
Automatic pump bypass valve, Exhibit 6.34
For positive displacement pumps, 6.17.2.3(D)

C
Cabin heaters, A.1.3.2(8)
Calibration
Of meters, 6.17.5.3
Carbon monoxide, A.5.20.7
Carbon monoxide alarms, A.5.20.7
Carbon steel wire braid, 5.9.6.2
Carburetion equipment, 11.5
Shutoff valves, 11.5
Two-stage pressure regulation converter, 11.5, Exhibit 11.4
Vacuum fuel locks, 11.5, Exhibit 11.6
Cargo containers
Flush-type internal pressure relief valves for, 5.7.2.4(A), Exhibit 5.23
Cargoes of particular hazard, 13.3.1
Cargo tank heaters, 6.23.7.3
Cargo tanks, 3.3.11
Internal valves, 9.4.2.4, Exhibit 9.10
Portable containers used as, 9.3.3.8
Transferring LP-Gas directly from railcars to, 4.3.3
Cargo tank vehicles, 3.3.11, 6.23.2, Exhibit 9.9. *See also* bobtails
Accidents involving, 6.12
Bobtails, 9.4
Brass valves prohibited on, 9.4.3.9
Construction specifications, A.9.1.1(3)
DOT safety features, 9.4.2.4
Electrical lighting requirements, 9.2
Electric pumps, 9.4.4.4
Excess-flow valves and, 5.7.8.1(H)
Filling at pipeline terminals, 7.1.2, Exhibit 7.1
Hazardous materials and, 9.4
Liquid transfer from railcars, 6.18.2.3(C)
Maximum container capacity, 11.3.5.1, Commentary Table 11.1
MC-331, A.9.1.1(3), 9.4.4, Exhibit 9.1
Parking regulations, 9.7, 9.7.2.4, 9.7.3.5, Exhibit 9.15
Passive transport shutdown systems, 7.2.3.9, Exhibit 7.13
Pull away protection, 7.2.3.9
Regulation of, Chapter 9
Retail delivery (*See* bobtails)
Safety requirements, 7.2.3.9
Servicing, 9.7.3.6, Exhibit 9.16
Tractor-trailers (transports), 9.4
Unloading, 7.2.3.4
Valves, 9.4.3.4
Carousel filling installations, 7.4.2.1, Exhibit 7.17
Cast iron, 5.17.1.3(E)
Catalytic heaters, 6.19.2.8
Cathodic protection systems, 6.6.6.1(H), A.6.6.6.1(H)
Active, A.6.6.6.1(H), 6.16.2
Failure of, 6.16.2
Passive, 6.16.2
Cavitation, 6.16.2.3(D)
Centrifugal pumps, 5.17.2
CGA A-1.1, *Pressure Relief Device Standards, Part I—Cylinders for Compressed Gases*, 5.7.2.2, 5.7.2.3
CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*, 5.2.2.2, 5.2.3
CGA C-6.3. *Guidelines for Visual Inspection and Requalification of Low Pressure Aluminum Compressed Gas Cylinders*, 5.2.2.2
CGA C-14, *Methods for Hydrostatic Testing of Compressed Gas Cylinders*, 5.7.2.3
CGA 791 connections, 6.19.3.6(C), 7.2.2.5
CGA 810 connections, 6.19.3.6(C), 7.2.2.5
CGA S-1.3, 11.4.1.9
CGA V-1, *Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections*, 5.7.3.4
Check-Lok, 3.3.1
Check-Mate, 3.3.1
Checkmate valves, A.5.2.5.4
Check valves, 5.7.4.2(F)(2), 5.7.4.2(H)(4)
Chemical plants, 1.3.2(4)
Chemical Transportation Emergency Center (CHEMTREC), 7.3.1
Chock blocks, A.9.1.1(3)
Class A fires, 8.5.2
Class B fires, 8.5.2
Class C fires, 8.5.2
Class I, Division 1 locations, A.6.22.2.2, 13.2.3.3
Class I, Division 2 locations, A.6.22.2.2
Class I, Group D locations, 6.21.6.1
Class I flammable liquids, A.6.4.5.3
Class II flammable liquids, A.6.4.5.3
Class I locations, A.6.22.2.2

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 529

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Click-Lok valves, A.5.2.5.4
Closed-bodied vehicles
Cylinder transport in, 9.3.2.5
Coatings. *See also* corrosion coatings
Containers, 6.25.5.1
Underground piping, 6.16.2
Code
Defined, 2.1
Color-coded stakes
For snow removal operations, 6.6.3.6
Combustible liquids
Horizontal separation from containers, 6.4.5.5
In underground tanks, 6.4.5.7
Combustible materials
Loose or piled, 6.4.5.2
Vegetation, 12.7.7
Combustion explosion hazards, 10.1.1
Commerce
Transportation in, A.1.1
Commercial customers
Cylinder warning labels, Exhibit 5.17
Common grounding
Defined, A.6.22.1.2
Composite cylinders, 5.2.1.1, 11.3.1.4(D)
Compressed air or gas
Prohibited for liquid transfer, 6.18.2
Compressed Gas Association (CGA), 3.3.12, 3.3.48, 6.6.2.2
Compressed Gas Manufacturers' Association, 3.3.12, 3.3.48
Compressed natural gas (CNG), A.1.3.2(11)
As vehicle fuel, 6.24
Compression-type fittings, A.5.9.5(D)(3)
Compressor liquid transfer method, 7.2.3, Exhibit 7.6
Compressors
Liquid traps, 5.17.3.3, Exhibit 5.57
Operation of, 6.18.2.4(A)
Portable, 5.17.3.4, 6.17.3.5, Exhibit 6.36
With protection devices, 5.17.3.2, Exhibit 5.56
Selection of, 5.17.3.1
Condensation
Dew point and, 14.4.11.3
Second-stage pressure regulators and, 6.9.3.8
Temperature and, 6.9.1.1, 6.9.3.8, 14.4.11.3
Connecting pipe, 6.6.2.2
Construction
Equivalency requirements for, 6.19.4.10
Fire resistance ratings, 6.6.7.2, Commentary Table 6.3
Separation distance from, 8.4.1.3
Construction Safety Standards (State of Michigan, Dept. of Labor & Economic Growth), 6.23.3.5
Consumer education, 14.4.13.1
Consumer Product Safety Commission (CPSC), A.4.2.3
Container appurtenances, Chapter 5
Accessibility of, 6.6.1.5
Container type and, 5.7.4.1
Criteria for, 5.7
Defined, 6.7
Engine fuel containers, 11.4.1.3
For engine fuel containers, 11.4
Gaskets, 5.7.1.3(D)
Materials, 5.7.1(2), A.5.7.1.2(4)
Protection, 5.7.8.2
Protection of, on motor vehicles, 6.23.3.4(I)
Requirements, 6.19.2.1
Safety system operation, 5.7.8.4(C)
Container assembly
Defined, 7.2.2.11
Container installations, 6.6
Authority having jurisdiction and, 6.3.11
On building roof, 6.6.7
Distances between groups of containers, 6.4.2
Domestic, 6.6.3.1, Exhibit 6.11
Exceptions, 6.6.3.4
Flammable liquid storage containers and, A.6.4.5.3
Location, 6.2.2
Loose or piled combustible material and, 6.4.5.2
Multiple, Exhibit 6.2
Number of containers in groups, 6.4.2
Overhead electric power lines and, 6.4.5.12
Positioning, 6.6.1.1
Protection during snowfall, 6.6.3.6, Exhibit 6.14
Saddles for, 6.6.3.1
Separation distances, 6.3.1, 6.3.4, 6.3.9
Separation of combustible liquids from, 6.4.5.5
Separation of flammable liquids from, 6.4.5.3, 6.4.5.5
Smaller containers, 6.4.5.6
Stacked, 6.4.5.1
Container markings. *See* markings
Container nameplates. *See* nameplates
Container ownership, A.5.2.1.1
Containers, Chapter 5. *See also* ASME containers; ASME engine fuel containers; bulk containers; engine fuel containers; industrial containers; LP-Gas containers; mounded containers; portable containers; propane containers; refrigerated containers; underground containers
Accurate filling of, 7.1.2
Ammonia contamination of, A.4.5
Appurtenance requirements, 5.7.4.1
Coatings, 6.25.5.1
Defined, 3.3.13
Determining code-compliance of, 7.2.2.7
Determining suitability for filling, 7.2.2.2
Enclosures for, A.6.4.7
Failure of, 6.25.5.1
Filling, 7.2.2.2, 7.2.2.7, Exhibit 7.2
Filling by weight, 3.3.22, 7.4.1
Filling methods, 7.4.1
Fire fighters and, A.3.3.68
Fire protection, 6.25
Five percent water capacity provision, 9.6.2.2, Exhibit 9.14
General use, 5.2.1.6
Inspection of internal components, 5.2.1.9
Installed on vehicles, maximum capacity, 11.3.5
Insulation of, 6.25.5.1
Leased, A.5.2.1.1
Lightning protection, A.6.22.1.2
Liquid withdrawal from, 6.6.1.1
LP-Gas capacity of, 7.4.2.1
Maximum filling densities, 7.4.2.2
Maximum filling limit, 3.3.22
Maximum surface temperatures, 6.3.1, 6.25.5.1, Commentary Table 6.1
On motor vehicles with LP-Gas systems, 6.23.3.4(I)
Noncomplying, notification of owner, 7.2.2.1
Older, 5.2.1.2(B)
Owned by industrial customers, A.5.2.1.1
Owned by residential customers, A.5.2.1.1
Pressure of, A.4.2.3
Propane capacity of, 3.3.79
Protection of, 6.25.5.1
Radiant heat effects on, 6.3.1
Requalification, 5.2.2.2
Retroactive requirements, 1.4.2
Rooftop, 6.19
Separation distances, 6.3.1
Separation of pressure relief valves from, 6.7.2.7
Size classification, 5.7.4.1
Special protection of, 6.25.5, Exhibit 6.52
Special transportation permits, 9.6.1.2
Stationary installations of, 4.3.1
Transferring LP-Gas into, A.3.3.37
Transportation of, 9.6.2.2
Type of service classification, 5.7.4.1
Underground, installed above ground, 5.7.2.7
Vertical installation of, 5.2.4.3(E)
Water capacity of, 3.3.79, 5.2.1.9
Water spray fixed protection of, 6.25.5, Exhibit 6.53
Continuing education programs, 14.4.13.1
Cooking appliances. *See* portable cooking appliances
Cooking demonstrations
Cylinders used in, 6.19.9.1

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 530

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Copper
For POL connectors, 6.6.2.2
Corrosion
Cathodic protection systems, 6.6.6.1(H)
Caused by water trapped under insulation, 6.25.5.1, Exhibit 6.54
Container nameplates and, A.5.2.8.3
Holes, Exhibit 6.19
Pinholes, 6.6.6.1(H)
Rate of, 6.6.6.1(H)
Visual inspection and, 5.2.3.3
Corrosion coatings
Damage repair, A.6.6.6.1(J)
Epoxy coal tar, 6.6.6.3
Powder, A.11.3.7
Underground containers, 6.6.6.1(H), A.6.6.6.1(H), 6.6.6.2
Corrosion protection
Engine fuel containers, 11.3.7
Mounded containers, A.6.6.6.3(4), 6.16.2
Underground containers, 6.16.2
Underground piping, 6.9.3.14
Corrosion protection painting
ASME containers, A.6.6.1.4
Container burial depth, A.6.6.6.1(B)
Mounded containers, 6.6.6.3
Paint color, A.6.6.1.4
Steel cylinders, A.6.6.1.4
Corrugated stainless steel tubing (CSST) systems, A.6.8.2(H)
Characteristics of, A.6.9.1.1(4), Exhibit 6.27
CSA American Inc., 5.20.1
Cutting
Cylinders for, 5.7.3.5(1)
Purging requirements, 6.22.3.4
Cylinder cabinets, 8.4.1.1, 8.4.2.1, Exhibit 8.2
Cylinder collars, 5.2.6.1, 6.7.2.2, 6.19.2.1, 6.19.3.5, 8.2.2.2, Exhibit 5.11
Cylinder connections, 4.1.1
Cylinder filling rooms, 10.1.1
Cylinder installations
Building openings and, 6.3.7
Fifty percent open perimeter of space below decks, 6.3.8, Exhibit 6.5
Firm foundation for, 6.6.2.1
Location, Exhibit 6.4
Manifold, next to buildings, Exhibit 6.3
Next to buildings, 6.3.6, 6.3.7
Separation distances, 6.3.9
Tiling, 6.6.1.1
Underneath buildings, 6.3.8
Weather protection, 6.3.8
Cylinder refilling facilities, 3.3.20, 7.2.2.7, Exhibit 7.3
Cylinders, Chapter 5. *See also* butane cylinders; DOT cylinders; DOT/TC cylinders; gas grill cylinders; industrial truck cylinders; portable cylinders; propane cylinders; rooftop cylinders; universal cylinders
Aluminum, A.5.2.1.1, 5.2.1.2(D), 11.3.1.4(D)
Anchoring, 6.6.1.6
Approval of systems using, 4.1.1
On balconies, 6.19.11, Exhibit 6.43
Capacity of, Commentary Table 5.1
Checking, before filling, 7.2.2.7
Composite, 5.2.1.1, 11.3.1.4(D)
Connection of, 6.19.9.4
Damage protection, 8.2.1.1
Defined, 3.3.16, 8.1
Designed weakness points in, 5.7.2.3
Determining code-compliance of, 7.2.2.7
Disposable, 7.2.2.6, 7.2.2.8
DOT 4BA-240 (steel construction) cylinders, A.5.2.1.1
DOT 4E (aluminum construction) cylinders, A.5.2.1.1, 5.2.1.2(D)
DOT regulation of, A.5.2.1.1
"Empty," 8.2.1.4
Exchange, 6.3.9
Filling, 7.2.2.2, 7.2.2.7
Filling at bulk plants, 6.3.5
Filling methods, 7.4.1
Filling on site, 5.2.3
Filling time, 8.4.1.4
Fire-damaged, 5.2.1.2(D)
Firm foundation for, 5.2.3.3
Horizontal, 5.7.3.5(2), 5.7.3.6, 5.7.5.6(B)(2)
Inside buildings, 6.19, 6.19.1.2(B), 6.19.3.4
Inside buildings, for food preparation, 6.19.9.1
Inside buildings, for temporary exhibitions and demonstrations, 6.19.9.1
Liquid withdrawal from, 6.6.1.1
Location of, 8.2.1.1
Manifold, 6.3.6, Exhibit 6.3
Maximum size for educational buildings, 6.19.7.2
In mobile and engine fuel service, 5.7.8.1(D)
In multifamily buildings, 6.19.11.2, Exhibit 6.42
National requirements for, A.5.2.1.1
Nonrefillable, 7.2.2.6, 7.2.2.8, 8.3
Non-U.S., 8.1
One-pound, A.6.19.9.3
Orientation of, 6.19.2.1
Out-of-date, 7.2.2.7
Overfilling, 5.7.3
Overfilling prevention devices for, 5.7.3, 7.2.2.7
Overheating, 6.19.4.6
"Permanently" installed, A.5.2.1.1
Physical protection of, 6.19.3.4
For portable cooking appliances, A.6.19.9.3, 6.19.9.4
Portable tar kettles, 6.23.3.5
Pressure relief devices for, 6.7.2.2
Pressure relief valves for, 5.7.2.2, 6.19.3.4, 8.2.1.2
Propane capacity of, 3.3.79
Purging, 7.3.2.2(C)
Redundant seals, 7.2.2.5
Replacing, 5.7.8.3
Requalification markings, 5.2.2.2
Requalification of, 5.2.2.2, 11.3.1.4(D), 11.3.1.5
Restaurant use of, 6.19.9.1, 6.19.9.4
"Rocketing," 5.7.2.3
Room temperature and, 6.19.3.4
Securing, 6.19.3.5
Separating from air intakes, 6.19.11.1(B)
Steel, A.5.2.1.1, A.6.6.1.4
For temporary heating equipment, 6.19.8.1
Transportation within buildings, 6.19.3.6(C)
Transportation within buildings undergoing major renovation, 6.19.4.2
Transport Canada (TC) regulations for, A.5.2.1.1
Types of, A.5.2.1.1, 6.19.2.1, Commentary Table 5.1
Universal, 3.3.74
Vapor service, 6.19.2.1
Wallpaper steamers, 8.3.2.2
Warning labels, 5.2.8.4
Wood foundations for, 6.6.2.1
Cylinder storage, 6.19.1.3, 8.2, Chapter 8. *See also* outside cylinder storage
Cabinets, 8.4.1.1, 8.4.2.1
Cylinders awaiting use, 6.19.1.3
Fire extinguishers, 8.5.2
Fire protection, 8.5
Non-publicly accessible buildings, 8.3.3.3
Outdoor, 8.4
Protection, 8.4.2.1
Publicly accessible buildings, 8.3
Residential buildings, 8.3, 8.3.5
Rooftop, 8.2.1.5
Separation from gas or diesel fuel dispensers at gas stations, 8.4.1.1
Special buildings or rooms, 8.3
Sprinkler density and, 8.3.1(B)
Storage racks, 8.4.1.4, Exhibit 8.3
Vehicular damage protection, A.8.4.2.2
Cylinder valve plugs, 9.3.2.4
Cylinder valves
Approval of, 4.1.1
Protection of, 8.2.2.2, 9.3.2.4

D

Decks
Fifty percent open perimeter of space below, 6.3.8, Exhibit 6.5
Definitions, Chapter 3
Deflagration, Chapter 10

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 531

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Delivery hoses
Routing through buildings, 6.5.1.4
Demonstrations
Temporary use of cylinders inside buildings for, see6.19.9.1
Designed points of weakness, 5.7.2.3
Design margin (safety factors), A.5.2.1.1
Design pressure
ASME engine fuel containers, 11.3.2.2
Engine fuel containers, 11.3.1
Flexible connectors, 9.4.3.4
Hydrostatic pressure relief valves, 5.13.2
Mobile containers, 6.23.3.1(F)
Pressure vessels, 7.2.2.9
Refrigerated containers, 12.7
Detonation, Chapter 10
Dew point, 14.4.11.3
Diesel engines, 3.3.67
Differential back pressure valves, 5.17.5.1, 6.24.3.5, Exhibit 6.51
Digging
Around underground propane containers, A.6.6.6.1(E)
Dikes
For butane, 6.4.5.12
For refrigerated and nonrefrigerated propane, 6.4.5.12
Refrigerated containers, 12.5, 12.5.4, 12.5.5, 12.5.8.1, 12.5.9.3
Dip tubes, 5.7.5.7
Direct-currant voltage, A.6.6.6.1(H)
Direct-fired vaporizers, 3.3.75.1, 5.21.3.1, 6.21.3.6, Exhibt 5.62
Defined, 6.21.3
Indirect vaporizers *vs.*, 6.21.2.4
Liquid provided to heat-exchanger, 6.21.3.4
Location of, 6.21.3.1, 6.21.3.6
Markings, 5.21.3.1
Multiple installations, 6.21.3, Exhibit 6.46
Operating on demand, Exhibit 5.63
Outside surface, 5.21.3.1
100 percent shutoff requirements, 5.21.3.8
Relief valves for, 5.21.3.3
Shutoff valves for, 6.21.3.5
Source of ignition, 6.21.3
Temperature-sensing devices for, 5.21.3.8
Vaporizing burners, 5.21.5
Direct gas-fired tank heaters, 5.21.4.7
Defined, 6.21.4
Hazards of, 6.21.4.4
Safety instructions, 6.21.4.5
Direct spring-loaded pressure relief valves, 5.7.2.4(A), 5.7.2.4(B)
Discharge piping, 6.7.2.5, 6.9.3.4
Materials for, 6.7.2.15
Protection against physical damage, 6.7.2.15
Rate of flow, 6.7.2.15
Requirements for, 6.7.2.15
Discharge stacks, 6.7.2.7
Dispenser tanks, 3.3.54
Dispensing stations
Anchorage of units, 6.24.3.12
Defined, 3.3.20
Installation instructions, 6.24.3.1
Quick-acting shutoff valves, 6.24.3.13
Remotely operated shutoff valves with thermal actuation, 6.24.3.8, 6.24.3.10
Security, 6.24.3.7
Separation distance from, 8.4.1.3, 8.4.1.4
Shutoff valve distance to dispenser, 6.24.3.14
Underground containers serving, 6.7.2.13
Vehicular traffic and, 7.2.3.4
Disposable cylinders
Filling, 7.2.2.8
Valve outlet seals and, 7.2.2.6
"Distinct hazard to life and property," 1.4.3
DOT 4BA-240 (steel construction) cylinders, A.5.2.1.1
DOT cylinders
Aluminum construction (4E), A.5.2.1.1, 5.2.1.2(D)
Defined, 8.1
Determining suitability for filling, 7.2.2.2
Fire-damaged, 5.2.1.2(D)
Installation of, 6.3.5
Marking requirements, A.5.2.1.1, 5.2.8(B), Exhibit 5.4, Exhibit 5.14
Pressure relief valves for, 5.7.2.2
Requalification of, 5.2.2.2, 11.3.1.4(D), 11.3.1.5
Requirements for, A.5.2.1.1, 5.2.4.1
Steel construction (4BA-240), A.5.2.1.1
Volumetric filling method, 7.4.3.1
Water capacity markings, 9.3.2.1
DOT nonrefillable metal containers
Pressure relief valves, 5.7.2.3
2P containers, 5.7.2.3
2Q containers, 5.7.2.3
DOT 51 portable containers, 9.3.3, Exhibit 9.6
DOT shipping containers, 3.3.57
DOT-SP 11209 exemption, 9.3.4
DOT/TC cylinders
Capacities of, Exhibit 5.3
Dimensions of, Exhibit 5.3
Pressure relief valves, Exhibit 5.19
Requirements for, A.5.2.1.1
Types of, Exhibit 5.1, Exhibit 5.2
Double backflow check valves, 11.4.1.14
Double-check filler valves, 9.6.2.2
Downcomers, 12.5.3
Dowtherm, 6.21.2.5
Drainage channels, 12.5.3
Drill size orifice
Venting and, 6.5.4.2, 7.3.1
"Dry" hose, 9.4.4.5(B)

E
Educational occupancies
Maximum cylinder size for, 6.19.7.2
Elastomeric gaskets, 6.9.3.5
Electrical equipment
Classified areas, A.6.22.2.2, Exhibit 6.49
Prohibited areas for, A.6.22.2.2
Electrical wiring
In same trench with gas piping, 6.9.4.6(B)
Electric power lines, 6.4.5.12
Electric vaporizers, 3.3.75.2
Electronic LP-Gas cylinder filling carousel, 7.4.2.1, Exhibit 7.17
Emergency fuel supply
Rooftop cylinders for, 6.19.1.2(C)
Emergency heating equipment
Cylinders for, 6.19.8.1
Emergency responders
Coordination with, 6.25.2.1
Fire safety analysis and, 6.25.3.3
Training of, 6.25.2.2
Venting and, 7.3.1
Emergency response procedures
"Readily available" manuals, 13.4.3
Training in, 7.2.2.1
Emergency shutoff valves (ESVs), 5.12.4, 6.12, 7.2.3.6, A.9.1.1(3), Exhibit 5.50
Automatic activation of, 6.12.6
Fire safety analysis and, 6.25.3.5
Installation of, 6.12, Exhibit 6.28
Manual control of, 6.12
Plant transport unloading areas, 6.12
Pull away protection, A.6.12.8
Remote control of, 6.12, 6.12.9
Retroactivity of requirements, 6.12.9
Separation distance and, 6.4.3
Tank cars, 6.12.1
Tank car unloading stations, 6.12
Testing, 6.12.9
Two-directional flow and, 6.12.5
"Empty" cylinders, 8.2.1.4
Enclosures
Aboveground propane containers, A.6.4.7
Regulators, 6.8.1.5
Use of term, 6.8.1.6
Enforcement, 1.7, Chapter 1
Engine fuel container appurtenances, 11.4
Excess flow check valves, 11.4.1.3
Installation, 11.7
Internal excess-flow valves, 11.4.1.3
Engine fuel containers
Corrosion protection, 11.3.7
Design pressure, 11.3.1
Exchangeable, 11.3.1.8
External pressure relief valves, Exhibit see11.3
Fastener strength, 11.7.4.1

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 532

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Gastight boxes around, 11.8.1.5, Exhibit 11.10, Exhibit 11.11
Ignition sources and, 11.3.6.4
Installation, 11.7, 11.7.4.1
Interior installation, 11.8.1.5
Location of, 11.7
Maximum capacities, 11.3.5.1, 11.3.5.2, Commentary Table 11.1
Permanently installed, 11.3.1.8
Remote filling, Exhibit 11.3, Exhibit 11.12
Road clearances, 11.7.3.1
Storage rack for, 8.4.1.4, Exhibit 8.3
Trunk mounted, 11.8.1.5, Exhibit 11.9
Typical, 11.3.5.2, Exhibit 11.2
Engine fuel systems, Chapter 11
General purpose vehicles, 11.1
Industrial trucks, 11.1
Low emission transfer, 11.4.1.6
Piping and hose, 11.6
Pressure relief discharge location and, 11.7.4.3
Propane, 11.1, Chapter 11
Spring-loaded check valves, 11.9.1.8
Truck locations, 11.7.5.1, Exhibit 11.7, Exhibit 11.8
Vehicle exhaust systems and, 11.7.1.3
Engines, 5.17.6. *See also* internal combustion engines
"Explosion-proof," 5.17.6
Portable, 5.17.6, Exhibit 5.59
Epoxy coal tar coatings, 6.6.6.3
Equipment, 5.17
Aluminum components, 5.17.1.3(C), 5.17.1.3(E)
Materials, 5.17.1.3(E)
Minimum requirements, A.4.6
Propane, 5.17
Equivalency requirements, 1.5, 6.19.4.10
Ethyl mercaptan, A.4.2.1, A.4.2.3
Excess-flow valves, A.5.2.5.4, 5.7.4.1(C), 5.7.4.2(A)(2), 5.7.4.2(H)(4), 5.7.8.1(A). *See also* actuated liquid withdrawal excess-flow valves
Cargo tanks, 9.4.2.4
Characteristics, 5.7.4.5(4)
Engine fuel container appurtenances, 11.4.1.3
Internal, 11.4.1.3
Liquid LP-Gas transfer and, 7.2.3
LP-Gas meters, 6.24.3.5
Operation, 5.7.4.5(4), Exhibit 5.35
Pressure regulators and, 5.7.4.1(F)
Sizing, 5.7.8.1(H)
System maximum design flow capacity, 5.7.8.1(H)
Vapor service cylinders, 6.19.2.1
Vehicles, 6.23.7.3
Exchange cylinders, 6.3.9
Exhibitions
Temporary use of cylinders inside buildings for, 6.19.9.1
Exit access
Cylinder storage not permitted in, 8.2.1.3
Expansion loops, 6.9.3.7
"Explosion-proof" engines, 5.17.6
Explosion venting, 10.1.1, 10.2.1.2
Exterior bearing walls
Fire resistance ratings, Commentary Table 6.3

F

Facilities of particular hazard, 13.3.1
Factory-assembled risers, A.5.9.5(E), 6.9.4.4(B)
Farm carts, 3.3.43, 9.3.4, 9.5.2.6
Farm equipment, A.1.3.2(6)
Federal Aviation Administration (FAA), 1.3.2(7), 11.1
Fencing
Security, 6.18.4.2(C)
Field-assembled risers, A.5.9.5(E)
Design-certified, 6.9.4.4(A)
Materials, 6.9.4.4(B)
Pressure testing, 6.9.4.4(A)
Field welding, 5.2.1.6, 6.6.1.3
Fifty (50) percent of perimeter, 6.3.8
Filling methods
Volumetric method filling, 3.3.22.1, 5.7.3.1, 7.4.1, 7.4.3.1
Weight method filling, 3.3.22.2
Film (surface), 6.19.2.1
Final Rule HM-220D, U.S. DOT, 5.2.2.2
Fire Analysis Department, NFPA, 6.25.3.2
Fire damaged DOT cylinders, 5.2.1.2(D)
Fire department response, 6.25
Fire detection, A.3.3.23
Fire extinguishers, 6.25.4.2, A.9.1.1(3)
Class A rating, 8.5.2
Class B rating, 8.5.2
Class C rating, 8.5.2
For cylinder storage locations, 8.5.2
Fire fighters
LP-Gas containers and, A.3.3.68
Fire protection
Defined, A.3.3.23, 6.25.3.1
Emergency responders and, 6.25.2.1, 6.25.2.2
Incident response plans, 6.25.2.2
LP-Gas storage containers, 6.25
Planning, 6.25.2, 6.25.2.1
Fire resistance ratings, 6.6.7.2, Commentary Table 6.3
Point of transfer within buildings, 6.5.4.3
Fire safety analysis, 6.25
Authority having jurisdiction and, 6.25.3.3
Bulk plants, 6.25.3.2
Emergency responders and, 6.25.3.3
Emergency shutoff valves, 6.25.3.5
High value occupancies and, 6.25.3.6
Internal valves, 6.25.3.5
Shutoff valves, 6.25.3.5
Special protection and, 6.25.3.6
For stationary installations, 4.3.1
Total product control, 6.25.3.5
Updating, 6.25.3.4
"Fires at LP-Gas Bulk Plants" (NFPA, Fire Analysis Department), 6.25.3.2
Fire suppression, A.3.3.23
Fire Test Committee, 6.25.5.1
Firm foundation
For cylinders, 6.6.2.1
First-stage pressure regulators, A.1.3.2(6), Exhbit 3.11
Functions of, 6.8.1.4
High-pressure regulators and, 6.8.2 (D)
Installation of, 6.8.1.3, 6.8.1.4
LP-Gas vapor condensation and, 6.9.3.8
Role of, 6.8.2 (B)
Fittings
Brazing, 5.9.4.1
Compression type, A.5.9.5(D)(3)
Flared, 5.9.4.2
Fusion joints, A.5.9.5
Mechanical, A.5.9.5(D)(1), Exhibit 5.48
Metallic piping and tubing, 5.9.4
Polyethylene and polyamide piping and tubing, A.5.9.5(D)
Safety requirements, 9.4.3.2
Fixed fill lines
For rooftop propane tanks, 6.6.7.2, Exhibit 6.22
Fixed maximum liquid level gauges, A.5.2.5.7, 5.7.5.7, Exhibit 5.40
Cylinder size and, 5.7.4.1(H)
Locations for, 5.7.5.7, Exhibit 5.42
Flame effects displays, 6.19.10.5
Flame failure protection
For portable heaters, 6.19.2.8
Flammable gases
Backflow check valves and, 7.3.2.2(C)
Dispersion of, 6.3.10, Exhibit 6.6
Labels, 5.2.8(B), Exhibit 5.13
LP-Gas liquid transfer and, 7.2.2.3
Flammable liquids
Class I, A.6.4.5.3
Class II, A.6.4.5.3
Horizontal separation from containers, 6.4.5.5
In underground tanks, 6.4.5.7
Flammable liquid storage containers
Proximity of LP-Gas containers to, A.6.4.5.3
Flammable vapor-air mixtures
Ignition of, 10.1.1
Flanged piping systems
Gaskets for, 6.9.3.5
Flared fittings, 5.9.4.2
Flashover
Of lightning currents, A.6.22.1.3

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 533

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Flash points, A.6.4.5.3
Flexible connectors, 3.3.25, 5.9.6.4(A), 5.17.5.3, 6.9.6.2, A.9.1.1(3)
Defined, 3.3.25
Metallic, 6.8.1.3, 6.9.6.2
defined, 3.3.25
Minimum design pressure, 9.4.3.4
Replacement of, 9.4.3.7
Floor buffing machines, 5.7.3.5(1), 11.13.1, 11.13.2.3(B), Exhibit 11.14
Flotation devices, 13.2.3.5
Flow capacity
Of pressure relief valves, 5.7.2.7
Flow-check mechanisms, 6.19.3.6(C)
FM Global, 6.25.5.1
Food-warming delivery vehicles, A.6.23.1
Forge-welded containers, A.5.2.1.1
Forklift trucks
LP-Gas fueled, 11.12, Exhibit 11.13
Overfilling prevention devices and, 5.7.4.1(E)
Universal cylinders, 5.7.5.6(B)(2)
Formal Interpretation 58-1, 11.7.4.3
Formal Interpretation 58-01-3, 5.12.4
Formal Interpretation 58-04-01, 6.13
Formal Interpretation 58-04-4, 6.25.3.1
Formal Interpretation 79.1, 6.12.2
Formal Interpretation 79.2, 6.12.2
Formal Interpretation 89-3, 6.19.9.1
Formal Interpretation 95-1, 6.5.3
Form RSPA F7100, A.14.4.3.1
Foundations
For cylinders, 5.2.3.3, 6.6.2.1
Materials for, 6.6.2.1
Noncombustible, 6.6.3.1, Exhibit 6.12
Refrigerated containers, A.12.3.4.2, 12.3.4.6
FPN No. 1, A.6.22.2.2
FPN No. 2, A.6.22.2.2
Frozen ground containers, 1.3.2(1)
Fuel dispensers. *See* vehicle fuel dispensers
Fusible plugs, 5.21.2.4, 11.4.1.7(B)
ASME containers, 5.7.2.12
Fusion joints, A.5.9.5

G

Galley stoves, A.1.3.2(8)
Gas-air mixers, A.3.3.28, 5.21.8
Defined, 5.21.8, 6.21.8
High-pressure orifice, 5.21.8.6, Exhibit 5.65
Installation methods, 5.21.8.6
Process air for, 5.21.8.6
Ratio of gas to air, 6.21.8.4
Venturi, 5.21.8.6
Gas chromatographic analysis, A.4.2.3
Gaseous hydrogen storage, A.6.4.5.8, 6.4.5.9
Gas grill cylinders
Excess-flow valves, 6.19.2.1
Overfilling prevention devices, 5.7.3
Storage, 8.3.5
Tampering protection, 8.2.1.1
Transport of, 9.3.2.5
Valves and connections, 7.2.2.6
Verification of fitness of, A.5.2.1.1
Warning labels, 5.2.8.4, Exhibit 5.16
Gas grill fires, 5.7.3
Gaskets, 5.7.1.3(D), 6.9.3.5
Gas plants
Application of NFPA 58 to, 1.3.1(3)
Exclusion of, 1.3.2(2)
Gas Processors Association (NPA), A.4.2.3
Gas safety, A.5.20.7
Gas stations
Separation of cylinders from gas or diesel fuel at, 8.4.1.1
Gauge pressure, 3.3.61
Gear pumps, Exhibit 5.54
Operation of, Exhibit 5.55
General-purpose vehicles
Defined, 11.1
Engine fuel systems on, 11.1, 11.12
Marking, 11.1
Maximum container capacity, 11.3.5.1, Commentary Table 11.1
General requirements, Chapter 4
General use containers, 5.2.1.6
Glass-forming operations, A.1.3.2(5)
Grass fires, 6.4.5.2
Groundwater
Undertank insulation and, 12.3.4.7
***Guidance Manual for Operators of Small LP-Gas Systems, The* (PHMSA),** 14.4.2.2

H

Half-buried containers, 6.6.6.2
Half-cell meters, 6.16.2
Handling, A.1.1
Hazardous materials
Cargo tank vehicles and, 9.4
DOT container marking requirements, 5.2.8(B)
Marine terminals and, 13.3.1
Placard requirements, 9.3.2.10
Heaters
Cylinder overheating and, 6.19.4.6
Safety, 5.20.4
Heat transfer fluids, 6.21.2.5
Heavy construction requirements, 10.2.1.2, Exhibit 10.1
High-high-liquid level flow cutoff devices, 12.4.1.7
High-liquid level alarms, 12.4.1.3, 12.4.1.6
High-pressure orifice gas-air mixers, 5.21.8.6, Exhibit see5.65
High-pressure regulators, 6.8.2 (D), 6.8.2 (E)
Functions, 6.8.1.4
Installation, 6.8.1.4
High value occupancies
Fire safety analysis and, 6.25.3.6
Holidays
Corrosion and, 6.6.6.1(H)
Horizontal ASME containers, 6.6.3.1
Interconnected, overfilling, 6.6.3.2
Horizontal cylinders
Filling, 5.7.5.6(B)(2)
Overfilling prevention devices and, 5.7.3.5(2), 5.7.3.6
Required markings, 5.7.3.6
Hose, 5.9.6.1
Agricultural applications, 5.9.6.4(D)
Delivery, routing through buildings, 6.5.1.4
Design capacity, 5.9.6.4(B)
"Dry," 9.4.4.5(B)
Failure, 9.4.3.7
Inspection, 7.2.4.5
Kinking, 7.2.4.5
Length, 6.19.2.6
Portable appliances, 6.20.3.3
Pressure testing, 5.9.6.4(C), 7.2.4.5
Protection against physical damage, 6.20.3.8
Replacement frequency, 9.4.3.7
Restrictions, 6.9.3.9
Stainless steel wire braid, 3.3.25.2, 9.4.3.7
Swivel end fittings, 7.2.4.5, Exhibit 7.14
Vehicular non-fuel LP-Gas systems, 6.23.5.1(E)
Wet, 9.4.4.5(B)
Working pressure and, 5.9.6.4(A)
Working pressure requirements, 6.19.2.6
Hose connections, 5.9.6.4(A)
Hose stream resistance, 6.25.5.1
Hot air balloons, 1.3.2(7), 11.1
Hydrocarbon vapors
Low emission transfer, A.3.3.37
Vapor pressure, 3.3.36
Hydrogen containers
Separation distance, A.6.4.5.8
Hydrogen fuel
For vehicles, 1.3.2(11)
Hydrostatic pressure relief valves, 5.13.1, Exhibit 5.51
For liquid LP-Gas piping, 5.9.1.4
Operation of, 6.13
Piping system design pressure and, 5.13.2
Set point of, 5.13.1
For vaporizing burners, 5.21.5.10
Hydrostatic pressure testing
ASME containers, 5.2.1.2(B)

I

Ignition
Prevention of, A.6.22.2.2

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 534

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Ignition sources, 3.3.67, 6.22.2.5
Controlling, 6.22
Engine fuel containers and, 11.3.6.4
LP-Gas transfer operations and, 7.2.3.2(B), 7.2.3.2(C), 7.2.3.2(D)
Recreational vehicles (RVs), 7.2.3.2(E)
Immersion heaters, 5.21.6.6
Immersion suits, 13.2.3.5
Important buildings, 6.3.1
Impractical, 1.4.4
"In attendance"
During LP-Gas liquid transfer, 7.2.1.2
Incident response plans, 6.25.2.2
Incubators (farm equipment), A.1.3.2(6)
Indirect-fired electric waterbath vaporizers, 6.21.2, Exhibit 6.45
Indirect-fired vaporizers, 5.21.2.1, 5.21.2.2
Atmospheric heat, 6.21.2.11
Boilers as heat source for, 6.21.2.9, 6.21.2.10
Defined, 6.21.2
Direct vaporizers *vs.*, 6.21.2.4
Ignition source and, 6.21.2
Installation of, 6.21.2.9
Phase separators and, 6.21.2.10
Remote heat sources, 6.21.2
Vapor discharge piping, 5.21.2.3
Indoor trade shows
Cylinder use for, 6.19.9.1
Industrial containers
Appurtenance requirements, 5.7.4.1, 5.7.4.4
Safety precautions, 7.2.3.5(B)
Water capacity of, 5.7.4.2
Industrial LP-Gas systems
Liquid transfer, 6.17.5.3
Industrial occupancies (plants)
Atmospheric vaporizers, 6.21.2.12
Containers owned by, A.5.2.1.1
Cylinder storage, 8.3
Cylinder warning labels, Exhibit 5.17
LP-Gas storage facilities, 3.3.33
Maintenance procedures, A.14.3
Operating procedures, 14.2.1
Operations and maintenance manuals, A.14.1.2
Industrial truck containers
Storage rack for, 8.4.1.4, Exhibit 8.3
Industrial truck cylinders
Overfilling prevention devices and, 5.7.3.5(1), 5.7.4.1(E)
Pressure relief valves, 5.7.2.13, 11.12.2.5
Requirements for, 11.12.2
Industrial trucks
Atmospheric-type regulators, 11.13.2.1
LP-Gas fueled, 11.12
Propane fueled, 11.1
Infrared heaters
Cylinder overheating and, 6.19.4.6
Inlet openings
Internal valves, 6.26.3.5
In-line hygrometers, 7.4.1, Exhibit 7.16
Inspections
Container internal components, 5.2.1.9
Corrosion, 5.2.3.3
Cylinders, 5.2.3.3
Cylinders filled on site, 5.2.3
Documentation of, 5.2.3.2, 5.2.3.3
Hose, 7.2.4.5
Pressure relief valves, 5.7.2.13
Inspectors
Third-party, 12.6.2
Training and qualification of, 5.2.3.2
Installation. *See also* container installations; cylinder installations
LP-Gas systems, Chapter 6
Safety-enhancing equipment not required, A.6.1.3
Institutional occupancies
Maximum cylinder size, 6.19.7.2
Insulation
Containers, 6.25.5.1
Corrosion caused by water trapped under, 6.25.5.1, Exhibit 6.54
Railroad tank cars, 6.25.5.1
Integral full-capacity relief valves, 5.8.1.2
Integral two-stage regulators, Exhibit 3.12
Operation of, 5.8.1.3
Interchangeable aboveground-underground container assemblies, 6.6.6.1
Specifications for, A.6.6.6.1(D)
Interconnected ASME containers
Overfilling, 6.6.3.2
Interior bearing walls
Fire resistance ratings, Commentary Table 6.3
Intermodal containers, Exhibit 5.6
Defined, A.5.2.1.1
Internal combustion engines, 5.17.6. *See also* engines
At points of transfer, 7.2.3.2(A)
Portable, 5.17.6, Exhibit 5.59
Separation distance, 9.4.10, Exhibit 9.11
Internal excess-flow valves, 11.4.1.3
Internal pressure relief valves, A.3.3.74.4, Exhibit 3.15. *See also* pressure relief valves
Bulk plant containers, 5.7.4.2
Container size and, 5.7.4.3
Design, 5.7.4.1(A)
Industrial containers, 5.7.4.2
Industrial sizes, 5.7.4.2(I)(2)
Lever-operated, for flanged installation, Exhibit 5.31
Lever-operated, for threaded installation, Exhibit 5.30
Liquid inlet openings, 5.7.4.2(F)(2), 5.7.4.5(6)
Pneumatically operated, Exhibit 5.32
As positive shutoff valves, 5.7.4.5(6)
Pump pressure-operated, Exhibit 5.33
Remote operating point, 5.7.4.2(G)
Retrofit installations, 5.7.4.2(C), 5.7.4.2(D)(2)
Types, 5.7.4.2, Exhibit 5.30, Exhibit 5.31, Exhibit 5.32, Exhibit 5.33
Internal valves
Automatic shutoff capability, 6.4.3
Cargo tanks, 9.4.2.4, Exhibit 9.10
Fire safety analysis and, 6.25.3.5
Remote shutoff capability, 6.4.3, 6.11.5
For withdrawal and inlet openings, 6.26.3.5
Interstate Commerce Commission (ICC), A.5.2.1.1
Intrinsically safe equipment
Marine terminals, 13.2.3.3
Isolating spark gaps, A.6.22.1.2

J

Jewelry operations, A.1.3.2(5)
Joint efficiency
Of refrigerated containers, 12.1.1.1
Joint Industry Task Force on Propane Odorization, A.4.2.3

K

Key valves, A.14.4.7
Kilo-pascals, 3.3.61

L

Labeled, 3.2.4
Labels
DOT requirements, 5.2.8(B), Exhibit 5.13
Latent heat of vaporization, 5.21
Leakage
Corrosion holes and, 6.6.6.1(H)
Piping system service limitations and, 6.9.1
Safety considerations, 6.8.1.4
Testing, 6.14.1, 14.4.8.2
Underground containers, A.6.6.6.1(F)(2)
Leak reports, 14.4.9.1
Leak surveys, 14.4.12.4
Leased containers, A.5.2.1.1
"Length-of-stain" tube tests, A.4.2.3
Lever operated internal valves
For flanged installation, Exhibit 5.31
For threaded installation, Exhibit 5.30
Life Safety Code Committee, 8.4.1.1
Lifting lugs, 5.2.4.3(E), 9.6.2.2
Lightning conductors, A.6.22.1.2
Lightning protection, A.6.22.1.2
Lightweight construction requirements, 10.2.1.2, Exhibit 10.1
Line of adjoining property, 6.3.1, Exhibit 6.1
Line pressure regulators, 6.8.1.10

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 535

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"Liquid full," 3.3.58, 7.4.2.2
Liquid inlet openings
Internal pressure relief valves in, 5.7.4.2(F)(2), 5.7.4.5(6)
Options for, 5.7.4.2(H)(4)
Liquid level gauging devices
Fixed maximum, 5.7.5.7
Float type, variable, Exhibit 5.39
Identifying, 5.7.8.5(B)
Rotary type, variable, Exhibit 5.38
Variable, 5.7.5.7, 5.7.5.8
Liquid LP-Gas
Devices preventing return of, 6.21
Gas release during liquid transfer, 7.1.2, Chapter 7
Piping into buildings, 6.19.12.1, 6.19.12.2(J)
Pressure limitations, 6.19.1.2(D)
Liquid LP-Gas piping, 5.9.1.4
Hydrostatic pressure relief valves for, 5.9.1.4
Material requirements, 6.9.1.3
Requirements, 6.19.2.5
Restrictions of use of, 6.9.1
Liquid meters, 5.17.5.1
Liquid propane
Pressurized, 6.4.5.12
Liquid transfer, Chapter 7
ASME container filling, 7.2.2.2
Bulk plants, A.3.3.10, 6.17.5.3
Compressed air or gas prohibited for, 6.18.2
Compressor method, 7.2.3, Exhibit 7.6
Container filling, 7.2.2.2, 7.2.2.7, Exhibit 7.2
Cylinder filling, 7.2.2.2
Determining container code-compliance, 7.2.2.7
Excess-flow check valves and, 7.2.3
Flammable gas mixtures and, 7.2.2.3
Gas release during, 7.1.2, 7.2.1.2, Chapter 7
Hose inspection, 7.2.4.5
Ignition sources and, 7.2.3.2(B), 7.2.3.2(C), 7.2.3.2(D)
Industrial systems, 6.17.5.3
Internal combustion engines and, 7.2.3.2(A)
LP-Gas capacity and, 7.4
Mobile railcar unloading systems, 6.18.2.3(C), Exhibit 6.39
New unused cylinders, 7.2.2.6
Nonrefillable (disposable) cylinders, 7.2.2.6, 7.2.2.8
Operating procedures, 14.2.1.1
Portable compressors, 6.17.3.5, Exhibit 6.36
Pressure differential gravity method, 7.2.3, Exhibit 7.4
Pump method, 7.2.3, Exhibit 7.5
Purging, 7.3.2.2(C)
Qualified persons in attendance during, 7.2.1.2
From railcars to cargo tank trucks, 6.18.2.3(C)
Redundant seals and, 7.2.2.5
Remote shutoff, 6.18.2.4(C)
Transfer system operations, 7.2.3
Venting LP-Gas to atmosphere, 7.3.1
Liquid traps
Compressors, 5.17.3.3, Exhibit 5.57
Liquid withdrawal fittings, 6.6.1.1
Liquid withdrawal lines, 5.7.4.2(B), 5.7.4.2(C)
Liquid withdrawal valves, 6.6.1.1
Listed, A.3.2.1, A.3.2.5
Locking devices, 6.18.4.2(C)
Lock out/tag out procedures, 6.17.2.3(D)
Louvers
Motor vehicles with LP-Gas systems, 6.23.4.2(E)
Low emission transfer, A.3.3.37
Engine fuel systems, 11.4.1.6
Nozzle, Exhibit 6.55
Overfilling prevention, 6.26.5.2(F), 11.4.1.15
Requirements, 6.26.5.1(D)
Separation distance and, 6.26.5
LP-Gas
Anhydrous ammonia contamination and, A.4.5
Burning with oxygen, A.1.3.2(5)
Cloud ignition, 6.25.4.2
High-pressure piping for industrial applications, A.6.9.1.2
Ignition source control, 6.22
As material of trade, A.1.1
Odorization, A.4.2.1, 4.2.2, 5.2.8.5, 14.4.5
Portable cooking appliances, 6.19.8.3
Preventing ignition of, A.6.22.2.2
Refrigerant, 1.3.2(9)
Technical Committee on Liquefied Petroleum Gases, 8.3.1
Transferring directly from railcars to cargo tanks, 4.3.3
Transferring into containers, A.3.3.37
Transport of, A.1.1
Vapor pressure, 3.3.36
Venting to atmosphere, 7.3.1
Warning labels, 5.2.8.4
"LP-Gas: Emergency Planning and Response," 6.25.2.2
LP-Gas Committee, 8.4.1.1
LP-Gas committee, 6.6.6.1(H)
LP-Gas containers. *See* containers
LP-Gas detectors
Portable, 13.2.3.1, Exhibit 13.3
LP-Gas distribution facilities, Chapter 10
Attached structures, 10.3.1
Buildings constructed before 1972, 10.1.2
Common walks, 10.3.1
Construction of rooms within structures, 10.3.2
Heavy construction, 10.2.1.2, Exhibit 10.2
Lightweight construction, 10.2.1.2, Exhibit 10.1
Locations for, 10.2
LP-Gas industry, A.1.1
LP-Gas installations, Chapter 6
Container locations, 6.2
Rural and urban areas, 6.4.1
Separation distances, 6.3
LP-Gas liquid transfer. *See* liquid transfer
LP-Gas-powered vehicles, 6.4.1
Point of transfer, 6.5.4.1
LP-Gas propellants, 10.1.1
LP-Gas railroad tank cars
BLEVEs from, A.3.3.68
LP-Gas storage facilities
Accidents, 6.12
LP-Gas systems
Mounted on motor vehicles, A.6.23.1, 6.23.2, 6.23.3.3
LP-Gas transportation, Chapter 9
History of, Chapter 9
LP-Gas vapor
Accumulation of, 10.2.1.4
Activating remote shutdown with, A.6.10(3)
Burning off, 7.3.2.2(C), Exhibit 7.15
Condensation of, 6.9.1.1
Condensation temperature, 6.9.3.8
Maximum pressure, 6.9.1.1
Pits, sumps and sewers and, 6.21.3.2
Recondensation, 6.8.1.3
LP-Gas vapor piping, Exhibit 15.1
Discharge piping, 6.9.3.4
Sizing, 6.9.2.2
Working pressure design, 6.9.3.3

M

Magnetic gauges, 3.3.29.4
Maintenance. *See* operations and maintenance
Maintenance contractors, 14.3.1.3
Maintenance manuals, 14.3.2.5
Maintenance procedures, A.14.3, 14.3.1.4
Maintenance records, 14.3.2.5
Major renovation, 6.19.4.2
Mandatory references, 2.1
Mandatory requirements, 2.1
Manifold containers
First-stage regulators, 6.8.1.3
Overfilling, 6.6.3.2
Manifold cylinders
Adjacent to buildings, 6.3.6, Exhibit 6.3
Manifolded LP-Gas systems
Installed on different floors from heaters, 6.19.4.9

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 536

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Maximum pressure, 6.19.4.8
Separation of, 6.19.4.8
Manual shutoff valves, A.5.2.5.4, 11.4.1.3
Manufactured homes, A.5.20.6, 6.23.2
Point of transfer hazards, 6.5.3
Marine terminals, 1.3.1(3), 13.2.1, Chapter 13, Exhibit 1.1, Exhibit 13.1
Cargoes of particular hazard, 13.3.1
Electrical equipment, 13.2.2
Emergency procedures manuals, 13.4.3
Facilities of particular hazard, 13.3.1
Flammable liquids handling, 13.2.3, Exhibit 13.2
Flotation devices, 13.2.3.5
Immersion suits, 13.2.3.5
Intrinsically safe equipment, 13.2.3.3
Lighting, 13.2.1.9(5)
Location, 13.2.3
Medical first aid equipment, 13.2.1.13
Mooring equipment, 13.2.1.8
Pipeline protection, 13.3.1
Portable LP-Gas detectors, 13.2.3.1, Exhibit 13.3
Refrigerated facilities, 14.2.1.4
Security, 13.2.1.7
U.S. DOT regulations, 1.3.1(3)
Markings
Direct-fired vaporizers, 5.21.3.1
DOT requirements, 5.2.8(B), Exhibit 5.14
Horizontal cylinders, 5.7.3.6
Underground containers, 6.6.6.1
For variable liquid level gauges, 5.7.5.8
Water capacity, 9.3.2.1
Mass meters, 5.17.5.1
Material of trade, A.1.1
"Maximum allowable quantities," 8.3.1
Maximum allowable working pressure (MAWP), 5.21.2.1
For ASME containers, 5.2.4.2
Metallic piping, 6.9.3.3
For mobile fuel containers, A.5.2.4.4
Waterbath vaporizers, 5.21.6.1
MC-331 cargo tank vehicles, A.9.1.1(3), 9.4.4, Exhibit 9.1
Means of egress, 8.4.1.1
Mechanical fittings, A.5.9.5(D)(1), Exhibit 5.48
Mechanical ventilation systems
As building openings, 6.3.7
Inlet blockage, 10.2.2
Reliability of, 10.2.2
Medical first aid equipment
Marine terminals, 13.2.1.13
Mega-pascals, 3.3.61
Melting points
For metals and alloys, 6.7.2.15, Commentary Table 6.4
Mercantile occupancies
Cylinder storage, 8.3
Merriam-Webster's Collegiate Dictionary, 3.1
Metal alloys
Brazing, 5.9.4.1
Melting points for, Commentary Table 6.4
Metallic connectors, 3.3.25, 6.8.1.3, 6.9.6.2, 6.17.2.2
Metallic fittings, 6.9.3.7
Metallic piping
Burial depth, 6.9.3.12
Expansion loops for, 6.9.3.7
Lightning protection, A.6.22.1.2
Maximum allowable working pressure (MAWP), 6.9.3.3
Protection of, 6.9.3.12
Rules of, A.6.9.3.1
Metallic tubing, 6.9.3.12
Meters
Calibration, 6.17.5.3
Differential back pressure valves, 6.24.3.5, Exhibit 6.51
Excess-flow valves, 6.24.3.5
Field calibration, 5.17.5.1
Half-cell, 6.16.2
In-line hygrometers, 7.4.1, Exhibit 7.16
Liquid, 5.17.5.1
Mass, 5.17.5.1
Positive displacement, 5.17.5.1
Positive displacement liquid, 5.17.5.1, Exhibit 5.58
Turbine, 5.17.5.1
Type approval, 5.17.5.1
Ultrasonic, 5.17.5.1
Vapor, 5.17.5.1
Vehicle-mounted systems, 5.17.5.1
Metric units of measurement, 3.3.61
Mexico
Container installations, 6.4.1
Propane pump discharge pressures, 5.17.2
Michigan Dept. of Labor & Economic Growth, 6.23.3.5
Milford, CT, cylinder valve fire, 7.2.2.5
Minor renovations, 6.19.4.2, 6.19.5.2
Mobile containers
Defined, 3.3.41, 6.23.3.1(F)
Design pressure, 6.23.3.1(F)
Maximum allowable working pressure (MAWP) for, A.5.2.4.4
Mobile homes. *See* manufactured homes
Mobile railcar unloading systems, 6.18.2.3(C), Exhibit 6.39
Modified hydrostatic test method, 5.2.2.2
Monitor nozzles, 6.25.5.3
Mooring equipment, 13.2.1.8
Motor carrier safety regulations, 9.4
Motor vessels, A.1.3.2(8)
Mounded containers
Bottom connections, A.6.6.6.3(1)
Corrosion protection, 6.6.6.1, 6.6.6.3, A.6.6.6.3(4), 6.16.2
Defined, 3.3.42
Installation of, 6.6.6.3
Nameplates for, A.5.2.8.3
Partially buried, 6.6.6.2, A.6.6.6.3(1)
Separation distances, 6.3.4, 6.3.4.1, 6.4.4.5, 6.26.2.3
Special protection, 6.6.6.3, A.6.6.6.3(1), Exhibit 6.20
Mounding materials, A.6.6.6.3(1)
Movable fuel storage tenders, 9.5.2.6
Multifamily buildings
Cylinders in, 6.19.11.2, Exhibit 6.42
Multi-fuel appliances, 5.20.2
Multipurpose passenger vehicles, 3.3.46

N

Nameplates, A.5.2.8.3, Exhibit 5.15
ASME engine fuel containers, 11.3.4(B)
For buried or mounded tanks, A.5.2.8.3
Containers, A.5.2.8.3, Exhibit 5.15
Corrosion and, A.5.2.8.3
Missing, A.5.2.8.3
Refrigerated containers, 12.2.2
National Board Inspection Code (NBIC), 5.2.1.6
National Board of Boiler and Pressure Vessel Inspectors, 6.6.1.3
National Board of Fire Underwriters, Chapter 9
National Board "R" Stamp, 5.2.1.6, Exhibit 5.8
National Bottled Gas Association, 3.3.48
National Conference on Weights and Measures (NCWM), 5.17.5.1
National Fire Protection Association
Official Definitions, Chapter 3
Standards Council, 7.2.2.2, 8.4.1.1
National Fire Protection Association (NFPA)
Fire Analysis Department, 6.25.3.2
As standards-developing organization, 3.3.3
National Geographic, A.4.2.3
National Institute of Standards (NIST)
Handbook 44, 5.17.5.1
National LP-Gas Association, 3.3.48
National Pipe Thread (MNPT), 5.13.1
National Propane Gas Association (NPGA), 3.3.12, 6.25
Defined, 3.3.48
Membership, 3.3.48
Technology and Standards Committee, 3.3.48, A.3.3.68
National Type Evaluation Program (NTEP), 5.17.5.1
NBFU 59, *Regulations for the Design, Construction, and Operation of Automobile Tank Trucks and Tank Trailers for the Transportation of Liquefied Petroleum Gases*, Chapter 9
NEMA 7 liquid-level switches, 5.17.3.3

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 537

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NFPA 10, *Standard for Portable Fire Extinguishers*, 2.1, 6.25.4.2, 8.5.2, 14.3.3.4
NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 6.25.5.2
NFPA 30, *Flammable and Combustible Liquids Code*, A.6.4.5.3, 6.4.5.7, 6.26.5, 12.5.4, Chapter 13
NFPA 30-2003, *Flammable and Combustible Liquids Code*, A.6.22.2.2
NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, 1.3.2(11), 3.3.20, 6.5.3, 6.24, 6.24.4.1
NFPA 30B, *Code for the Manufacture and Storage of Aerosol Products*, 1.3.2(4), 10.1.1
NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*, 6.6.7
NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*, 6.19.7.2
NFPA 50, *Standard for Bulk Oxygen Systems at Consumer Sites*, A.6.4.5.8
NFPA 50A, *Standard for Gaseous Hydrogen Systems at Consumer Sites*, A.6.4.5.8
NFPA 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*, A.1.3.2(5)
NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 6.22.3.4, 7.2.3.2(C)
NFPA 52, *Liquefied Petroleum Gas Piping and Appliance Installations in Buildings*, A.1.3.2(6)
NFPA 54, *National Fuel Gas Code*, A.1.3.2(6), 5.7.8.3, 5.8.1.2(3), 5.9.1.2, 6.8.1.10, A.6.9.1.1(4), 6.9.2.2, 6.14.1, 6.14.2, 6.19.8.1, 6.23.7.5, Chapter 15, Exhibit 1.2
NFPA 55, *Standard for Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks*, A.6.4.5.8, 6.4.5.9
NFPA 58, *Liquefied Petroleum Gas Code*, A.1.3.2(6), Chapter 1
  Application, 1.3, 1.3.1(2)
  Enforcement, 1.7, Chapter 1
  Equivalency, 1.5
  Retroactivity, 1.4
  Scope, A.1.1, Exhibit 1.2
  U.S. Dot regulations and, A.1.1, 1.3.1(2)
NFPA 58-2004, *Liquefied Petroleum Gas Code*, A.6.22.2.2
NFPA 59, *Utility LP-Gas Plant Code*, 1.3.2(3), 5.21.6, Chapter 12, Chapter 13
NFPA 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)*, Chapter 13
NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 10.1.1, 10.2.1.2, Chapter 10
NFPA 70, *National Electrical Code*, 6.9.3.15, 6.21.6.1, 6.22, A.6.22.2.2, 13.2.3.3
NFPA 77, *Recommended Practice on Static Electricity*, A.6.22.1.3, 7.3.2.2(C)
NFPA 85, *Boiler and Combustion Systems Hazards Code*, 6.21.2.6
NFPA *101*, *Life Safety Code*, 3.3.33, 6.19.7.2, 8.2.1.3, 8.3, 8.4.1.1
NFPA 160, *Standard for the Use of Flame Effects Before an Audience*, 6.19.10.5
NFPA 220, *Standard on Types of Building Construction*, 6.6.7
NFPA 290, *Standard for Fire Testing of Passive Protection Materials for Use on LP-Gas Containers*, 6.25.5.1
NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*, A.1.3.2(8), 11.1
NFPA 407, *Standard for Aircraft Fuel Servicing*, 6.6.7
NFPA 501, *Standard on Manufactured Housing*, A.5.20.6
NFPA 501B, *Standard for Mobile Homes*, 6.23.2
NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*, 11.12
NFPA 780, *Standard for the Installation of Lightning Protection Systems*, A.6.22.1.2, A.6.22.1.3
NFPA 1192, *Standard on Recreational Vehicles*, 1.3.2(10), A.5.2.4.4, A.5.20.6, 6.23.2, 6.23.9.2, 11.7.1.3
***NFPA 5000, Building Construction and Safety Code*,** 3.3.33, 8.3.1, Chapter 10
Noncombustible foundations
  Installation of ASME containers on, 6.6.3.1, Exhibit 6.12
Noncomplying containers
  Notification of owners, 7.2.2.1
Nondestructive test methods
  ASME containers, 5.2.1.2(B)
Nonferrous materials, 12.1.1.4
Nonrefillable cylinders
  Filling, 7.2.2.8
  Storage in restaurants, 8.3
  Valve outlet seals and, 7.2.2.6
Nonventing liquid level devices, 6.26.5.2(F)
Normal fluids, A.6.9.3.1
NOT ODORIZED marking, 5.2.8.5, Exhibit 5.18
Nylon piping. *See* polyamide (PA) piping

O

Occupiable structures, 6.8.1.6
Odorator, A.4.2.3
Odor fade, A.4.2.3
Odorization, A.4.2.1, 4.2.2, 14.4.5
  NOT ODORIZED marking, 5.2.8.5, Exhibit 5.18
  Restrictions on use of, 5.2.8.5
  Unodorized propane, 5.2.8.5
Office of Pipeline Safety (OPS), A.14.4, A.14.4.3.1
One-call notification system, 14.4.2.2
One-pound cylinders, A.6.19.9.3
One-stage pressure regulation systems, 5.8.1.1
Open-bodied vehicles
  Cylinder transport, 9.3.2.5
Open delivery trucks
  Portable container transport, 9.3.2.1, Exhibit 9.4
Operating procedures, 14.2.1
  Content, 14.2.2.2
  Location, 14.2.1.5
Operations and maintenance, Chapter 14
  Consumer education, 14.4.13.1
  Dew point, 14.4.11.3
  Gas leak reports, 14.4.9.1
  Key valves, A.14.4.7
  Leak surveys, 14.4.12.4
  Leak testing, 14.4.8.2
  LP-Gas liquid transfer, 14.2.1.1
  Maintenance contractors, 14.3.1.3
  Maintenance manuals, 14.3.2.5
  Maintenance procedures, A.14.3, 14.3.1.4
  Maintenance records, 14.3.2.5
  Manuals, A.14.1.2
  Odorization, 14.4.5
  Operating procedures, 14.2.1, 14.2.1.5, 14.2.2.2
  Operator qualification, 14.4.10.1
  Refrigerated LP-Gas storage systems, 14.2.1.4
  Retroactivity, A.14.1
  Vaporizers, 14.2.1.3
Operations & Maintenance Handbook
  CD-ROM, Chapter 14
Operator qualification, 14.4.10.1
Outage gauges, 3.3.29.2
Outdoor appliances
  Overfilling prevention devices for, 5.7.3

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 538

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Outside cylinder storage
Cabinets, 8.4.1.1, Exhibit 8.2
Distance to doorways or openings, 8.4.1.1
Separation distances to building openings, 8.4.1.1
Separation distance to construction work, 8.4.1.3
Separation distance to dispensing stations, 8.4.1.3, 8.4.1.4
Outside surface
Direct-fired vaporizers, 5.21.3.1
Overfilling
ASME containers, 6.6.3.2, 6.6.3.3, 6.6.7.2
ASME engine fuel containers, 11.4.1.13
Cylinders, 5.7.3
Interconnected horizontal ASME containers, 6.6.3.2
Low emission transfer, 6.26.5.2(F), 11.4.1.15
Manifold containers, 6.6.3.2
Portable cylinders, A.7.4.4
Purging and, 7.3.2.2(C)
Refrigerated containers, 12.4
When permitted, 7.4.1
Overfilling prevention devices (OPD), 5.7.3, 6.26.5.2(F), Exhibit 3.8, Exhibit 5.29
ASME engine fuel containers, 11.4.1.13, 11.4.1.15
Checking, before filling cylinders, 7.2.2.7
Cylinders, 5.7.3, 7.2.2.7
Cylinder size and, 5.7.4.1(G)
Cylinder valve restrictions, 5.7.3.4
Defined, 3.3.49
Forklift trucks, 5.7.4.1(E)
Gas grill cylinders, 5.7.3
Horizontal cylinders and, 5.7.3.5(2), 5.7.3.6
Industrial truck service cylinders and, 5.7.3.5(1), 5.7.4.1(E)
Outdoor appliances, 5.7.3
Portable propane cylinders, 5.7.3.1
Propane cylinders, 5.7.3, 5.7.3.1
Purging and, 7.3.2.2(C)
Retrofit provisions, 5.7.3.2
UL listing, 5.7.3.1
Welding cutting gas service and, 5.7.3.5(1)
Overpressure, 5.8.1.2
Overpressure protection
Methods, 5.8.1.2
2 psi regulator systems, 5.8.1.11
Two-stage pressure regulation systems, 6.8.1.8, 6.8.2 (G)
Overpressure shutoff devices, 3.3.50, 5.8.1.2
Owners
Notifying of noncomplying containers, 7.2.2.1
Oxygen containers, A.6.4.5.8
Oxygen-fueled gas systems, A.1.3.2(5)
Oxy-propane torches, A.1.3.2(5), A.6.4.5.8

P

Parking regulations, 9.7, 9.7.2.4, 9.7.3.5, Exhibit 9.15
Pascals (Pa), 3.3.61
Passenger vehicles. *See also* vehicles
Cylinder valve fire, 7.2.2.5
Engine fuel container installation in, 11.8.1.5
Grill cylinder transport in, 9.3.2.5
Maximum container capacity, 11.3.5.1, Commentary Table 11.1
Multipurpose, 3.3.46
Propane systems, 11.1, Exhibit 11.1
Passive cathodic protection systems, 6.16.2
Passive transport shutdown systems, 5.7.8.1(H), 7.2.3.9, Exhibit 7.13
Patio heaters, 6.20.2.2, 6.20.2.3
"Peak shaving" installations, A.3.3.28
Performance requirements
Vehicle impact protection, 6.6.1.2
"Permanently" installed cylinders, A.5.2.1.1
Permitted, 3.3.52
Personnel qualifications, A.4.4, Commentary Table 4.1
Field welding, 6.6.1.3
Training, A.4.4
Welding, 6.9.3.2
Petrochemical plants
Application of NFPA 58 to, 1.3.1(3)
Exclusion of, 1.3.2(2)
Phase separators, 6.21.2.10
"Piggyback" regulators, 5.8.1.3. *See also* integral two-stage regulators
Pigtail, 6.6.2.2, 6.8.1.3
Pilot-operated pressure relief valves, 5.7.2.4(A), 5.7.2.4(B), Exhibit 5.24
Closed position, 5.7.2.4(B), Exhibit 5.25
Open position, 5.7.2.4(B), Exhibit 5.26
Pilot plant, 1.3.2(4)
Pinhole corrosion, 6.6.6.1(H)
Pipeline and Hazardous Materials Safety Administration (PHMSA), A.14.4, 14.4.2.2
Pipeline systems
One-call notification systems, 14.4.2.2
Regulation of, A.1.3.1(4)
Pipeline terminals
Filling cargo tank vehicles at, 7.1.2, Exhibit 7.1
Piping. *See also* discharge piping; liquid LP-Gas piping; LP-Gas vapor piping; metallic piping; polyamide (PA) piping; polyethylene (PE) piping; PVC piping; underground piping
Aboveground, 6.9.3.10
Agricultural applications, 5.9.1.2
Brazing, 5.9.4.1
Connecting, 6.6.2.2
Between container and second-stage regulator, 5.9.1.2
Corrosion protection, 6.9.3.14
Defined, 5.9
Electrical wiring in same trench with, 6.9.4.6(B)
Fittings for metallic piping and tubing, see5.9.4
Flashover of lightning currents on, A.6.22.1.3
Leakage, 6.9.1
Leak testing, 6.14.1
Lightning protection, A.6.22.1.2
Liquid LP-Gas, 5.9.1.4
Material limitations, 6.9.1.1
Operating pressure requirements, 9.4.3.3
Plastic, 5.9.3.2
Pressure limitations, 5.9.4
Pressure testing, 6.14.2
Prohibited as grounding electrode, 6.9.3.15
Redundant fail-safe product control measures (RFPCM), 6.26.4.3(C)
Refrigerated storage systems, 12.1.1.5
Safety requirements, 9.4.3.2
Service limitations, 6.9.1
Sizing methods, Chapter 15
Sizing tables, Chapter 15, Commentary Table 15.2, Commentary Table 15.3, Commentary Table 15.4
Snowfall and, 6.15
Vehicular damage protection, 6.9.3.10
Vehicular liquid LP-Gas installments, 6.23.5.1
Placards, 9.3.2.10, Exhibit 9.5
Plant transport unloading areas
Safety devices, 6.12
Plastic pipe and tubing, 5.9.3.2
Pneumatic valves, 5.12.4
Emergency shutoff, 6.12, 6.12.5, Exhibit 6.29, Exhibit 6.31
Internal pressure relief, Exhibit 5.32
Points of transfer, Exhbit 3.9
In buildings, 6.5.4.1, 6.5.4.3
Defined, 3.3.54
Distance requirements, 6.5.3, Exhibit 6.10
Fire resistance rating and, 6.5.4.3
Hazards, 6.5.3
Internal combustion engines, 7.2.3.2(A)
LP-Gas-powered vehicles, 6.5.4.1
Portable containers, 6.5, Commentary Table 6.2
Separation distances, 6.5.4.2
Stationary containers, 6.5, Commentary Table 6.2
Vehicle fuel dispensers, 6.24

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 539

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POL connectors, 6.6.2.2
POL valves, 6.19.3.6(C)
Polyamide (PA) piping, 3.3.2, 5.9.3.2, A.5.9.5.5
Burial depth, 6.9.4.2
Expansion and contraction of, A.6.9.4.5
Installation, 6.9.4
Mechanical fittings for, A.5.9.5(D)(3)
Protecting with steel pipe, 6.9.4.9
Repairing, 6.9.4.13
Restrictions on use of, A.5.9.5(D)(3), 6.9.1.1, 6.9.4.1
Risers and, A.5.9.5(E)
Tracer wire or pipe for locating, 6.9.4.6(B)
Valve boxes for, 6.9.5.1
Vault installation, 6.9.4.7
Polyethylene (PE) piping, 3.3.2, 5.9.3.2
Burial depth, 6.9.4.2
Expansion and contraction of, A.6.9.4.5
Installation, 6.9.4
Mechanical fittings for, A.5.9.5(D)(3)
Prohibited from indoor use, 6.9.4.1
Protecting with steel pipe, 6.9.4.9
Repairing, 6.9.4.13
Restrictions on use of, A.5.9.5(D)(3), 6.9.1.1
Risers and, A.5.9.5(E)
Tracer wire or pipe for locating, 6.9.4.6(B)
Valve boxes for, 6.9.5.1
Vault installation, 6.9.4.7
Portable appliances
Butane, A.6.19.9.3
Cylinders for, 8.2.1.2, Exhibit 8.1
Hose length for, 6.20.3.3
Propane, A.6.19.9.3
Two-stage regulation and, 6.8.2 (C)
Portable compressors, 5.17.3.4
Liquid transfer, 6.17.3.5, Exhibit 6.36
Vapor recovery, 6.17.3.5, Exhibit 6.36
Portable container appurtenances
Physical damage protection, 5.2.6.2(C)
Portable containers
ASME, 9.3.2.1
As cargo tanks, 9.3.3.8
Container location, A.6.5.1
DOT 51, 9.3.3, Exhibit 9.6
Farm carts, 9.3.4
Filling, 6.5
"Full framework," 5.2.7.3
Integrity of, 6.6.5.4
Maximum size, 9.3.2.1
Open delivery truck transport of, 9.3.2.1, Exhibit 9.4
Point of transfer, 6.5, 6.5.3, Commentary Table 6.2
Stationary installations, 6.6.3.7
Temporary installations, 6.6.5.4
Transportation of, 9.3.3, Chapter 9
Portable cooking appliances
Butane, 6.19.9.4, Exhibit 6.40
Designed weakness points in cylinders for, 5.7.2.3
Listed butane cylinders for, 6.19.9.4, Exhibit 6.41
LP-Gas for, 6.19.8.3
Prohibition of, A.6.19.9.3
Removal after use, 6.19.8.3
Restaurant use of, 8.3
Portable cylinders
CGA 791 and 810 connections, 7.2.2.6
DOT/TC cylinders, A.5.2.1.1
Maximum size, 9.3.2.1
Overfilling, A.7.4.4
Propane capacity, 5.2.8.4
Tampering protection, 8.2.1.1
Warning labels, 5.2.8.4
Portable heaters
Electronic ignition, 6.19.2.8
Flame failure protection, 6.19.2.8
Pilot lights, 6.19.2.8
Safety of, 5.20.4
Structural support restrictions, 6.19.2.8
Portable internal combustion engines, 5.17.6, Exhibit 5.59
Portable LP-Gas detectors, 13.2.3.1, Exhibit 13.3
Portable tanks
Defined, 3.3.57
DOT design specifications, 6.6.3.8
Positive closure, 5.7.4.5(1)
Positive displacement liquid meters, 5.17.5.1, Exhibit 5.58
Positive displacement meters, 5.17.5.1
Positive displacement pumps, 5.17.2, Exhibit 5.52
Bypass for, 6.17.2.3(D), Exhibit 6.34
Positive shutoff valves, 5.7.4.1(C), 5.7.4.2(F)(2), 5.7.4.2(H)(4), 5.7.4.5(6)
Pump bypass return, 9.4.4.3
Positive suction head, 6.17.2.3(D)
Pounds per square inch (psi), 3.3.61
Powder coatings
For corrosion protection, A.11.3.7
Power takeoff, 9.4.4.4
Pressure differential gravity liquid transfer method, 7.2.3, Exhibit 7.4
Pressure gauges, 5.7.6.2
Installing, A.5.2.5.5
Pressure measurements, 3.3.61
Pressure regulation systems
One-stage, 5.8.1.1
Operation of, 5.8.1, Exhibit 5.45, Exhibit 5.46
Overpressure protection, 6.8.1.8
Three-stage, 5.8.1.11
Two-stage, 5.8.1, 5.8.1.2, 6.8.1.8, 6.8.2 (B), 6.8.2 (C), 6.8.2 (G), 6.23.4.2(E), Exhibit 5.47
Pressure regulators. *See* regulators
Pressure relief devices, 3.3.58
Burning gas discharged from, 6.7.2.2
Butane cylinders, 5.7.2.3
Corrosion protection paint color and, A.6.6.1.4
Cylinder orientation and, 6.19.2.1
Defined, 3.3.58
Fire protection requirements, 6.8.1.7
Installation of, 6.7.2.1
Maintenance on, 6.7.2.10
Propane cylinders, 5.7.2.3
Protection of, 6.7.2.5
For water vapor relief, 5.7.2
Pressure relief discharge
Direction of, 6.19.2.1, 11.7.4.3
Engine fuel systems, 11.7.4.3
Truck locations, 11.7.4.3, Exhibit 11.7, Exhibit 11.8
Pressure relief stacks, 6.7.2.7, 6.7.2.12
Pressure relief valve manifolds, 6.7.2.10
For ASME containers, 5.7.2.5, Exhibit 5.27
Pressure relief valves, A.5.2.1.1, 6.7. *See also* internal pressure relief valves
ASME containers, 5.7.2.1, 5.7.2.6, 6.3.9, 6.3.11, 6.7.2.3
ASME engine fuel containers, 11.4.1.7(B)
Blockage, 12.8.1.10
Container position and, 6.6.1.1
Cylinders, 6.3.9
Cylinders in industrial truck service, 5.7.2.13
Direct-fired vaporizers, 5.21.3.3
Direct spring-loaded, 5.7.2.4(A), 5.7.2.4(B)
Discharge from, 6.8.1.8
Discharging liquid, 5.2.5.6(C)
Discharging vapor, 5.2.5.6(C)
Discharging vertically upward, 6.21.2.3
Dispersion of flammable gases from, 6.3.10, Exhibit 6.6
Distance to building opening, 6.3.9
DOT cylinders, 5.7.2.2
DOT nonrefillable metal containers, 5.7.2.3
DOT/TC cylinders, Exhibit 5.19
Engine fuel containers, 11.3.1
Excess-flow, 5.7.4.1(C)
External type, for large ASME containers, 5.7.2.4(A), Exhibit 5.21
External type, for small ASME containers, 5.7.2.4(A), Exhibit 5.22
Fire exposure and, 5.2.5.6(C), 12.8.4.1
5 to 1 safety factor, A.5.2.1.1
Flow capacity of, 5.7.2.7
Flush-type internal, for cargo containers, 5.7.2.4(A), Exhibit 5.23
4 to 1 safety factor, A.5.2.1.1
High temperature and, 6.19.3.4

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 540

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Industrial truck cylinders, 11.12.2.5
Inspection, 5.7.2.13
Installation, 6.23.4.1
Internal, 5.7.4.1(A)
Location, 5.2.5.6(C), 6.23.4.1
Pilot-operated, 5.7.2.4(A), 5.7.2.4(B)
Positioning, 8.2.1.2
Positive shutoff, 5.7.4.1(C)
Pressure settings, 5.7.2.6
Propane cylinders, 5.7.2.2
Rain caps and, 6.7.2.5
Rating calculations, 5.7.2.5
Refrigerated containers, 12.4.2.1, 12.8, 12.8.1.1, 12.8.1.4, 12.8.1.10, 12.8.1.11, 12.8.2, 12.8.4.1, 12.8.4.4
Release of gases through, 6.3.11
Replacement of, 5.7.2.13
Required distance to, 6.3.9
Separation from containers, 6.7.2.7
Sizing, 12.8.1.1, 12.8.1.3, 12.8.2
Start-to-discharge settings for, 6.3.9
Tamperproof nonadjustable internal springs, 5.7.2.10
Testing, 12.8.1.4, 12.8.1.11
Underground containers, 5.7.4.1(A), 6.4.5.1, 6.7.2.11
Vacuum condition protection, 12.8.1.2
Vaporizer, 5.21.9, 6.21.2.2
Venting upwards, 6.7.2.3

Pressure testing
Hose, 5.9.6.4(C)
Piping, 6.14.2

Pressure vessels, A.4.2.3
Authority having jurisdiction and, A.5.2.1.1
Construction requirements, A.5.2.1.1
Design margin, A.5.2.1.1
Design pressure, 7.2.2.9
Welding operations on, 6.6.1.3

Pressurized LP-Gas containers, A.5.2.1.1

Primary storage, A.1.1

Propane
Boiling point, 12.4.2.1, Chapter 12
Condensation temperature of, 6.9.1.1
Engine fuel systems, 6.24, A.9.1.2(4), 11.1, Chapter 11
Flash point and, A.6.4.5.3
Ignition temperature, 7.2.3.2(D)
Not odorized, 5.2.8.5
Pressurized liquid, 6.4.5.12
Refrigerated containers for, Chapter 12
Vaporization of, paint color and, A.6.6.1.4
Vapor pressure of, 6.9.1.1, Commentary Table 6.5
Warning labels, 5.2.8.4

Propane-air mixtures
Gas-air mixers, 6.21.8
Vehicle fuel dispensers, 6.24.3.3

Propane capacity
ASME containers, 3.3.79
Containers, 3.3.79
Cylinders, 3.3.79
Portable cylinders, 5.2.8.4
Warning labels and, 5.2.8.4

Propane containers
Diking, 6.4.5.12
Enclosures for, A.6.4.7
Installation of, A.1.3.2(6)
Location of, 6.2.2
In Mexico, 6.4.1
Proximity to buildings, 6.3.1
Proximity to property lines, 6.3.1
Regulators for, 5.8.1
Separation distances, 6.3.1
Underground, digging around, A.6.6.6.1(E)
Underground service, 5.7.2.7

Propane cylinders
Hot air ballooning, 1.3.2(7)
Indoor storage of, 6.2.2
Maximum size for educational occupancies, 6.19.7.2
Overfilling prevention devices for, 5.7.3, 5.7.3.1
Pressure relief valves, 5.7.2.2, 5.7.2.3
Service pressure, 5.7.2.2
Shopping malls, A.1.3.2(5)
Sprinkler density and, 8.3.1(B)
Storage in non-publicly accessible buildings, 8.3.3.3
Test pressure, 5.7.2.2

Propane dispensers, 1.3.2(11)

Propane Education and Research Council (PERC), 6.25, 6.25.2.2, Chapter 14

"Propane Emergencies, Facilitator's Guide," 6.25.2.2

Propane equipment, 5.17

Propane facilities
Fueling stations, 6.24
Latent heat of vaporization, 5.21
Security requirements, 6.18.4.1

Propane-fueled portable cooking appliances, A.6.19.9.3

Propane-fueled vehicle fueling stations, 6.24, Exhibit 6.50
Low emission nozzles, Exhibit 6.55

Propane-fueled vehicles
General-purpose, 11.1
Industrial trucks, 11.1
Types of, 11.1

Propane-fueled vessels, 11.1

Propane industry regulation, A.3.2.2

Propane-powered floor buffing machines, 11.13.1, 11.13.2.3(B), Exhibit 11.14

Propane pumps
Discharge pressure of, 5.17.2
Operation of, 6.17.2.3(D)
Selection of, 6.17.2.3(D)

Propane tanks
Rooftop, 6.6.7.1, Exhibit 6.21

Propane vapor
Open drains, sewers or sump pits and, 6.21.2.2

Protective housing
For regulator vents, 6.8.1.5

Public access
Refilling points at LP-Gas storage areas, 7.2.3.1

Pull away protection, A.6.12.8, Exhibit 6.33
Cargo tank vehicles, 7.2.3.9
Fuel dispensers, 6.24.4.2

Pull away valves, A.6.12.8, Exhibit 6.32

Pump bypass return
Positive shutoff valves, 9.4.4.3

Pump discharge pressures, 6.17.2.3(D)

Pump liquid transfer method, 7.2.3, Exhibit 7.5

Pump pressure-operated internal valves, Exhibit 5.33

Pumps
Bypass piping, 6.17.2.3(D)
Cargo tank vehicles, 9.4.4.4
Centrifugal, 5.17.2
Discharge pressure of, 5.17.2
Gear, Exhibit 5.54
Lock-out procedures, 6.17.2.3(D)
Operation of, 6.17.2.3(D)
Positive displacement, 5.17.2, Exhibit 5.52
Requirements for, 5.17.2
Selection of, 6.17.2.3(D)
Sliding vane, Exhibit 5.53
Strainers, 6.17.4
Suction inlet pressure, 6.17.2.3(D)
Temperature-operated automatic shutoff, 12.5.9.3
Temperature-sensitive valves, 12.5.9.3
Typical installation, 6.17.2.3(D), Exhibit 6.35
Vibration stresses, 6.17.2.2

Purging, 7.3.2.2(C)

PVC piping, 6.7.2.7
Discharge piping and, 6.7.2.15
For venting regulators, 5.8.3.1

Q

Quick-closing coupling (QCC), 6.19.12.2(J)

Quick connectors, 3.3.62

R

Radiant-type heaters, 6.19.4.6

Railroad sidings, 6.18.2.3(C)

Railroad tank cars
Compressors and, 5.17.3.1
Dome, Exhibit 7.11
Insulation of, 6.25.5.1
Liquid transfer to cargo tank trucks, 6.18.2.3(C)

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 541

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Pull away protection, A.6.12.8, Exhibit 6.33
Transferring LP-Gas directly to cargo tanks from, 4.3.3
Transfer station accidents, 7.2.3.6
Unloading facilities, 7.2.3.6, 7.2.3.7, 7.2.3.8, Exhibit 7.10, Exhibit 7.12
Unloading with compressors, 7.2.3
Warning sign, 7.2.3.6, Exhibit 7.8
Rain caps, 6.7.2.5
"Readily accessible," 11.7.4.3
"Readily available," 13.4.3
Recommendations, 2.1
Recreational vehicles (RVs), 1.3.2(10)
Cylinder storage for, 8.3.5
Ignition sources, 7.2.3.2(E)
With LP-Gas systems, 6.23.2
Point of transfer hazards, 6.5.3
Propane tanks, 3.3.41, Exhibit 3.7
Universal cylinders, 5.7.5.6(B)(2)
Red litmus paper test, A.4.5
Redundant fail-safe product control measures (RFPCM), 6.26, 6.26.4.3(C)
Redundant pressure seals, 7.2.2.5
Referenced publications, Chapter 2
Refineries
Application of NFPA 58 to, 1.3.1(3)
Exclusion of, 1.3.2(2)
Refresher training, A.4.4
Refrigerated containers, Chapter 12
Absolute vapor pressure, 12.1.2.1
Air prohibited in, 12.4.2.2
API 620 code, 12.1.1.1
ASME code, 12.1.1.1
Back pressure relief valves, 12.8.1.2
Design and construction, 12.1
Design pressure, 12.7
Design temperature and pressure, 12.1.2.1
Diking, 12.5, 12.5.4, 12.5.5, 12.5.8.1, 12.5.9.3
Downcomers, 12.5.3
Enclosed drainage channels prohibited, 12.5.3
Foundations, A.12.3.4.2, 12.3.4.6
Frozen ground containers, 1.3.2(1)
High-high-liquid level flow cutoff devices, 12.4.1.7
High-liquid level alarms, 12.4.1.3, 12.4.1.6
Impoundments, 12.5.4
Joint efficiency, 12.1.1.1
Marking requirements, 12.2.2
Nameplates, 12.2.2
Overfilling, 12.4
Pressure relief valve blockage, 12.8.1.10
Pressure relief valves, 12.4.2.1, 12.8
Pressure relief valve sizing, 12.8.1.1, 12.8.1.3, 12.8.1.11, 12.8.4.1, 12.8.4.4
Pressure relief valve testing, 12.8.1.4, 12.8.1.11
Separation from vegetation, 12.7.7
Siting, 12.7
Soil heave and, 12.3.4.6
Spills in diked areas, 12.5.5
Temperature allowances, 12.1.2.2
Temperature sensors, 12.4.1.8
Third-party inspectors, 12.6.2
Types, Chapter 12
Undertank insulation, 12.3.4.7
Uses, Chapter 12
Vacuum relief devices, 12.8.1.2, 12.8.3.1
Welded, 12.1.1.1, 12.1.1.3
Wind loading, 12.3.1.2
Refrigerated LP-Gas, 1.3.2(9), 3.3.63
Refrigerated LP-Gas storage systems, Chapter 12
Design and construction, 12.1.1.1
Monitoring, 14.2.1.4
Piping requirements, 12.3.3.1
Piping system failure, 12.1.1.5
Seismic analysis, 12.3.2.2
Size of, Chapter 12
Refrigeration cycle equipment, 1.3.2(9)
Regulators, 6.7. *See also* first-stage pressure regulators; second-stage pressure regulators; 2 psi regulator systems
Automatic changeover, 6.8.1.4, Exhbit 3.12, Exhibit 6.24
Excess-flow valves and, 5.7.4.1(F)
Failure, 5.8.1.2
Functions, 5.8.1, 6.8.1.4
High-capacity, 5.8.1.2(3), 5.8.1.8
High-pressure, 6.8.2 (D), 6.8.2 (E)
Line pressure, 6.8.1.10
Outdoor installation, 5.8.1.2
Propane safety and, 5.8.1
Single-stage, 6.8.1.9, 6.8.2 (B)
Types, 3.3.64, Commentary Table 3.1, Exhibit 3.11, Exhibit 3.12, Exhibit 3.13
Weather protection, 6.8.1.5
Regulator venting pipe, 5.8.3.1
Regulator vents
Discharging, 6.6.6.1(G)
Protective housing for, 6.8.1.5
Remote bulkheads, 6.5.3, Exhibit 6.10
Remote control
Bulk plants shutdown, A.6.10(3)
Emergency shutoff valves (ESVs), 6.12, 6.12.9
Filling engine fuel containers, Exhibit 11.3, Exhibit 11.12
Internal valve shutoff, 6.4.3, 6.11.5
Liquid transfer shutoff, 6.18.2.4(C)
LP-Gas vapor shutdown, A.6.10(3)
Shutoff valves with thermal actuation, 6.24.3.8, 6.24.3.10
Renovation sites equivalency requirements, 6.19.4.10
"Repair" templates, 5.2.1.6, Exhibit 5.8
Requalification
Containers, 5.2.2.2
Cylinder markings, 5.2.2.2
Cylinders, 5.2.2.2, 11.3.1.4(D), 11.3.1.5
DOT cylinders, 5.2.2.2, 11.3.1.4(D), 11.3.1.5
Requalifier identification number (RIN), 5.2.2.2, 5.2.3.3
Residential buildings
Cylinder storage within, 8.3, 8.3.5
Residential customers
Containers owned by, A.5.2.1.1
Restaurants
Cylinder storage within, 8.3, 8.3.2.3
Cylinder use in, 6.19.9.1, 6.19.9.4
Patio heaters, 6.20.2.2
Retail delivery cargo tank vehicles. *See* bobtails
Retail marketing
Bulk plant, A.3.2.2
Residential installations, A.3.2.2
Vehicle, A.3.2.2
Retail stores
Cylinder storage, 8.4.1.2, Exhibit 8.2
Retroactivity, 1.4
Retrofitting
Internal pressure relief valves, 5.7.4.2(D)(2)
Liquid withdrawal lines, 5.7.4.2(C)
Retroactive requirements, 1.4.2
Rim relief, 6.19.9.4
RIN (requalifier identification number), 5.2.2.2, 5.2.3.3
Risers
Anodeless, 3.3.2, A.5.9.5(E), 6.9.4.3(B)
Factory-assembled, 6.9.4.4(B)
Field-assembled, A.5.9.5(E), 6.9.4.4(A), 6.9.4.4(B)
Integrity of, 6.9.4.3(C)
Rocketing, 5.7.2.3, 6.19.9.4
Roofing industry, 6.23.3.5
Rooftop containers
Allowed uses, 6.19
ASME containers, 6.5.1.3, 6.6.7, 6.6.7.2
Requirements for, 6.6.7
Rooftop cylinders
Allowed uses, 6.19, 6.19.1.2(B)
For emergency fuel supply, 6.19.1.2(C)
Permanent installations, 6.19.11
Prohibited storage, 8.2.1.5
Rooftop propane tanks, 6.6.7.1, Exhibit 6.21
Fixed fill lines for, 6.6.7.2, Exhibit 6.22
Rotary gauges, 3.3.29.4
"R" stamp certification, 6.6.1.3
Rubber gaskets, 6.9.3.5
Rural container installations, 6.4.1

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 542

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S
Sacrificial anodes, A.5.9.5(E), 6.16.2
Saddles, 6.6.3.1, Exhibit 6.13
Saddle trailers, Exhibit 9.13
Safety factors, A.5.2.1.1
SafEvac valves, A.5.2.5.4
Sandford, North Carolina, emergency shutoff valve incident, 6.12.9
SCFM, 5.7.2.8
Secondary storage, A.1.1
Second-stage pressure regulators, A.1.3.2(6), Exhibit 3.13
Discharge pressure limits, 5.8.1.2
High-pressure regulators and, 6.8.2 (D)
LP-Gas vapor condensation and, 6.9.3.8
Overpressure protection, 6.8.1.8
Piping downstream of, 5.9.1.2
Role of, 6.8.2 (B)
Security requirements
Dispensing stations, 6.24.3.7
Fencing, 6.18.4.2(C)
Fire safety analysis and, 6.25
Locking devices, 6.18.4.2(C)
Marine terminals, 13.2.1.7
Propane facilities, 6.18.4.1
Seismic considerations
ASME containers, 6.6.7.2
Self-extinguishing materials, 6.6.3.3
Self-vaporizing liquid burners, 6.21.5. *See also* vaporizing burners
Semi-refrigerated LP-Gas storage systems, Chapter 12
Semitrailer cargo tank vehicles, 9.4, Exhibit 9.9
As temporary storage, 9.5.2.1
Separation distances
Between aboveground containers, 6.3.4
Building extensions and, 6.3.11
Building openings, 8.4.1.1
Buildings, 6.3.1, 6.3.3
Buildings used for gas manufacturing, 6.3.5
Emergency shutoff valves (ESVs), 6.4.3
Exchange cylinders, 6.3.9
Flammable and combustible liquids, 6.4.5.5
Flammable and combustible liquids in underground tanks, 6.4.5.7
Important buildings, 6.3.1
Internal combustion engines, 9.4.10, Exhibit 9.11
Line of adjoining property, 6.3.1, Exhibit b.1
Low emission transfer and, 6.26.5
Mounded containers, 6.3.4, 6.4.4.5, 6.26.2.3
Oxygen and gaseous hydrogen containers, A.6.4.5.8
Point of transfer, 6.5.4.2
Rural and areas, 6.4.1
Smaller containers, 6.4.5.6
Smoking, 7.2.3.2(B)
Two-hour fire resistance ratings and, 6.4.5.9
Underground containers, 6.3.4, 6.4.4.5, 6.26.2.3
Vaporizing burners, 6.21.5
Vehicle fuel dispensers, 6.24
Service head adapters, 3.3.65
Service interruptions
Cylinder replacement following, 5.7.8.3
Shutoff valves
ASME engine fuel containers, 11.4.1.8
Carburetion equipment, 11.5
Direct-fired vaporizers, 6.21.3.5
Engine fuel systems, 11.13.2.1
Fire safety analysis and, 6.25.3.5
First-stage regulators, 6.8.1.3
Installation of, 6.7.2.10
Location, 6.20.3.6
Manually operated, A.5.2.5.4
Quick-acting, 6.24.3.13
Readily accessible, 11.7.4.3
Remotely operated, with thermal actuation, 6.24.3.8, 6.24.3.10
Sierra Nevada mountains
Snowfall model law, 6.15
Sight flow indicators, 5.17.7, Exhibit 5.60, Exhibit 5.61
Single-stage pressure regulators, 6.8.1.9, 6.8.2 (B)
Sliding vane pumps, Exhibit 5.53
Slugging, 7.2.3
Smoking
Prohibition, 9.4.10
Separation distance, 7.2.3.2(B)
Sniff testing, A.4.2.3, 14.4.5
Snowfall
Container installation protection, 6.6.3.6, Exhibit 6.14
Model law, 6.15
Piping installations and, 6.15
Snow stakes, 6.6.3.6, Exhibit 6.14
Soil heave
Refrigerated containers and, 12.3.4.6
Solder, 6.9.3.5
Solenoid-actuated valves
ASME engine fuel containers, 11.4.1.8
Sources of ignition, 3.3.67
Spark-ignition internal combustion engines, 3.3.67
Special buildings or rooms
Cylinder storage within, 8.3
Defined, 8.3.4.3
Special Permit 11209, 9.5.2.6
Special Permit 13341, 9.6.1.2, Exhibit 9.14
Special protection, Exhibit 6.52
Defined, 6.25.5
Fire safety analysis and, 6.25.3.6
Modes of, 6.25.5
Mounded containers, 6.6.6.3, A.6.6.6.3(1), Exhibit 6.20
Splash guards
Motor vehicles with LP-Gas systems, 6.23.3.4(I)
Spring-loaded pressure relief valves, 5.21.2.4
Sprinkler systems
Cylinder storage and, 8.3.1(B)
Stainless steel containers, A.11.3.7
Stainless steel reinforced tub, 3.3.25.2
Stainless steel wire braid hose, 3.3.25.2, 9.4.3.7
Stain tube test, A.4.2.3
Standard cubic foot, 5.7.2.8
Stand-by systems
Gas-air mixers, 5.21.8
State boiler agencies, A.5.2.1.1
Stationary containers
Transportation of, 9.6.1.2, Exhibit 9.13
Stationary installations
Filling, 6.5, 6.5.2
Fire safety analysis for, 4.3.1
Plans submitted to AHJ, 4.3.1
Point of transfer, 6.5, 6.5.3, Commentary Table 6.1
Portable containers in, 6.6.3.7
Steel container failure, 6.25.5.1
Steel cylinders
Corrosion protection painting, A.6.6.1.4
DOT 4BA-240, A.5.2.1.1
Steel tubing, 6.23.5.1
"Stop, Tank Car Connected" warning sign, 7.2.3.6, Exhibit 7.8
Storage. *See also* cylinder storage; outside cylinder storage; refrigerated LP-Gas storage systems
Accidents, 6.12
Cylinders, Chapter 8
Gaseous hydrogen, A.6.4.5.8, 6.4.5.9
Indoor, 6.2.2
Industrial occupancies, 3.3.33
Lightning protection, A.6.22.1.2
Primary, A.1.1
Propane cylinders, 6.2.2
Propane cylinders for hot air ballooning, 1.3.2(7)
Secondary, A.1.1
Separation distances, 6.3.1
Tertiary, A.1.1
Utility gas plants, 1.3.2(3)
Storage and transfer facilities, 1.3.1(3), Exhibit 1.1
Public access, 7.2.3.1
Strainers, 6.17.4
Strapping systems, 5.2.4.3(E)
"Study of Cleaning Methods for LP-Gas Transports, A" (Battelle Memorial Institute), A.4.4.5
Submerged-combustion vaporizers, 6.21.3

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 543

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Suction inlet pressure, 6.17.2.3(D)
Sulfur, 4.2.2
Sump pumps, 12.5.8.1
Supplement I, Guidelines for Conducting a Fire Safety Analysis, 6.25.3.2

T

Tamperproof nonadjustable internal springs, 5.7.2.10
Tank cars. *See also* railroad tank cars
Transfer from, 6.12.1, Exhibit 6.30
Unloading station safety devices, 6.12
Tank heaters, 5.21
Defined, 6.21.4
Direct gas-fired, 5.21.4.7
Spacing requirements, 6.21.4.1
Tar kettles, A.6.23.1, 6.23.3.5
Technical Committee on Liquefied Petroleum Gases, 1.3.2(1), 1.3.2(3), 2.1, 3.3.12, 3.3.48, A.3.3.68, A.5.2.1.1, 5.2.1.1(A), 5.7.2.2, 5.7.4.2, 5.7.4.2(I)(2), A.6.9.3.1, A.6.10(3), 6.21.3.6, 6.25.3.1, 8.3.1
Technical Committee on Liquefied Petroleum Gases at Utility Plants, Chapter 12
Technical Committee on LP-Gas at Utility Gas Plants, 1.3.2(3)
Technical Committee on Special Effects, 6.19.10.5
Technical Committee on Water Spray Fixed Systems, 6.25.5.2
Technical documentation, 1.5.2
Temperature
Cylinders inside buildings and, 6.19.3.4
Temperature sensors
Refrigerated containers, 12.4.1.8
Temporary heating equipment
Cylinders for, 6.19.8.1
Temporary installations, 4.3.2
Portable containers, 6.6.5.4
10-percent gauge, 3.3.29.2
Tentative Interim Agreement (TIA), 8.4.1.1
Tertiary storage, A.1.1
Test and Specification Committee, Compressed Gas Association, 3.3.12
Test flares, 6.21.8, Exhibit 6.47
Thermal actuation
Remotely operated shutoff valves, 6.24.3.8, 6.24.3.10
"Thermal inertia," 7.4.2.2
Therminol, 6.21.2.5
Thiophane (tetrahydrothiophene, THT), A.4.2.3
Three-stage pressure regulation systems, 5.8.1.11
TIA (01-1), 5.2.3
Tiling
Cylinders, 6.6.1.1
Title 24, Code of Federal Regulations
24 CFR 3280 "Mobile Home Construction and Safety Standard," 6.23.2
Title 49, Code of Federal Regulations (CFR), A.1.1, 3.3.57, 5.2.7.3
49 CFR, Parts 190-192, A.14.4
49 CFR 100-185, 9.4
49 CFR 173.301, 5.7.2.3
49 CFR 173.304, 5.7.2.3
49 CFR 173.315, 9.5.2.6
49 CFR 177.834, Subpart B, *Hazardous Materials Regulations,* 6.23.3.3
49 CFR 180, Continuing Qualification and Maintenance of Packagings, 5.2.2.2
49 CFR 192, A.1.3.1(4)
49 CFR 195, 13.3.1
49 CFR 393, "Motor Carrier Safety Regulations," 6.23.3.3
49 CFR 397.13, 9.4.10
49 CFR 712.502, 9.3.2.10
49 CFR 712.532[6], 9.3.2.10
Cylinder marking under, 5.2.8(B)
Total product control, 6.25.3.5
Tracer wires or tapes
For locating underground piping, 6.9.4.6(B)
Tractor-trailers (transports), 9.5.2.1, Exhibit 9.9
Training, A.4.4
Transfer systems
LP-Gas liquid transfer, 7.2.3
Transportation regulations, Chapter 9. *See also* Title 49, Code of Federal Regulations (CFR)
Commerce, A.1.1
U.S. Department of Transportation, A.1.1, 1.3.1
Transport Canada (TC)
Cylinder regulations, A.5.2.1.1
Transportation regulations, Chapter 9
Transport trucks, 3.3.11
Unloading stations, 7.2.3.4, Exhibit 7.7
Unloading with compressors, 7.2.3
Tubing
Fittings for metallic piping and tubing, see 5.9.4
Plastic, 5.9.3.2
Polyamide (PA, or nylon), 5.9.3.2,
Polyethylene (PE), 5.9.3.2
Sizing tables, Chapter 15
Turbine meters, 5.17.5.1
20-percent gauge, 3.3.29.2
Two-hour fire resistance ratings
Separation distance and, 6.4.5.9
2P nonrefillable metal containers, 5.7.2.3, 8.3.2.1
2 psi regulator systems, A.1.3.2(6), Exhibit 1.2
CSST systems and, A.6.8.2(H)
Overpressure protection, 5.8.1.11
2Q nonrefillable metal containers, 5.7.2.3, 8.3.2.3
Two-stage pressure regulation systems, 5.8.1, 5.8.1.3, 11.5, Exhibit 3.12, Exhibit 5.47, Exhibit 11.4
Components of, 6.8.2 (B)
Fixed piping systems, 6.8.2 (B)
Motor vehicles with LP-Gas systems, 6.23.4.2(E)
Overpressure protection, 6.8.1.8, 6.8.2 (G)
Portable appliances and, 6.8.2 (C)
Preventing overpressure with, 5.8.1.2
Type approval
Meters, 5.17.5.1

U

U. S. Environmental Protection Agency (EPA), 6.6.6.1(F)(2)
U-200 ASME specifications, A.5.2.1.1
U-201 ASME specifications, A.5.2.1.1
U-68 containers, 5.2.1.1, A.5.2.1.1, 5.2.4.2
U-69 containers, A.5.2.1.1, 5.2.1.3, 5.2.4.2
UL 132, *Standard on Safety Relief Valves for Anhydrous Ammonia and LP-Gas,* A.5.2.1.1, 5.7.2.4(A)
UL 144, *Standard for LP-Gas Regulation,* 5.8.1.2, 6.8.1.5
UL 644, *Container Assemblies for LP-Gas,* A.6.6.6.1(D)
UL 651, *Schedule 40 and 80 Rigid PVC Conduit,* 5.8.3.1, 6.7.2.7
UL 147A, *Nonrefillable (Disposable) Type Fuel Gas Cylinder Assemblies,* A.6.19.9.3, 8.3.2.3
UL 147B, *Nonrefillable (Disposable) Type Metal Container Assemblies for Butane,* 6.19.9.4, 8.3.2.3
UL-listed materials, 3.3.72
Ultrasonic meters, 5.17.5.1
Underground containers
Abandonment, A.6.6.6.1(F)(2)
Aboveground containers over, 6.4.5.1
Aboveground installations, 5.7.2.7
Access, 6.3.11
Cathodic protection systems, A.6.6.6.1(H)
Collapse, A.6.6.6.1(F)(2)
Corrosion protection, 6.6.6.1, 6.6.6.1(H), A.6.6.6.1(H), 6.6.6.2, 6.16.2
Digging around, A.6.6.6.1(E)
External pressure relief valves, 5.7.4.1(A)
Filling methods, 7.4.1
Installation, 6.6.6.1, Exhibit 6.16, Exhibit 6.17, Exhibit 6.18
Leaking, A.6.6.6.1(F)(2)
Marking, 6.6.6.1

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 544

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Nameplates, A.5.2.8.3
Partially underground, 6.6.6.2
Pressure relief valves, 6.4.5.1, 6.7.2.11
Preventing shifting of, A.6.6.6.1(J)
Propane, 5.7.2.7
Relief stack requirements, 6.7.2.12
Separation distances, 6.3.4, 6.3.4.1, 6.4.4.5, 6.26.2.3
Serving dispersing stations, 6.7.2.13
Vehicular traffic protection, A.6.6.6.1(B), A.6.6.6.1(C)
Underground gasoline tanks
Leaking, A.6.6.6.1(F)(2)
Underground heating oil tanks
Leaking, A.6.6.6.1(F)(2)
Underground piping
Burial depth, 6.9.3.12
Coating, 6.16.2
Corrosion protection, 6.9.3.14, 6.16.2
Damage prevention, 14.4.2.2
Protection, 6.9.3.12
Tracer wire or tape for, 6.9.4.6(B)
Undertank heating systems, 12.3.4.6
Undertank insulation, 12.3.4.7
Underwriters Laboratories, Inc. (UL), 3.3.72, 6.8.1.5
Universal cylinders, 3.3.74, 5.7.3.5(1), 8.4.1.4, 8.4.2.1
Filling in horizontal position, 5.7.5.6(B)(2)
Position of, 11.12.2.5
Requirements for, 11.12.2
Urban area container installations, 6.4.1
U.S. Bureau of Weights and Measures, 6.24.4.1
U.S. Coast Guard, 1.3.1(3), 13.2.3.5, 13.3.1
U.S. Department of Housing and Urban Development (HUD), A.5.20.6
U.S. Department of Transportation (DOT), 3.3.57
Cargo tank vehicle safety requirements, 7.2.3.9
Composite cylinders, 5.2.1.1
Container marking requirements, 5.2.8(B)
Cylinder requirements, A.5.2.1.1
Design specifications for portable tanks, 6.6.3.8
Final Rule HM-220D, 5.2.2.2
Jurisdiction, 1.3.2(7)
Marine terminal regulations, 1.3.1(3)
Office of Motor Carrier Safety, 9.1.2
Pressure relief valves, 5.7.2.2
Transportation regulations, A.1.1, 1.3.1(2), A.5.2.5.4, Chapter 9
U.S. Environmental Protection Agency (EPA), Chapter 14
U.S. Occupational Safety and Health Administration (OSHA), A.3.2.2, 6.17.2.3(D)
Utility companies
One-call notification systems, 14.4.2.2
Utility gas plants
LP-Gas storage, 1.3.2(3)

V

Vacuum fuel locks, 11.5, Exhibit 11.6
Vacuum relief devices
Refrigerated containers, 12.8.1.2, 12.8.3.1
Valve boxes, 6.9.5.1
Valve outlet seals
Nonrefillable (disposable) cylinders, 7.2.2.6
Redundant, 7.2.2.5
Valves. *See also* actuated liquid withdrawal excess-flow valves; backflow check valves; emergency shutoff valves (ESVs); excess-flow valves; hydrostatic pressure relief valves; internal pressure relief valves; internal valves; pressure relief valves; shutoff valves
Brass, 9.4.3.9
Internal, A.3.3.74.4, Exhibit 3.15
Performance criteria for materials, 5.12.1(C)
Redundant pressure seals for, 7.2.2.5
Safety requirements, 9.4.3.2, 9.4.3.4
Vapor discharge piping, 5.21.2.3
Vapor eliminators, 5.17.5.1
Vaporization
Latent heat of, 5.21
Process, 6.21
Volumetric method filling and, 3.3.22.1
Vaporizer pressure relief valves, 5.21.9
Vaporizers, 5.21. *See also* direct-fired vaporizers; indirect-fired vaporizers
Boilers as heat source for, 6.21.2.9, 6.21.2.10
Defined, 3.3.75
Devices preventing return of liquid LP-Gas and, 6.21
Electric, 3.3.75.2
First-stage regulators, 6.8.1.3
Indirect-fired electric waterbath, 6.21.2, Exhibit 6.45
Internal capacity, 5.21.2.5
Maintenance, 6.21
Operating procedures, 14.2.1.3
Operator training, 6.21
Pressure relief valves, 6.21.2.3
Submerged-combustion, 6.21.3
Testing, 6.21
Types, 6.21
Uses, 6.21
Waterbath, 3.3.75.4, 5.21.2, 5.21.6, 5.21.6.1, Exhibit 6.45
Vaporizing burners, 5.21.5, 6.21, Exhibit 5.64
Automatic shutdown devices, A.5.21.5.8
Defined, 6.21.5
Hydrostatic relief valves, 5.21.5.10
Installation, 6.21.5
Separation distances, 6.21.5
Temporary use, 5.21.5.10
Uses, 6.21.5
Vapor meters, 5.17.5.1
Vapor piping, 6.19.2.5
Vapor pressure, 3.3.36, 12.1.2.1
Vapor service cylinders, 6.19.2.1
Vapor withdrawal lines, 5.7.4.2(A)(2), 5.7.8.5(B)
Vapor withdrawal openings, 5.7.4.2(E)(2)
Vapor withdrawal valves, 9.6.2.2
Variable liquid level gauges, Exhibit 5.43
Float type, Exhibit 5.39
Gauge scale, 5.7.5.8
Markings, 5.7.5.8
No. 54 drill size opening, 5.7.5.10
Reliability, A.5.2.5.7
Rotary type, Exhibit 5.38
Variable liquid level gauging devices, 5.7.5.7
Vegetation
Refrigerated containers and, 12.7.7
Vehicle exhaust systems, 11.7.1.3
Vehicle fuel dispensers, 6.24
Anchorage, 6.24.3.12, 6.24.4.2
Defined, 3.3.20
Differential back pressure valves, 6.24.3.5
Hose length limits, 6.24.4.2
Installation instructions, 6.24.3.1
Propane-air mixtures, 6.24.3.3
Pull away protection, 6.24.4.2
Security, 6.24.3.7
Separation distances from points of transfer, 6.24
Separation of propane and gasoline dispensers, 6.24.4.3
Shutoff valves, 6.24.3.8, 6.24.3.10, 6.24.3.13, 6.24.3.14
Vehicle fuel types, 6.24
Vehicle non-fuel LP-Gas systems
Container installation limitations, 6.23.3.1
Container mounting arrangements, 6.23.3.4(I)
Storage quantity, 8.3.3.4
Vehicle refueling stations, 1.3.2(11), 6.4.1, 6.24
Vehicles. *See also* cargo tank vehicles; general-purpose vehicles; passenger vehicles; recreational vehicles
Alternate vehicle, 6.24
Closed-bodied, 9.3.2.5
Dispensing stations and, 7.2.3.4
Food-warming delivery, A.6.23.1
Impact protection, 6.6.1.2
Internal combustion engines, 7.2.3.2(A)
LP-Gas-powered, 6.4.1, 6.24

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 545

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Maximum container capacity, 11.3.5.1, Commentary Table 11.1
Open-bodied, 9.3.2.5
Placard display, 9.3.2.10, Exhibit 9.5
Semitrailer cargo tank, 9.4, 9.5.2.1, Exhibit 9.9
Service equipment containers, 8.3, 8.3.3.4
Vehicular damage protection, 8.2.1.1
Aboveground piping, 6.9.3.10
Cylinder storage and, A.8.4.2.2
Performance requirements, 6.6.1.2
Underground containers, A.6.6.6.1(B), A.6.6.6.1(C)
Vehicular non-fuel LP-Gas systems, 6.23.3
Appliance installation, 6.23.7.3
Container appurtenances, 6.23.3.4(I), 6.23.4.1
Container installation, 6.23.3.1, 6.23.3.1(F)
Container location, 6.23.3.3
Container mounting arrangements, 6.23.3.4(I)
Excess-flow valves, 6.23.7.3
Hose length, 6.23.5.1(E)
Parking, servicing, and repair of vehicles, 6.23.9.2
Piping, 6.23.5.1
Separation of LP-Gas systems from combustion systems, 6.23.7.5
Steel tubing, 6.23.5.1(A)
Tar kettle cylinders, 6.23.3.5
Two-stage pressure regulation, 6.23.4.2(E)
Types, A.6.23.1
Vent blockage tests, 5.8.1.2
Vent discharge elevation, 6.8.1.8, Exhibit 6.26
Vent extensions, 6.8.1.5, Exhibit 6.25
Ventilated caps, 5.2.6.1, 6.19.2.1
Ventilated collars, 5.2.6.1
Venting gas to atmosphere, 7.3.1, 7.3.2.2(C)
Venting gas within buildings, 6.5.4.2
Venturi gas-air mixers, 6.21.8, Exhibit 6.47
Venturi mixers, 5.21.8.6
Vertical ASME containers, Exhibit 5.12, Exhibit 6.15
Applications, 6.6.4.1
Attached supports, 5.2.7.1(C)
Continuous steel skins, 5.2.7.1(C)
Lifting lugs, 5.2.4.3(E)
Manifolded, 6.6.4.5
Structural base, fire protection, 6.6.4.3
Vessels
Propane-fueled, 11.1
Visual cylinder inspection, 5.2.3.3
Visual requalification method, 5.2.2.2
Volumetric method filling, 5.7.3.1, 7.4.1, 7.4.3.1
Defined, 3.3.22.1

W

Wallpaper steamers, 8.3.2.2
Warning labels
Cylinders, 5.2.8.4
Gas grill cylinders, 5.2.8.4, Exhibit 5.16
Industrial cylinders, Exhibit 5.17
Portable cylinders, 5.2.8.4
Waterbath vaporizers, 3.3.75.4, 5.21.6
Class I, Group D locations, 6.21.6.1
Immersion heaters, 5.21.6.6
Maximum allowable working pressure (MAWP), 5.21.6.1
Safety controls, 5.21.6.1
Venturi gas-air mixers, 6.21.8, Exhibit 6.47
Water capacity markings, 9.3.2.1
Water-jacket hydrostatic test method, 5.2.2.2
Water levels
Discharging regulator vents above, 6.6.6.1(G)
Water spray fixed protection, Exhibit 6.53
Automatic activation, 6.25.5.2
Criteria for, 6.25.5.2
Monitor nozzles, 6.25.5.3
Performance problems, 6.25.5.2
Weather shelters, 6.5.1.1
Weep holes, 6.7.2.5
Weight method filling, 3.3.22, 7.4.1
Welded refrigerated containers
Acceptable defects, 12.1.1.1
Construction standards, 12.1.1.3
Piping system failure, 12.1.1.5
Welder qualifications, 6.9.3.2
Welding
ASME engine fuel containers, 11.3.3.3
Cylinders used in, 5.7.3.5(1)
Field welding, 5.2.1.6, 6.6.1.3
LP-Gas transfer operations and, 7.2.3.2(C)
Pressure vessels, 6.6.1.3
Purging requirements, 6.22.3.4
Wet hose, 9.4.4.5(B)
Wheel chocks, 7.2.3.6, Exhibit 7.9
Wind loading, 12.3.1.2
Wire braid
Carbon steel, 5.9.6.2
Stainless steel, 3.3.25.2, 9.4.3.7
Withdrawal openings, 6.26.3.5
Wood cylinder foundations, 6.6.2.1
Wood enclosures, A.6.4.7

Z

Zero governors, 11.13.2.1
Zinc, 5.17.1.3(E)

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 546

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Exhibit 1003, Page 547

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Tentative Interim Amendment
NFPA 58
Liquefied Petroleum Gas Code
2008 Edition

Reference: 11.6.3
TIA 08-3
(SC 07-10-5/TIA Log #890)

Pursuant to Section 5 of the NFPA Regulations Governing Committee Projects, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 58, *Liquefied Petroleum Gas Code,* 2008 edition. The TIA was processed by the Technical Committee on Liquefied Petroleum Gases, and was issued by the Standards Council on October 4, 2007, with an effective date of October 24, 2007.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a proposal of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process.

1. Make the following changes to Section 11.6.3:

~~**11.6.3** Hose that is utilized at lower than container pressure shall be designed and marked for its maximum anticipated operating pressure.~~

11.6.3 Hose, Hose Connections, and Flexible Connectors.

11.6.3.1 Hose, hose connections, and flexible hose connectors (see 3.3.26) used for conveying LP-Gas liquid or vapor at pressures in excess of 5 psig (34.5 kPag) shall be fabricated of materials resistant to the action of LP-Gas both as liquid and vapor and the hose and flexible hose connector and shall be reinforced with stainless steel wire braid.

11.6.3.2 Hose that can be exposed to container pressure shall be designed for a pressure rating of 350 psig (2.4 MPag) with a safety factor of 5 to 1, and the reinforcement shall be of corrosion-resistant material.

11.6.3.3 Hose shall be continuously marked with LP-GAS, PROPANE, 350 PSI WORKING PRESSURE and the manufacturer's name or trademark. Each installed piece of hose shall contain at least one such marking.

11.6.3.4 After the application of couplings, hose assemblies shall be capable of withstanding a pressure of not less than 700 psig (4.8 Mpag). If a pressure test is performed, such assemblies shall be pressure tested at 120 percent of the pressure rating [350 psig (2.4 Mpag) minimum] of the hose.

11.6.3.5 Hose used for vapor service at 5 psig (34.5 kPag) or less shall be constructed of material resistant to the action of LP-Gas.

11.6.3.6 Hose in excess of 5 psig (34.5 kPag) service pressure and quick connectors shall be approved.

11.6.3.7 Hose that is utilized at lower than container pressure shall be designed and marked for its maximum anticipated operating pressure.

Issue Date: October 4, 2007

Effective Date: October 24, 2007

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Tentative Interim Amendment
NFPA 58
Liquefied Petroleum Gas Code
2008 Edition

Reference: 5.2.1.5 (New)
TIA 08-2
(SC 07-10-4/TIA Log #884)

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1. Add the following text to NFPA 58:

5.2.1.5 Except for containers used in cargo tank vehicle service, ASME containers of 3,000 gallons water capacity or less used to store anhydrous ammonia shall not be converted to LP-gas fuel service.

2. Renumber current 5.2.1.5 through 5.2.1.9 as 5.2.1.6 through 5.2.1.10.

Issue Date: October 4, 2007

Effective Date: October 24, 2007

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Exhibit 1003, Page 549

EXHIBIT 1006

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Two-Stage Low Pressure Hose & Regulator



2-Stage Low Pressure Regulator Assembly

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Used for connecting commercial grade BBQ & Catering Grills requiring gas input in excess of 100,000 BTU's per hour to a propane tank via high volume green Type 1 tank connection. The green Type 1 allows a higher volume of gas to pass through the tank connection before going into bypass mode. *Standard Hose Length is 18" OAL Learn More

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2-Stage Low Pressure Regulator Assembly with Stainless Steel Overbraid

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The light green Type 1 is used to connect an outside threaded LP cylinder to high pressure appliances such as portable BBQ grills, camping stoves, and turkey fryers. Eliminates the need for wrenches and features a thermal shut-off and excess flow device. Max output is 200,000 BTU/hr. MB Sturgis has designed the green Type 1 to provide the highest flow rate possible before going into bypass mode. The light green Type 1 is also designed to allow the hose to depressurize itself when the hose is disconnected from the appliance allowing the pent up gas to escape rather than storing a pressurized LP gas hose. Learn More

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Exhibit 1003, Page 551



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Tanya Zeif

Tanya Zeif

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Exhibit 1003, Page 554

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Exhibit 1003, Page 556

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…ter·sunk (koun'tər-sungk') *v.* Past tense and past participle of **countersink.**

…ter·sink (koun'tər-singk') *v.* **…sank** (-sangk'), **…sunk** (-sungk'), **…sink·ing**, **…sinks.** To sink (a screw) so that the head is flush with or below the surface.

…ter·tenor (koun'tər-ten'ər) *n.* *Music.* **1.** An adult male singer having a range above that of tenor. **2.** A singer having within this range. —*attributive.* Often used to modify a noun: *a countertenor part; a countertenor aria.*

…ter·ter·ror (koun'tər-ter'ər) *adj.* Intended to prevent terrorism: *counterterror measures; counterterror operations.*

…ter·ter·ror *n.* Action or strategy intended to suppress terrorism. —**coun'ter·ter'ror·ism** *n.*

…ter·ter·ror·ist *adj.* & *n.*

…ter·top (koun'tər-top') *n.* A level surface on a cabinet in a kitchen or department store. —*attributive.* Often used to modify another noun: *a countertop appliance; countertop cooking.*

…ter·trade (koun'tər-trād') *n.* International barter in which a country agrees to import commodities from another country in exchange for its own exports commodities. —**coun'ter·trad'er** *n.*

…ter·trans·fer·ence (koun'tər-trăns-fûr'əns, -trăns'fər-) *n.* The surfacing of a psychotherapist's own repressed conflicts through identification with the emotions, experiences, or problems of a person undergoing treatment.

…ter·vail (koun'tər-vāl', koun'tər-vāl') *v.* **-vailed, …vail·ing, …vails.** — **1.** To act against with equal force; counterbalance. **2.** To compensate for; offset. —*intr.* To act against an equal force or power. [Middle English *counterveilen*, from Old French *contreval-* : *contre-*, against (from Latin *contrā*) + *valoir*, to be worth (from Latin *valēre*, to be strong; see wel- in Appendix.)]

…ter·weigh (koun'tər-wā') *intr.* & *tr.v.* **-weighed, …weigh·ing, …weighs.** To counterbalance or cause to counterbalance.

…ter·weight (koun'tər-wāt') *n.* **1.** A weight used as a counterbalance. **2.** A force or influence equally counteracting another.

—coun'ter·weight'ed (-wā'tid) *adj.*

…ter·wom·an (koun'tər-wŏom'ən) *n.* A woman who works as a waitress in a diner.

…tess (koun'tĭs) *n.* **1.** A woman holding the title of count or countess. **2.a.** The wife or widow of a count in various European countries. **b.** The wife or widow of an earl in Great Britain. **3.** A woman of rank equal to such a noblewoman. [Middle English *countes*, *contesse*, feminine of *conte*, count. See COUNT².]

…ting house also **count·ing house** (koun'tĭng-hous') A room or office in which a business firm carries on activities such as accounting and correspondence.

…tless (kount'lĭs) *adj.* Incapable of being counted; innumerable. See Synonyms at **incalculable.** —**count'less·ly** *adv.*

…ter noun *n.* A noun for an object, such as *chair*, or for an idea or experience, that speakers of a language identify as a single entity and that can form a plural or occur in a phrase construction with an indefinite article, with numbers, or with such terms as *many*.

…ty palatine *n.*, *pl.* **counts palatine. 1.a.** Any of various counts originally exercising certain royal powers within their counties, especially a count of the Holy Roman Empire having sovereign powers in his own territories. **b.** A feudal lord having sovereign powers over his lands. **2.** The titled proprietor of a county palatine in England or Ireland.

…try·fied also **coun·try·fied** (kŭn'trĭ-fīd') *adj.* **1.** Resembling or having the characteristics of country life; rural. **2.** Lacking sophistication.

…try (kŭn'trē) *n.*, *pl.* **-tries. 1.a.** A nation or state. **b.** The territory of a nation or state; land. **c.** The people of a nation or state. *The whole country will profit from the new reforms.* **2.** The land of a person's birth or citizenship: *a visitor restricted in his country.* **3.** A region, territory, or tract of land distinguishable by features of topography, vegetation, etc.: *hill country; Bible country.* **4.** A district outside cities and towns; a rural area: *a vacation in the country.* **5.** *Informal.* Country music. —**country** *adj.* **1.** Of, typical of the country: *a country road; country life.* **2.** Of or relating to country music. —***idiom.*** **in country.** In Vietnam during the period of U.S. military operations there: *stationed in country a month longer than the other four* [soldiers]. [Middle English *countre*, from Old French *contree*, from Vulgar Latin **terra contrāta*, (land) opposite, before, from Latin *contrā*, opposite. See **kom** in Appendix.]

…try and western *n.* *Abbr.* **C & W, C and W** See **country music.**

…try club *n.* A suburban club for social and sports activities, featuring a golf course.

…try cousin *n.* One whose ingenuousness or rustic ways set him apart from certain city dwellers.

…try-dance (kŭn'trē-dăns') *n.* A folk dance of English origin in which two lines of dancers face each other.

…try·fied (kŭn'trĭ-fīd') *adj.* Variant of **countrified.**

…try gentleman *n.* A man who owns a country estate.

…try·man (kŭn'trē-măn) *n.* **1.** A person from one's own country; a compatriot. **2.** A native or inhabitant of a particular country. **3.** A man who lives in the country or has country ways.

…try mile *n.* *Informal.* A very great distance.

…try music *n.* *Music.* Popular music based on the folk style of the southern rural United States or on the image of cowboys in the American West. Also called *country and western.*

coun·try·seat (kŭn'trē-sēt') *n.* An estate or mansion in the country.

coun·try·side (kŭn'trē-sīd') *n.* **1.** A rural region. **2.** The inhabitants of a rural region.

country singer *n.* *Music.* One who sings country music.

coun·try·wide (kŭn'trē-wīd') *adv.* & *adj.* Throughout a whole country; nationwide: *launched a fundraising campaign countrywide; a countrywide search.*

coun·try·wom·an (kŭn'trē-wŏom'ən) *n.* **1.** A woman from one's own country; a compatriot. **2.** A woman from a particular country. **3.** A woman who lives in the country or has country ways.

coun·ty (koun'tē) *n.*, *pl.* **-ties.** *Abbr.* **co, co.** **1.** An administrative subdivision of a state in the United States. **2.a.** A territorial division exercising administrative, judicial, and political functions in Great Britain and Ireland. **b.** The territory under the jurisdiction of a count or earl. **3.** The people living in a county. [Middle English *counte*, territorial division, from Old French *conte*, the territory of a count, from Medieval Latin *comitātus*, from Late Latin, the office of count, from Latin, retinue, from *comes*, *comit-*, companion. See **ei-** in Appendix.] —**coun'ty** *adj.*

county agent *n.* A government employee who serves as a consultant and adviser in a chiefly rural county on such matters as agriculture, education, and home economics.

county fair *n.* A fair usually held every year at the same location in a county, especially for the competitive showing of livestock and farm products.

county palatine *n.*, *pl.* **counties palatine.** The domain of a count palatine in England or Ireland.

county seat *n.* A town or city that is the administrative center of its county.

county town *n.* *Chiefly British.* A county seat. Also called *shire town.*

coun·ty·wide (koun'tē-wīd') *adv.* & *adj.* Throughout a whole county: *found at locations countywide; a countywide tour on drugs.*

coup (kōō) *n.*, *pl.* **coups** (kōōz). **1.** A brilliantly executed stratagem; a masterstroke. **2.** A coup d'état. **3.** Among certain Native American peoples, a feat of bravery performed in battle, especially the touching of an enemy's body without causing injury. —***idiom.*** **count coup.** Among certain Native American peoples, to ceremoniously recount one's exploits in battle. [French, stroke, from Old French *colp*, from Late Latin *colpus*. See COPE¹.]

coup de grâce (kōō' də gräs') *n.*, *pl.* **coups de grâce. 1.** A deathblow delivered to end the misery of a mortally wounded victim. **2.** A finishing stroke or decisive event. [French : *coup*, stroke + *de*, of + *grâce*, mercy.]

coup de main (də măN') *n.*, *pl.* **coups de main.** A sudden action undertaken to surprise an enemy. [French : *coup*, stroke, blow + *de*, of + *main*, hand.]

coup d'é·tat (dā-tä') *n.*, *pl.* **coups d'état** or **coup d'états** (-dā-tä'). The sudden overthrow of a government by a usually small group of persons in or previously in positions of authority. [French : *coup*, blow, stroke + *de*, of + *état*, state.]

coup de thé·â·tre (də tā-ä'trə) *n.*, *pl.* **coups de théâtre. 1.** A sudden, dramatic turn of events in a play. **2.** An unexpected and sensational event, especially one that reverses or negates a prevailing situation. [French : *coup*, stroke + *de*, of + *théâtre*, theater.]

coup d'oeil (dœ'yə) *n.*, *pl.* **coups d'oeil.** A quick survey; a glance. [French : *coup*, stroke + *de*, of + *oeil*, eye.]

coupe¹ (kōōp) *n.* **1.a.** A dessert of ice cream or fruit-flavored ice, garnished and served in a special dessert glass. **b.** The stemmed glass in which a coupe is served. **2.** A shallow, bowl-shaped dessert dish. [French, cup, from Late Latin *cuppa*.]

coupe² (kōōp) *n.* Variant of **coupé** (sense 2).

cou·pé (kōō-pā') *n.* **1.** A closed four-wheel carriage with two seats inside and one outside. **2.** Also **coupe** (kōōp). A closed two-door automobile. [French, from past participle of *couper*, to cut, from *coup*, blow. See COUP.]

Cou·pe·rin (kōō-pə-răN', kōōp-răN'), **François.** 1668–1733. French composer who was court organist at Versailles during the reign of Louis XIV.

cou·ple (kŭp'əl) *n.* **1.** Two items of the same kind; a pair. **2.** Something that joins or connects two things together; a link. **3.** *(used with a sing. or pl. verb)* **a.** Two people united, as by betrothal or marriage. **b.** Two people together. **4.** *Informal.* A few, several: *a couple of days.* **5.** *Physics.* A pair of forces of equal magnitude acting in parallel but opposite directions, capable of causing rotation but not translation. —**couple** *v.* **-pled, -pling, -ples.** —*tr.* **1.** To link together; connect: *coupled her refusal with an explanation.* **2.a.** To join as spouses; marry. **b.** To join in sexual union. **3.** *Electricity* To link (two circuits or currents) as by magnetic induction. —*intr.* **1.** To form pairs; join. **2.** To unite sexually; copulate. **3.** To join chemically. —**couple** *adj.* *Informal.* Two or few: *"Every couple years the urge strikes, to ... haul off to a new site"* (Garrison Keillor). [Middle English, from Old French, from Latin *copula*, bond, pair.]

SYNONYMS: *couple, pair, brace, yoke.* These nouns denote two individuals of the same kind together. *Couple* does not necessarily

ă pat — oi boy
ā pay — ou out
âr care — oo took
ä father — oo boot
ĕ pet — ŭ cut
ē be — ûr urge
ĭ pit — th thin
ī pie — th this
îr pier — hw which
ŏ pot — zh vision
ō toe — ə about, item
ô paw — ♦ regionalism

Stress marks: ' (primary), ' (secondary), as in dictionary (dĭk'shə-nĕr'ē).

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 562

EXHIBIT 1008

Petitioner MWE Investments, LLC, et al.

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 10,221,780 B2
APPLICATION NO.	: 14/738060
DATED	: March 5, 2019
INVENTOR(S)	: Sarder et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

Item (71) Applicant: delete "Chmapion" and substitute therefore -- Champion --.

Signed and Sealed this
Eleventh Day of June, 2024

Katherine Kelly Vidal

Katherine Kelly Vidal
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/738,060	06/12/2015	Mark J. Sarder	CET1090.019	9670

26629 7590 06/11/2024

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

EXAMINER
LATHERS, KEVIN ANTHONY

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
06/11/2024	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

info@zpatents.com
jmf@zpatents.com
lje@zpatents.com

APPLICATION NO.	ISSUE DATE	PATENT NO.
14/738,060	11-Jun-2024	10221780

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

ELECTRONIC CERTIFICATE OF CORRECTION NOTIFICATION

Your electronic certificate of correction is now available, and can be accessed via Patent Center at https://patentcenter.uspto.gov.

The electronic certificate of correction is the official certificate of correction under 35 U.S.C. 254 or 255. For more information, please visit https://www.uspto.gov/electronicgrants.

Patent
Attorney Docket No.: CET1090.019

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Number	:	10,221,780 B2
Issued	:	March 5, 2019
Name of Patentee	:	Sarder et al.
Title of Invention	:	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT FOR OFFICE'S MISTAKE (37 CFR 1.322)

1. It is noted that errors appear in this patent of a clerical nature or characterized as more fully described below and would not constitute new matter or would not require re-examination. A Certificate of Correction is requested.

2. Attached hereto is Form PTO-1050 which should be suitable for printing.

3. The errors to be corrected are as follows:

On the Title Page

Item (71) Applicant: delete "Chmapion" and substitute therefore -- Champion --.

4. Please send the Certificate to:

Timothy J. Ziolkowski
Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074

Date: May 15, 2024

/Timothy J. Ziolkowski/
Timothy J. Ziolkowski
Registration No. 38,368
Telephone: (262) 268-8100

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 10,221,780 B2

APPLICATION NO. : 14/738,060

ISSUE DATE : March 5, 2019

INVENTOR(S) : Sarder et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

Item (71) Applicant: delete "Chmapion" and substitute therefore -- Champion --.

(Also Form PTO-1050)

MAILING ADDRESS OF SENDER:

Timothy J. Ziolkowski
Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074

PATENT NO: 10,221,780 B2

Burden Hour Statement: This form is estimated to take 1.0 hour to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
14/738,060	**05/15/2024 12:33:58 PM Z ET**	**CET1090.019**

Title of Invention

DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	10221780
CONFIRMATION #	9670	FILED BY	Robyn Templin
PATENT CENTER #	65535201	FILING DATE	06/12/2015
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Timothy Ziolkowski

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024.05.15 Req for COC.pdf	2	Request for Certificate of Correction	77 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2024.05.15 Req for COC.pdf	667FB47FFC7A84EB3C98230F1BD2E13D3E06458285DD4D582FDD7A62A96A6101DD6D9ABCA14376DDA21C7C4CEA789576AD9CAB71ED3B14092634646ACC386DC8

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/738,060	03/05/2019	10221780	CET1090.019	9670

26629 7590 02/13/2019

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 605 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Mark J. Sarder, Waukesha, WI;
Champion Engine Technology, LLC, Sussex, WI;
Aleko D. Sotiriades, Cedarburg, WI;
James J. Dehn, Brookfield, WI;
Leigh Jenison, Hartland, WI;

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail, fax, or via EFS-Web.

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By fax, send to: (571)-273-2885

OPAP JAN 11 2019 PATENT AND TRADEMARK OFFICE

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26629 7590 12/11/2018
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Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Robyn L. Templin	(Typed or printed name)
Robyn L. Templin	(Signature)
1/11/19	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/738,060	06/12/2015	Mark J. Sarder	CET1090.019	9670

TITLE OF INVENTION: DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	03/11/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
LATHERS, KEVIN ANTHONY	3747	123-575000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Ziolkowski Patent Solutions Group, SC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Champion Power Equipment, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Santa Fe Springs, CA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☒ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date 1/11/19

Typed or printed name Timothy J. Ziolkowski Registration No. 38,368

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PAGE 1/2 * RCVD AT 1/11/2019 10:48:51 AM [Eastern Standard Time] * SVR:W-PTOFAX-002/2 * DNIS:2732885 * CSID:2622688185 * DURATION (mm-ss):01-03

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NOTICE OF ALLOWANCE AND FEE(S) DUE

26629 7590 12/11/2018

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

EXAMINER
LATHERS, KEVIN ANTHONY

ART UNIT	PAPER NUMBER
3747	

DATE MAILED: 12/11/2018

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/738,060	06/12/2015	Mark J. Sarder	CET1090.019	9670

TITLE OF INVENTION: DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	03/11/2019

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

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(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/738,060	06/12/2015	Mark J. Sarder	CET1090.019	9670

TITLE OF INVENTION: DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	03/11/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
LATHERS, KEVIN ANTHONY	3747	123-575000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
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(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 576

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/738,060	06/12/2015	Mark J. Sarder	CET1090.019	9670

26629 7590 12/11/2018

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

DATE MAILED: 12/11/2018

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/738,060	Applicant(s) Sarder et al.	
	Examiner KEVIN A LATHERS	Art Unit 3747	AIA Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to amendments filed 11/05/2018.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-2,4-8,19 and 21-27 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

2. Claims 1, 2, 4-8, 19, and 21-27 are allowed.

3. The following is an examiner's statement of reasons for allowance: The closest prior art fails to disclose or make obvious the use of a dual fuel lockout switch on a dual fuel internal combustion engine wherein when the lockout switch is in one position it prevents the fuel source from coupling to the fuel system lines of the engine.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN A LATHERS whose telephone number is (571)272-1050. The examiner can normally be reached on M-F 10a-6p.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lindsay Low can be reached on 5712721196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/738,060	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	3747

CPC - Searched*		
Symbol	Date	Examiner
F02D19/0613, 16/0605, 19/0647	07/28/2017	/K.L./
Y02T10/36	07/28/2017	/K.L./

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST including inventor and assignee search.	07/28/2017	/K.L./
Google key word search (e.g. "dual fuel generator").	07/28/2017	/K.L./
EAST and google search.	02/15/2018	/K.L./
Google Search performed	08/29/2018	/K.L./
EAST and google, interference search.	11/20/2018	/K.L./

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
F02D19	19/0613, 19/0605, 19/0647	11/20/2018	/K.L./
Y02T	10/36	11/20/2018	/K.L./

/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/738,060	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	3747

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant						☐ CPA		☐ T.D.		☐ R.1.47
CLAIM		DATE								
Final	Original	07/28/2017	02/15/2018	08/29/2018	11/20/2018					
1	1	✓	✓	✓	=					
2	2	✓	O	O	=					
	3	✓	O	O	-					
3	4	O	O	O	=					
4	5	O	O	O	=					
5	6	O	O	O	=					
6	7	✓	✓	✓	=					
7	8	✓	✓	✓	=					
	9	✓	✓	✓	-					
	10	✓	O	O	-					
	11	O	O	O	-					
	12	O	O	O	-					
	13	O	O	O	-					
	14	✓	✓	✓	-					
	15	✓	✓	✓	-					
	16	✓	✓	✓	-					
	17	✓	✓	✓	-					
	18	✓	✓	✓	-					
8	19	✓	✓	✓	=					
	20	✓	O	O	-					
9	21	✓	O	O	=					
10	22	✓	✓	✓	=					
11	23	✓	✓	✓	=					
12	24	✓	✓	✓	=					
13	25	✓	✓	✓	=					
14	26	✓	✓	✓	=					
15	27				=					

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/738,060	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

CPC						
Symbol					**Type**	**Version**
F02D	/	19	/	0613	F	2013-01-01
F02D	/	19	/	0605	I	2013-01-01
F02D	/	19	/	0647	I	2013-01-01
F02D	/	19	/	0673	I	2013-01-01
Y02T	/	10	/	36	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	15	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	20 November 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4B

U.S. Patent and Trademark Office — Part of Paper No.: 20181120

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/738,060	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

INTERNATIONAL CLASSIFICATION				
CLAIMED				
F02D	/	19	/	06

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	15	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	20 November 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4B

U.S. Patent and Trademark Office — Part of Paper No.: 20181120

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/738,060	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1		10	8	19										
2	2		11		20										
	3		12	9	21										
3	4		13	10	22										
4	5		14	11	23										
5	6		15	12	24										
6	7		16	13	25										
7	8		17	14	26										
	9		18	15	27										

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	15	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	20 November 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4B

U.S. Patent and Trademark Office — Part of Paper No.: 20181120

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 586

Bibliographic Data

Application No: 14/738,060

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /Kevin Lathers/ (Examiner's Signature) | (Initials)

Title: DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
06/12/2015	123	3747	CET1090.019
RULE			

APPLICANTS

Champion Engine Technology, LLC, Sussex, WI, UNITED STATES

INVENTORS

Mark J. Sarder Waukesha, WI, UNITED STATES

Aleko D. Sotiriades Cedarburg, WI, UNITED STATES

James J. Dehn Brookfield, WI, UNITED STATES

Leigh Jenison Hartland, WI, UNITED STATES

CONTINUING DATA

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

06/22/2015

** SMALL ENTITY **

STATE OR COUNTRY

UNITED STATES

ADDRESS

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074
UNITED STATES

FILING FEE RECEIVED

$970

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	445	F02D19/0613.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S2	1204	F02D19/0605.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S3	3408	F02D19/0647.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S4	15258	Y02T10/36.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S5	808	(S1 S2 S3 S4) and (switch valve) near20 (propane natural adj gas gaseous lng cng) near20 (gasoline liquid diesel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:28
S6	79	(S1 S2 S3 S4) and (switch valve) near20 (propane natural adj gas gaseous lng cng) near20 (gasoline liquid diesel) and (second secondary auxiliary) near5 (regulat$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:29
S7	64	(S1 S2 S3 S4) and (switch valve) near20 (propane natural adj gas gaseous lng cng) near20 (gasoline liquid diesel) and (second secondary auxiliary) adj (regulat$3 pressure)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:44
S8	28	("5450832" | "20130220274" | "5325835"	USPAT	OR	OFF	2017/07/27

		| "5320078" | "4619240" | "6082323" | "6453877" | "5171487" | "6223730" | "6213083" | "4489699" | "5287839" | "8590510" | "5673670" | "4450821" | "5816224" | "6276345" | "4502453" | "20130047964" | "4372276" | "6401685" | "7905469" | "2722208" | "4895124" | "5161496" | "5379740" | "5438968" | "5419291" | "6914342" | "8342158").PN.				14:45
S9	124	("5450832" | "20130220274" | "5325835" | "5320078" | "4619240" | "6082323" | "6453877" | "5171487" | "6223730" | "6213083" | "4489699" | "5287839" | "8590510" | "5673670" | "4450821" | "5816224" | "6276345" | "4502453" | "20130047964" | "4372276" | "6401685" | "7905469" | "2722208" | "4895124" | "5161496" | "5379740" | "5438968" | "5419291" | "6914342" | "8342158").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:45
S10	421	(duel dual) near5 fuel near20 (engine generator) same (switch valve) near20 between	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:46
S11	0	dual adj fuel near20 engine same "switchover valve"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 15:17
S12	44	dual adj fuel near20 engine same (switch switchover) near5 valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 15:19
S13	49	"6591817"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 15:19
S14	63	("3799125" | "4150645" | "4265208" | "4303049" | "4305350" | "4323046" | "4353345" | "4391251" | "4398517" | "4524033" | "4671243" | "5450832" | "5524582" | "5623907" | "5720266" | "5816224" | "6035837").PN. OR ("6591817").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:20
S15	80	dual adj fuel near20 engine same (switch switchover select$3) near5 valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 15:21

S16	30	(("SARDER") near3 ("Mark")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S17	28	(("SOTIRIADES") near3 ("Aleko")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S18	41	(("DEHN") near3 ("James")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S19	15	(("JENISON") near3 ("Leigh")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S20	16	(("CHAMPION") near3 ("ENGINE") near3 ("TECHNOLOGY") near3 ("LLC")).AANM.	USPAT	OR	OFF	2017/07/27 15:25
S21	19	(("CHAMPION") near3 ("ENGINE") near3 ("TECHNOLOGY") near3 ("LLC")).as.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:26
S22	5	("20040240141" | "20060169238" | "20130098349" | "20130122439" | "4489699").PN. OR ("9435273").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:42
S23	41	("1973142" | "2315882" | "2381304" | "4068639" | "4227497" | "4335697").PN. OR ("4489699").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:43
S24	97	(dual multi multiple plural plurality) adj fuel near20 engine same (switch switchover changeover change switch$3) near5 (valve switch)	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 16:02
S25	1	(09/813622).APP.	USPAT; USOCR	OR	OFF	2017/07/27 16:03
S26	63	("3799125" | "4150645" | "4265208" | "4303049" | "4305350" | "4323046" | "4353345" | "4391251" | "4398517" | "4524033" | "4671243" | "5450832" | "5524582" | "5623907" | "5720266" | "5816224" | "6035837").PN. OR ("6591817").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 16:03
S27	64	("4335697" | "4393848" | "4430978" | "4606322" | "4683864" | "4825842" | "4922862" | "5379740" | "5474047" | "5479906" | "5755211" | "5775282").PN. OR ("6035837").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 16:34
S28	27	("5999888" | "6543395" | "4619240" | "20140366577" | "20120168023" | "20140202430" | "4463735" | "5668310" | "5224457").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 10:32
S29	0	(14/156204).APP.	USPAT; USOCR	OR	OFF	2017/07/28 11:33
S30	5	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (quick-connect connect$3) near20 (cover flange)	USPAT; USOCR	OR	OFF	2017/07/28 11:47
S31	109	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (quick-connect connect$3) near20 (cover flange)	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2017/07/28 11:47

			EPO; JPO; DERWENT; IBM_TDB			
S32	280	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (cover flange)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 11:48
S33	171	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (cover flange) not S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 11:48
S34	5	"9435273"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 14:35
S35	1	"20070137591"	USPAT	OR	OFF	2018/02/12 15:56
S37	34	(champion near3 engine).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/02/12 15:59
S38	95	dual adj fuel near20 valve near10 switch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:19
S39	48	"4489699"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S40	5	"20070137591"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S41	29	"3412258"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30

S42	3	"20100258099"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S43	53	"5611312"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S44	138	(S39 S40 S41 S42 S43)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:31
S45	1	(10/591304).APP.	USPAT; USOCR	OR	OFF	2018/02/12 16:45
S46	6	("6332433" | "7146962").PN. OR ("7325519").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/02/12 16:46
S47	35	(US-20020014077-$ or US-20030168024-$ or US-20110168133-$ or US-20120204835-$ or US-20030010320-$ or US-20160363099-$ or US-20170037796-$ or US-20020134362-$ or US-20140202430-$ or US-20160221518-$ or US-20070137591-$).did. or (US-5320078-$ or US-5450832-$ or US-5816224-$ or US-6591817-$ or US-5524582-$ or US-4570605-$ or US-4712516-$ or US-9435273-$ or US-4489699-$ or US-4305350-$ or US-4353345-$ or US-6035837-$ or US-6904873-$ or US-7045916-$ or US-5092305-$).did. or (US-2558884-$ or US-2470747-$ or US-3022425-$ or US-3451424-$).did. or (JP-2004278332-$).did. or (US-20080290531-$ or US-20130047964-$ or US-4463735-$ or CN-203796423-$).did.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2018/02/12 17:19
S48	35	(US-20020014077-$ or US-20030168024-$ or US-20110168133-$ or US-20120204835-$ or US-20030010320-$ or US-20160363099-$ or US-20170037796-$ or US-20020134362-$ or US-20140202430-$ or US-20160221518-$ or US-20070137591-$).did. or (US-5320078-$ or US-5450832-$ or US-5816224-$ or US-6591817-$ or US-5524582-$ or US-4570605-$ or US-4712516-$ or US-9435273-$ or US-4489699-$ or US-4305350-$ or US-4353345-$ or US-6035837-$ or US-6904873-$ or US-7045916-$ or US-5092305-$).did. or (US-2558884-$ or US-2470747-$ or US-3022425-$ or US-3451424-$).did. or (JP-2004278332-$).did. or (US-20080290531-	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2018/02/13 17:40

		$ or US-20130047964-$ or US-4463735-$ or CN-203796423-$).did.				
S50	17	S48 and regulator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/02/13 17:40

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	(engine and lockout and fuel and first adj fuel and second adj fuel and source and switch).clm.	US-PGPUB; USPAT	OR	OFF	2018/11/20 15:47
S51	88	F02D19/0613.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06
S52	273	F02D19/0605.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06
S53	747	F02D19/0647.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06
S54	3711	Y02T10/36.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06

11/ 20/ 2018 3:47:39 PM
C:\ Users\ klathers\ Documents\ EAST\ Workspaces\ 14738060.wsp

Customer No. 26629 Patent
Confirmation No. 9670 Attorney Docket No. CET1090.019

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	14/738,060
Filed	:	June 12, 2015
For	:	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

I hereby certify that, on the date shown below, this correspondence is being:

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37 CFR 1.8(a) **37 CFR 1.10**

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Date: November 5, 2018 /Robyn L. Templin/
Signature

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AFTER-FINAL
AMENDMENT/RESPONSE TO FINAL OFFICE ACTION
MAILED FEBRUARY 22, 2018

Dear Sir:

Responsive to the Final Office Action mailed September 5, 2018, please amend the Application as follows:

OK TO ENTER: /K.A.L/

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/738,060	Filing Date 06/12/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 11/05/2018	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 15	Minus	** 26	= 0	X $50 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $230 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
TAMARA HARRELL

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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Customer No. 26629 Patent
Confirmation No. 9670 Attorney Docket No. CET1090.019

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	14/738,060
Filed	:	June 12, 2015
For	:	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

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37 CFR 1.8(a) **37 CFR 1.10**

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Date: November 5, 2018 /Robyn L. Templin/
Signature

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AFTER-FINAL
AMENDMENT/RESPONSE TO FINAL OFFICE ACTION
MAILED FEBRUARY 22, 2018

Dear Sir:

Responsive to the Final Office Action mailed September 5, 2018, please amend the Application as follows:

In the Claims

1. (Currently Amended) A mechanical fuel lockout switch for a dual fuel engine comprising:

a mechanical fuel valve actuateable between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line and a second fuel source through a second fuel line; and

a fuel lockout apparatus coupled to the mechanical fuel valve;

wherein the mechanical fuel lockout switch:

communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and

communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position; and

wherein the fuel lockout apparatus is configured to:

prevent the second fuel source from coupling to the second fuel line while the mechanical fuel valve is in the first position; and

permit the second fuel source to couple to the second fuel line while the mechanical fuel valve is in the second position.

2. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 1, wherein the fuel lockout apparatus prevents actuation of the mechanical fuel valve to the first position when the second fuel source communicates with the dual fuel engine

3. (Canceled)

4. (Currently Amended) The mechanical fuel lockout switch for a dual fuel engine of claim ~~3~~ 1, wherein the fuel lockout apparatus comprises a flange rigidly coupled to the mechanical fuel valve that covers an inlet of the second fuel line while the mechanical fuel valve is in the first position and uncovers the inlet of the second fuel line while the mechanical fuel valve is in the second position.

5. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 4, wherein the mechanical fuel valve rotates between the first position and the second position and the flange rotates transversely across the inlet of the second fuel line.

6. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 4, further comprising;

a first end of a quick-disconnect hose coupling attached to the inlet of the second fuel line; and

a second end of the quick-disconnect hose coupling attached to the second fuel source to mate with the first end of the quick-disconnect hose coupling to couple the second fuel source to the second fuel line.

7. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 1, wherein the mechanical fuel valve and the fuel lockout apparatus operate together to ensure that fuel from the first fuel source and fuel from the second fuel source are not simultaneously delivered to the dual fuel engine.

8. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 7, wherein the first fuel source provides liquid fuel from a liquid fuel tank to the dual fuel engine and the second fuel source provides gaseous fuel from a pressurized fuel container to the dual fuel engine.

9-18. (Canceled)

19. (Currently Amended) A method of assembling a mechanical fuel lockout switch for an internal combustion engine comprising:

providing an internal combustion engine configured to operate on a fuel from a first fuel source and a different fuel from a second fuel source;

coupling a mechanical fuel valve to the internal combustion engine actuateable between a first position and a second position to selectively control fuel flow to the internal combustion engine from the first fuel source through a first fuel line and the second fuel source through a second fuel line; and

coupling a fuel lockout apparatus to the mechanical fuel valve;

wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the first fuel source to the internal combustion engine and prevents the second fuel source from coupling to the internal combustion engine, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the second fuel source to couple to the internal combustion engine, and interrupts the first fuel source communication with the internal combustion engine; and

wherein the fuel lockout apparatus prevents actuation of the mechanical fuel valve to the first position when the second fuel source is coupled to the internal combustion engine.

20. (Canceled)

21. (Currently Amended) The method of claim ~~20~~19, wherein the fuel lockout apparatus is further configured to:

prevent coupling of the second fuel source to the second fuel line while the mechanical fuel valve is in the first position; and

permit coupling of the second fuel source to the second fuel line while the mechanical fuel valve is in the second position.

22. (Original) The method of claim 19, wherein the fuel lockout apparatus comprises a fuel inlet cover configured to actuate in unison with the mechanical fuel valve to cover a fuel inlet on the internal combustion engine for the second fuel source when the mechanical fuel valve is in the first position and uncover the fuel inlet when the mechanical fuel valve is in the second position.

23. (Original) The method of claim 19, further comprising coupling a fuel regulator system to the second fuel source to reduce fuel pressure therefrom and deliver fuel to the second fuel line at a pressure required for operation of the internal combustion engine.

24. (Original) The method of claim 23, further comprising mounting the fuel regulator system to the second fuel source located off-board the internal combustion engine.

25. (Original) The method of claim 23, further comprising:

coupling one end of a quick-disconnect hose coupling to an inlet on the internal combustion engine for the second fuel source; and

coupling a mating end of the quick-disconnect hose coupling to an outlet of the fuel regulator system.

26. (Original) The method of claim 19, further comprising providing gasoline in a liquid fuel tank as the first fuel source and LPG in a pressurized fuel container as the second fuel source.

27. (New) A mechanical fuel lockout switch for a dual fuel engine comprising:

a mechanical fuel valve actuateable between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line and a second fuel source through a second fuel line; and

a fuel lockout apparatus coupled to the mechanical fuel valve;

wherein the mechanical fuel lockout switch:

communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and

communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position; and

wherein the fuel lockout apparatus prevents actuation of the mechanical fuel valve to the first position when the second fuel source communicates with the dual fuel engine.

REMARKS

Claims 1-26 are pending in the present application. In the Final Office Action mailed September 5, 2018, the Examiner rejected claims 1 and 7 under 35 U.S.C. §102(a)(1) as being anticipated by Sugimoto et al. (US Pub. 2007/0137591). The Examiner next rejected claims 1, 7, 8, 19, 22, and 26 under 35 U.S.C. §102(a)(1) as being anticipated by Pursifull et al. (US Pub. 2011/0168133). Claims 9, 14-18, and 23-25 were rejected under 35 U.S.C. §103 as being unpatentable over Pursifull et al. in view of Sugimoto et al.

Claims 2-6, 10-13, 20, and 21 were indicated as containing allowable subject matter. Such indication is appreciated.

Rejection under 35 U.S.C. §102(a)(1) as being anticipated by Sugimoto et al.

Claim 1

The Examiner rejected claim 1 under 35 U.S.C. §102(a)(1) as being anticipated by Sugimoto et al. (US Pub. 2007/0137591). Without acquiescing to the rejection, Applicant has amended claim 1 in the present response in order to incorporate the allowable subject matter of claim 3.

As amended, claim 1 calls for a mechanical fuel lockout switch for a dual fuel engine comprising: a mechanical fuel valve actuateable between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line and a second fuel source through a second fuel line; and a fuel lockout apparatus coupled to the mechanical fuel valve; wherein the mechanical fuel lockout switch: communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position; and wherein the fuel lockout apparatus is configured to: prevent the second fuel source from coupling to the second fuel line while the mechanical fuel valve is in the first position; and permit the second fuel source to couple to the second fuel line while the mechanical fuel valve is in the second position.

In light of the incorporation of the allowable subject matter of claim 3 into claim 1, Applicant believes claim 1 to be in condition for allowance. Applicant therefore respectfully requests withdrawal of the rejection of claim 1 under 35 U.S.C. §102(a)(1) as being anticipated by Sugimoto et al., along with the rejection of all claims dependent therefrom.

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 601

Rejection under 35 U.S.C. §102(a)(1) as being anticipated by Pursifull et al.

Claims 1 and 19

The Examiner next rejected claims 1 and 19 under 35 U.S.C. §102(a)(1) as being anticipated by Pursifull et al. (US Pub. 2011/0168133).

Regarding claim 1, as set forth above, Applicant has amended claim 1 to incorporate the allowable subject matter of claim 3. Thus, claim 1 is believed to be in condition for allowance.

Regarding claim 19, without acquiescing to the rejection, Applicant has amended claim 19 in the present response in order to incorporate the allowable subject matter of claim 20.

As amended, claim 19 calls for a method of assembling a mechanical fuel lockout switch for an internal combustion engine comprising: providing an internal combustion engine configured to operate on a fuel from a first fuel source and a different fuel from a second fuel source; coupling a mechanical fuel valve to the internal combustion engine actuateable between a first position and a second position to selectively control fuel flow to the internal combustion engine from the first fuel source through a first fuel line and the second fuel source through a second fuel line; and coupling a fuel lockout apparatus to the mechanical fuel valve; wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the first fuel source to the internal combustion engine and prevents the second fuel source from coupling to the internal combustion engine, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the second fuel source to couple to the internal combustion engine, and interrupts the first fuel source communication with the internal combustion engine; and wherein the fuel lockout apparatus prevents actuation of the mechanical fuel valve to the first position when the second fuel source is coupled to the internal combustion engine.

In light of the incorporation of the allowable subject matter of claim 3 into claim 1 and the incorporation of the allowable subject matter of claim 20 into claim 19, Applicant believes claims 1 and 19 to be in condition for allowance. Applicant therefore respectfully requests withdrawal of the rejection of claims 1 and 19 under 35 U.S.C. §102(a)(1) as being anticipated by Pursifull et al., along with the rejection of all claims dependent therefrom.

Rejection under 35 U.S.C. §103 over Pursifull et al. in view of Sugimoto et al.

Claim 9

The Examiner rejected claim 9 under 35 U.S.C. §103 as being unpatentable over Pursifull et al. in view of Sugimoto et al.

Without acquiescing to the rejection, Applicant has elected to cancel claims 9-18 in the present response. Applicant therefore believes the rejection to be moot.

Canceled & Newly Presented Claims

In the present Response, claims 3, 9-18, and 20 have been canceled and claim 27 has been newly added. New claim 27 combines the allowable subject matter of claim 2 with original claim 1. Accordingly, Applicant believes new claim 27 to be in condition for allowance.

Conclusion

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1, 2, 4-8, 19, and 21-27.

No fees are deemed due for entering the claim newly presented herein, as a greater number of claims have been canceled and the total number of independent claims is still three.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

/Kevin R. Rosin/

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Registration No. 55,584
Phone 262-268-8100 ext. 16
krr@zpspatents.com

Dated: November 5, 2018
Attorney Docket No.: CET1090.019

P.O. ADDRESS:
Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074
262-268-8100

General Authorization and Extension of Time

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-2623. Should no proper payment be enclosed herewith, as by credit card authorization being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-2623. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extensions under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-2623. Please consider this a general authorization to charge any fee that is due in this case, if not otherwise timely paid, to Deposit Account No. 50-2623.

/Kevin R. Rosin/

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Dated: November 5, 2018
Attorney Docket No.: CET1090.019

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Electronic Acknowledgement Receipt

EFS ID:	34206596
Application Number:	14738060
International Application Number:	
Confirmation Number:	9670
Title of Invention:	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE
First Named Inventor/Applicant Name:	Mark J. Sarder
Customer Number:	26629
Filer:	Kevin Roger Rosin./Robyn Templin
Filer Authorized By:	Kevin Roger Rosin.
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response.pdf	133213 53dc24c1b4d76339b26913017fec5a2d5b811d0f	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	9
Warnings:			
Information:			
	Total Files Size (in bytes):	133213	

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/738,060	06/12/2015	Mark J. Sarder	CET1090.019	9670

26629 7590 09/05/2018

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EXAMINER
LATHERS, KEVIN ANTHONY

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
09/05/2018	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

info@zpspatents.com
sml@zpspatents.com

Office Action Summary	**Application No.** 14/738,060	**Applicant(s)** Sarder et al.	
	Examiner KEVIN A LATHERS	**Art Unit** 3747	**AIA Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 05/15/2018.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-26 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1,7-9,14-19 and 22-26 is/are rejected.

8) ☑ Claim(s) 2-6,10-13 and 20-21 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 102

1. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

2. **Claim(s) 1 and 7 is/are rejected under 35 U.S.C. 102(a)(1) as being clearly anticipated by Sugimoto (US 2007/0137591).**

3. **Regarding claim 1,** Champion discloses mechanical fuel lockout switch (Fig. 1, shown switch system) for a dual fuel engine (Fig. 1, shown engine 30) comprising:

a mechanical fuel valve 12 actuateable between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source 61 through a first fuel line A1 and a second fuel source 71 through a second fuel line A5 (Fig. 1, shown lines and valve); and

a fuel lockout apparatus 63 (a fuel cutoff is coupled via the regulator 62 to the valve 12) coupled to the mechanical fuel valve;

wherein the mechanical fuel lockout switch:

communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position (Para. [0082], the switch

has multiple positions which allow valve 12 connect either of the lines A1 or A4 to line A2 and also activate lockout apparatus 63).

4. **Regarding claim 7,** the mechanical fuel lockout switch for a dual fuel engine of claim 1, wherein the mechanical fuel valve and the fuel lockout apparatus operate together to ensure that fuel from the first fuel source and fuel from the second fuel source are not simultaneously delivered to the dual fuel engine (Para. [0082], the system does not allow two fuels to be delivered simultaneously).

5. Claim(s) 1, 7, 8, 19, 22, and 26 is/are rejected under 35 U.S.C. 102(a)(1) as being clearly anticipated by Pursifull et al (US 2011/0168133)

6. **Regarding claims 1 and 19,** Pursifull discloses a mechanical fuel lockout switch for a dual fuel engine (Fig. 3, shown dual fuel engine with lockout switch) and method of constructing it comprising: a mechanical fuel valve 120 actuateable between a first position and a second position to selectively control fuel flow to the dual fuel engine 102 from a first fuel source 112 through a first fuel line 119 and a second fuel source 134 through a second fuel line 140 (Para. [0025], the valve 120 is a three-way mechanical selection valve); and

7. a fuel lockout apparatus (Controller 128, pumps 136 114, and solenoid valves 118 126) coupled to the mechanical fuel valve (Fig. 1, the lockout apparatus is coupled to the valve 120 via controller 128 and fuel lines 119/140);

8. wherein the mechanical fuel lockout switch: communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position (Para. [0025], [0028], and [0066], the three-way valve and lockout apparatus determine connection of the first or second fuel to the dual fuel engine 102).

9. The apparatus above having all the parts coupled together and therefore being "coupled" and "provided" as per the method in claim 19.

10. **Regarding claim 7,** Pursifull discloses the mechanical fuel lockout switch for a dual fuel engine of claim 1, wherein the mechanical fuel valve and the fuel lockout apparatus operate together to ensure that fuel from the first fuel source and fuel from the second fuel source are not simultaneously delivered to the dual fuel engine (Para. [0025], [0028], and [0066], the lockout apparatus cuts off the fuel supply between the lines).

11. **Regarding claims 8 and 26,** Pursifull discloses the mechanical fuel lockout switch for a dual fuel engine of claims 7 and 19, wherein the first fuel source provides gasoline as liquid fuel from a liquid fuel tank to the dual fuel engine and the second fuel source provides LPG fuel from a pressurized fuel container to the dual fuel engine (Para. [0040], the multi fuel system may be liquid propane (gaseous fuel) and gasoline (liquid fuel)).

12. **Regarding claim 22,** the modified Pursifull discloses the method of claim 19 as disclosed above, wherein the fuel lockout apparatus comprises a fuel inlet cover configured to actuate in unison with the mechanical fuel valve to cover a fuel inlet on the internal combustion engine for the second fuel source when the mechanical fuel valve is in the first position and uncover the fuel inlet when the mechanical fuel valve is in the second position (Para. [0025], [0028], and [0066], the lockout apparatus cuts off the fuel supply between the lines, by considering the line which connects to the lockout valve as a "fuel inlet" then the valve cutting off flow is then covering the inlet to disallow fuel flow).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the

claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 9, 14-18, and 23-25 is/are rejected under 35 U.S.C. 103 as being unpatentable over Pursifull et al (US 2011/0168133) in view of Sugimoto et al (US 2007/0137591).

15. **Regarding claim 9,** Pursifull discloses a dual fuel engine and fuel delivery system comprising:

a dual fuel engine (Fig. 1, shown) configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line (Para. [0040], the multi fuel system may be pressurized liquid propane (gaseous fuel) and gasoline (liquid fuel)); and a mechanical fuel valve actuateable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line (Para. [0025], [0028], and [0066], the three-way valve and lockout apparatus determine connection of the first or second fuel to the dual fuel engine 102).

16. Pursifull fails to disclose a fuel regulator system located off board the dual fuel engine, the fuel regulator system comprising: a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure; and a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator.

17. Sugimoto discloses a dual fuel engine and delivery system (Fig. 1, as shown) wherein the system includes an off-board gaseous fuel system (Fb) which includes an off-board pressure regulator 72 which feeds fuel into an engine system 1 which includes another pressure regulator 62. The inclusion of pressure reduction devices for the gasification of liquid-held fuel allows for an effective cooling of the fuel system and systems (Para. [0010]) while allowing the dual fuel engine to be powered by an external fuel tank attached to it in an off board fashion such as in emergency situations (Para. [0002]).

18. Therefore, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to modify the device of Pursifull with the pressure regulators and gaseous fuel system methods of Sugimoto in order to improve the cooling of the fuel system parts through pressure reduction as well as regulate the pressure from an external attached fuel tank which allows the dual fuel engine system to be used in varying situations such as emergency ones using an external fuel source.

19. Further, the inclusion of multiple pressure regulators in the off-board fuel system, while not disclosed in Pursifull as modified by Sugimotor, would have been an obvious modification of the system of Sugimoto which includes an off-board fuel regulation system including a single regulator 72. It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the regulation system to have a dual-regulator off-board system since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8. Further, dual tank regulators are extremely old and well-known in the art to provide on off-board fuel tanks, particularly gaseous ones such as propane/natural gas tanks, as they are more efficient, durable, and effective in their regulation. These types of regulators are often called "dual-stage" or "double-stage" regulators.

20. **Regarding claim 14,** the modified Pursifull discloses the dual fuel generator and fuel delivery system of claim 9, further comprising: a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line (Fig. 1 of Sugimoto shows that the modification of Pursifull to includes an external source of gaseous fuel and regulators makes use of a connection hose coupling 14).

21. **Regarding claims 15,** the modified Pursifull discloses the dual fuel generator and fuel delivery system of claim 9, further comprising a regulator mounting device (a bracket as per applicant's

disclosure on in Para. [0024] of the disclosure) secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device (Fig. 1 of Sugimoto which discloses the regulator systems, the regulator 72 shown is attached to the fuel tank system 71).

22. The modified Pursifull fails to specifically note a bracket being used for the fixation of the regulator 72. However, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to attach the regulator 72 using some device wherein a bracket is an extremely old and well-known fixation device and one of ordinary skill in the art would have known to apply a known device and technique of mounting a regulator on a fuel tank, such as a bracket, to yield the predictable results of fixing the regulator to its fuel system.

23. **Regarding claim 16,** the modified Pursifull discloses the dual fuel generator and fuel delivery system of claim 15, but fails to disclose wherein the primary pressure regulator is mounted on the regulator mounting device. The modified Pursifull fails to disclose the two regulators being located in positions where they would be mounted making use of the same mounting bracket.
However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to mount both regulators in a similar location on the same bracket since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

24. **Regarding claim 17,** the modified Pursifull discloses the dual fuel generator and fuel delivery system of claim 16, but fails to disclose wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device secures to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.

25. In this case the claim pertains to the routine and known art of using propane tanks as a fuel tank source as these devices are well-known in the art to have a "collar" piece which often has regulators attached to it. While the art of Pursifull and Sugimoto never make reference to this specific old and well-

known device, they do make use of fuel tanks that could easily be substituted with them. Therefore, examiner makes official notice that it is old and well-known to make use of standard-in-the-art propane tanks with regulators attached to their collars as this would have allowed the modified Pursifull to make use of the common, cheap, and easy-to-use propane tanks for its regulation and propane tank systems. Some examples of such tanks can be seen at: RVDoctor (Oct. 2010, http://www.rvdoctor.com/2012/10/disconcerting-propane-leaks-on-rv.html) which shows two propane tanks with a regulator attached to their collar; and Nooutage.com (Aug. 27th, 2006, https://web.archive.org/web/20060928183104/http://www.nooutage.com:80/images/BS-7KW_Power_Now_tanks.jpg) which shows propane tanks with regulators attached to their collars.

26. **Regarding claim 18,** the modified Pursifull discloses the dual fuel generator and fuel delivery system of claim 9, but fails to disclose wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.

27. However, It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the regulators into a two-stage regulator, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. Howard v. Detroit Stove Works, 150 U.S. 164 (1893).

28. Claims 23-25 are rejected using Pursifull as modified by Sugimoto in the same manner as applied to claim 9 and its dependent claims above.

29. **Regarding claim 23,** the modified Pursifull discloses the method of claim 19, further comprising coupling a fuel regulator system to the second fuel source to reduce fuel pressure therefrom and deliver fuel to the second fuel line at a pressure required for operation of the internal combustion engine (Fig. 1 of Sugimoto shows the regulators in series reducing pressure).

30. **Regarding claim 24,** the modified Pursifull discloses the method of claim 23, further comprising mounting the fuel regulator system to the second fuel source located off-board the internal combustion engine (Fig. 1 of Sugimoto as modified onto Pursifull and shown).

31. **Regarding claim 25,** the modified Pursifull discloses the method of claim 23, further comprising: coupling one end of a quick-disconnect hose coupling to an inlet on the internal combustion engine for the second fuel source; and coupling a mating end of the quick-disconnect hose coupling to an outlet of the fuel regulator system (Fig. 1 of Sugimoto as modified onto Pursifull and shown).

Allowable Subject Matter

32. Claims 2-6, 10-13, 20, and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

33. Applicant's arguments filed 05/15/2018 have been fully considered but they are not persuasive.

34. Applicant argues in the remarks filed 05/15/2018 that the prior art of Suigmoto et al fails to disclose the limitations of claim 1. The argument is based on the construction of the fuel lockout apparatus and argues that Sugimoto fails to disclose a fuel lockout apparatus coupled to a mechanical fuel valve as they appear to be in separate locations. This argument is also presented as a reason why Pursifull et al fails to disclose the limitations of claims 1 and 19: it lacks a coupling between a fuel lockout apparatus and a mechanical fuel valve.

a. While it is true that the fuel lockout apparatus 63 is not *directly attached* to the selector valve 12, the fuel lockout apparatus 63 is clearly coupled to the valve 12 by way of other pieces. Applicant never specifies the term "couple" to take the meaning of "operationally coupled" or "directly mechanically coupled" and indeed the word "couple" simply means "something that joins or links two things together" (https://www.merriam-webster.com/dictionary/couple). In

this case the two parts are linked together via other parts of the construction, parts A2, A3, and 62 (Fig. 1, shown). A good example of this phrase's use would be a cylinder head *coupled to* a cylinder block even if there was a gasket between them; the two parts don't touch and instead are attached via a gasket/seal. Another example would be a "shaft coupling" which is a common term in the art that involves two shafts which never touch but are "coupled." In this way, two fuel system parts connected to one another via lines or other structures are coupled together.

b. With regards to Pursifull, in a manner similar to Sugimoto, a fuel lockout apparatus embodied in controller 128, pumps 136 114, and solenoids valves 118 126 is *coupled* to a mechanical fuel valve 120. The coupling takes place via the intervening parts of a fuel lines 119/140 as the term "couple" is never given a more specific meaning in the disclosure so a broadest reasonable definition (as quoted above) must be used. Therefore, while it's true the two structures are not in direct contact, they are *coupled.*

c. Examiner notes that the claims can be amended to claim "directly coupled" or "operationally coupled" in order to fulfill the desired claim breadth as per the arguments.

35. With regards to claim 9, applicant argues that the fuel regulator system is claimed to be located "off-board" and that the prior art of Purifull and Sugimoto fail to disclose the fuel regulator system being off board.

d. It is noted that the prior art of Sugimoto is used to remedy this deficiency in the prior art of Pursifull and will be relied upon for teaching of these claim limitations. The claim itself claims "a fuel regulator system located off board the dual fuel generator... comprising." Further, as applicant notes, Sugimoto only discloses a single off-board regulator in its system. However, the addition of another regulator or replacement with a dual-stage (two regulators in one housing) would have been exceedingly obvious and well-known to one of ordinary skill in the art. Therefore the claim remains rejected under Purisfull in view of Sugimoto.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN A LATHERS whose telephone number is (571)272-1050. The examiner can normally be reached on M-F 10a-6p.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lindsay Low can be reached on 5712721196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/738,060	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	3747

CPC - Searched*		
Symbol	Date	Examiner
F02D19/0613, 16/0605, 19/0647	07/28/2017	/K.L./
Y02T10/36	07/28/2017	/K.L./

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST including inventor and assignee search.	07/28/2017	/K.L./
Google key word search (e.g. "dual fuel generator").	07/28/2017	/K.L./
EAST and google search.	02/15/2018	/K.L./
Google Search performed	08/29/2018	/K.L./

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/738,060	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☑ Claims renumbered in the same order as presented by applicant					☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM		**DATE**								
Final	Original	07/28/2017	02/15/2018	08/29/2018						
	1	✓	✓	✓						
	2	✓	O	O						
	3	✓	O	O						
	4	O	O	O						
	5	O	O	O						
	6	O	O	O						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	O	O						
	11	O	O	O						
	12	O	O	O						
	13	O	O	O						
	14	✓	✓	✓						
	15	✓	✓	✓						
	16	✓	✓	✓						
	17	✓	✓	✓						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	O	O						
	21	✓	O	O						
	22	✓	✓	✓						
	23	✓	✓	✓						
	24	✓	✓	✓						
	25	✓	✓	✓						
	26	✓	✓	✓						

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14738060
Filing Date	2015-06-12
First Named Inventor	Mark J. Sarder et al.
Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.019

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3384059		1968-05-21	Kopa	
	2	3412258		1968-11-19	Satter	
	3	3659574		1972-05-02	Reschke et al.	
	4	3718000		1973-02-27	Walker	
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	6	3888223		1975-06-10	Mondt	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14738060
	Filing Date	2015-06-12
	First Named Inventor	Mark J. Sarder et al.
	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.019

	9	4480595		1984-11-06	Hobby et al.	
	10	4628871		1986-12-16	Glass	
	11	4708094		1987-11-24	Helmich et al.	
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	13	5092305		1992-03-03	King	
	14	5228423		1993-07-20	Oikawa et al.	
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	16	6591817	B2	2003-07-15	Deutsch	

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	1	20020134362	A1	2002-09-26	Deutsch	

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	7	20150122230	A1	2015-05-07	Sarder et al.	

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Signature	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2018-05-15
Name/Print	Kevin R. Rosin	Registration Number	55584

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Doc description: Information Disclosure Statement (IDS) Filed

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(Not for submission under 37 CFR 1.99)

Application Number	14738060
Filing Date	2015-06-12
First Named Inventor	Mark J. Sarder et al.
Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.019

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	1	2060477	CN	U	1990-08-15	Zhao Yunying		

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Examiner Signature	/KEVIN A LATHERS/	Date Considered	08/29/2018

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Signature	/Stephanie M. Laundre/	Date (YYYY-MM-DD)	2018-02-22
Name/Print	Stephanie M. Laundre	Registration Number	65124

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Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.019

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	1	1981121	CN	A	2007-06-13	Honda Motor Co., Ltd.		

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Signature	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2018-06-01
Name/Print	Kevin R. Rosin	Registration Number	55584

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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	Application Number	14738060
	Filing Date	2015-06-12
	First Named Inventor	Mark J. Sarder et al.
	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.019

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14738060
	Filing Date	2015-06-12
	First Named Inventor	Mark J. Sarder et al.
	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.019

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2018-06-01
Name/Print	Kevin R. Rosin	Registration Number	55584

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Customer No. 26629
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Patent
Attorney Docket No. CET1090.019

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	14/738,060
Filed	:	June 12, 2015
For	:	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

I hereby certify that, on the date shown below, this correspondence is being:

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INFORMATION DISCLOSURE STATEMENT
CERTIFICATION STATEMENT UNDER 37 CFR 1.704(D)(1)

Dear Sir:

Each item of information contained in this information disclosure statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office, and this communication was not received by an individual designated under 37 CFR 1.56(c) more than thirty (30) days prior to the filing of this information disclosure statement.

Dated: June 1, 2018
Attorney Docket No.: CET1090.019

Respectfully submitted,

/Kevin R. Rosin/

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Espacenet

Bibliographic data: CN1981121 (A) — 2007-06-13

Engine generator

Inventor(s): KATSUHIRO SUGIMOTO YASUHIRO KO [JP] ± (SUGIMOTO YASUHIRO,KOJIMA HIROAKI,TAKEMURA KAZUHITO,NAKAGAWA KATSUHIRO, ; SUGIMOTO YASUHIRO, ; KOJIMA HIROAKI, ; TAKEMURA KAZUHITO, ; NAKAGAWA KATSUHIRO)

Applicant(s): HONDA MOTOR CO LTD [JP] ± (HONDA MOTOR CO., LTD, ; HONDA GIKEN KOGYO K. K)

Classification: - international: ***F01P5/06; F02B63/04; F02M21/02; F02M21/06***
- cooperative: **F02B43/00**; **F02B63/04**; **F02D19/022**; **F02D19/027**; **F02D19/0615**; **F02D19/0647**; **F02D19/0676**; **F02D29/06**; **F02M21/0224**; **F02M21/0287**; **F02M21/029**; **F02M21/06**; F01P5/06; F01P9/02; F02B63/044; F02M21/047; Y02T10/32; Y02T10/36

Application number: CN2005822860 20050920

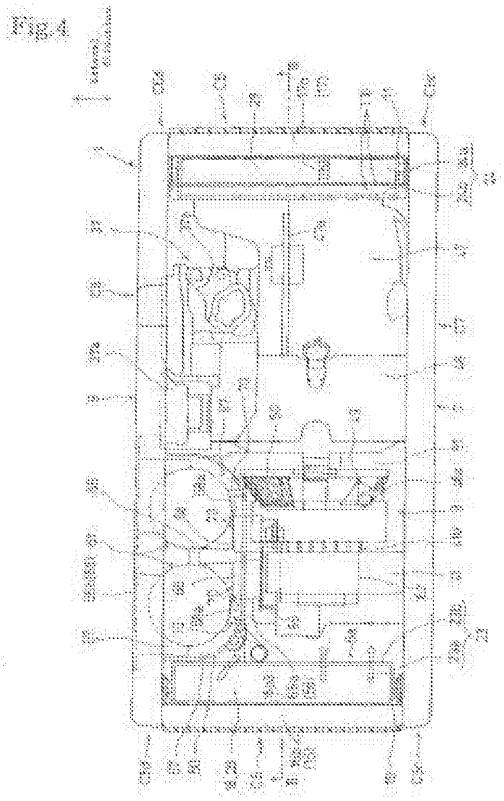
Priority number(s): JP20040285036 20040929

Also published as: CN100510347 (C) DE05785589 (T1) DE602005003347 (T2) EP1744030 (A1) EP1744030 (A4) more

Abstract of CN1981121 (A)

An engine generator (1), comprising an engine (30), a generator (40) driven by the engine (30), and a power control unit (41) controlling a power generated by the generator (40). A gas fuel stored, in a liquefied state, in cassette cylinders (61) stored in the case (C) of the engine generator (1) is supplied to the engine (30) through a fuel pressure regulator (62). The cassette cylinders (61) and the fuel pressure regulator (62) are disposed in proximity to the power control unit (41) so that the heat exchange thereof with the power control unit (41) with an inverter can be performed. As a result, heat can be mutually utilized between at least one of the cassette cylinders (61) as fuel containers and the fuel pressure regulator (62) and the power control unit (41) in the engine generator (1).

Fig.4



[19] 中华人民共和国国家知识产权局

[12] 发明专利申请公布说明书

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F02B 63/04 (2006.01)
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F02M 21/02 (2006.01)
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[22] 申请日 2005.9.20
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[86] 国际申请 PCT/JP2005/017294 2005.9.20
[87] 国际公布 WO2006/035636 日 2006.4.6
[85] 进入国家阶段日期 2007.1.5
[71] 申请人 本田技研工业株式会社
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[72] 发明人 杉本康弘 小嶋洋明 竹村一仁 中川胜博

[74] 专利代理机构 北京三友知识产权代理有限公司
代理人 陈 坚

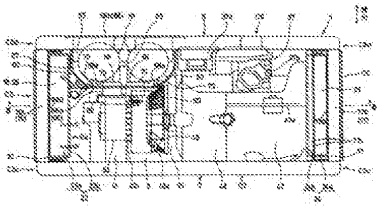
权利要求书 2 页 说明书 25 页 附图 10 页

[54] 发明名称

发动机发电机

[57] 摘要

本发明提供一种发动机发电机(1)，其具有：发动机(30)；发电机(40)，其由发动机(30)驱动；和电力控制单元(41)，其控制发电机(40)产生的电力。在容纳于发动机发电机(1)的箱体(C)内的盒式高压储气瓶(61)中，以液化状态储存有气体燃料，该气体燃料通过燃料压力调节器(62)而被供给发动机(30)。盒式高压储气瓶(61)和燃料压力调节器(62)接近电力控制单元(41)来进行配置，以便能够与具有变流器的电力控制单元(41)进行热交换。从而，在发动机发电机(1)中，在作为燃料容器的盒式高压储气瓶(61)和燃料压力调节器(62)中的至少一方与电力控制单元(41)之间，相互利用热量。



1．一种发动机发电机，该发动机发电机具有：燃料容器，其将气体燃料以液化状态储存；发动机，其被供给来自该燃料容器的气体燃料；燃料压力调节器，其调节从所述燃料容器供给到所述发动机的气体燃料的压力；发电机，其由所述发动机驱动；和电力控制单元，其控制所述发电机所产生的电力，所述发动机发电机的特征在于，

所述燃料容器和所述燃料压力调节器中的至少一方接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

2．如权利要求1所述的发动机发电机，其特征在于，

所述发动机发电机具有容纳所述燃料容器的容纳室；所述燃料容器与所述容纳室的室壁通过由热的良导体构成的传热部件进行热连接；所述室壁接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

3．如权利要求2所述的发动机发电机，其特征在于，

所述传热部件是以与所述燃料容器和所述容纳室的室壁相接触的方式介于所述传热部件与所述容纳室的室壁之间的多个柱状部件。

4．如权利要求1所述的发动机发电机，其特征在于，

所述燃料容器和所述燃料压力调节器中的至少一方与所述电力控制单元通过由热的良导体构成的传热部件进行热连接，或者直接进行热连接。

5．如权利要求1至4中任一项所述的发动机发电机，其特征在于，

所述电力控制单元具有变流器。

6．如权利要求1至4中任一项所述的发动机发电机，其特征在于，

所述发动机发电机具有箱体，所述箱体形成容纳所述燃料容器、所述发动机以及所述发电机的内部空间，

被导入所述内部空间的冷却风以顺次冷却所述燃料容器和所述电力控制单元后，冷却所述发电机和所述发动机的方式形成冷却风通路。

7．如权利要求6所述的发动机发电机，其特征在于，

相对于所述容纳室的室壁，在所述容纳室的相反侧，配置有所述燃料

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 644

压力调节器和所述电力控制单元，并且，所述电力控制单元位于所述燃料压力调节器的下侧。

8. 如权利要求 7 所述的发动机发电机，其特征在于，

所述箱体沿其一侧壁的上部具有空气导入口；所述燃料压力调节器设于所述空气导入口的下游。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 645

发动机发电机

技术领域

本发明涉及一种发动机发电机，该发动机发电机具有发动机和由该发动机驱动的发电机，以液化状态储存在燃料容器中的气体燃料被供给所述发动机。

背景技术

发动机发电机被广泛用作室外的临时电源，或是紧急情况下的电源。而且，发动机发电机例如在用作休闲用品或防灾用品的情况下，大多使用以储存在小型燃料容器例如盒式高压储气瓶中的气体燃料来作为燃料的燃气发动机。

可是，气体燃料以液化状态储存在燃料容器中，当向燃气发动机供给时，是以气化的状态进行供给。因此，当燃气发动机运转从而开始向该发动机供给气体燃料时，在燃料容器中，由于为了维持液相和气相的平衡状态，伴随着气体压力的降低，液态的气体燃料气化，所以夺取了大量的气化热，使得燃料容器的温度降低。此外，即使在调节气体燃料压力的燃料压力调节器中，也会由于刚气化后的被冷却了的气体燃料的流入或气体燃料的减压而使其温度降低。

而且，当燃料容器等的温度过度降低时，由于气体燃料的气化变得不充分等而使压力降低，从而气体燃料的供给不能顺利进行。为了防止这样的状况，就要根据燃料容器的温度或气体压力来加热燃料容器，这已为大家所知（例如，参照专利文献1、2）。

另一方面，在发动机发电机中，对发电机所产生的电力进行控制的电力控制单元由于其动作引起的发热量很大，所以公知有各种用于冷却电力控制单元的结构。例如，在专利文献3中公开有这样的技术：发动机发电机具有隔音罩，该隔音罩中容纳有发动机、发电机和控制电路单元（相当

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 646

于电力控制单元），在该发动机发电机中，在收纳控制电路单元的箱体上设置散热翼片，该散热翼片面对着取入冷却风的进风口，并与形成有进风口的端壁抵接。

专利文献 1：日本国特开平 10-131810 号公报；

专利文献 2：日本国特许第 2671015 号公报；

专利文献 3：日本国实开昭 63-171632 号公报。

在通过加热器来对储存有气体燃料的燃料容器进行加热的情况下，存在要对加热器的设计方法或加热方法进行设计等的问题、以及结构和控制方法的复杂化所带来的问题。进一步讲，在通过冷却风来冷却电力控制单元的情况下，存在着电力控制单元及其周边部件的配置受到制约或结构复杂化所带来的问题。

发明内容

本发明是鉴于如上状况，着眼于伴随着发动机发电机的运转，以液化状态储存的气体燃料的燃料容器处于温度降低的倾向，而相反，电力控制单元却处于温度上升的倾向而完成的，本发明的主要目的在于，在发动机发电机中，在燃料容器和燃料压力调节器中的至少一方与电力控制单元之间，相互利用彼此的热。本发明的再一目的在于，能够高效地进行通过燃料容器对电力控制单元的冷却和通过电力控制单元对燃料容器的加热，以及增大燃料容器和电力控制单元的配置自由度。本发明的另一目的在于，进一步提高燃料容器和燃料压力调节器中的至少一方对电力控制单元的冷却效果、以及电力控制单元对燃料容器和燃料压力调节器中的至少一方的加热效果；提高冷却风对电力控制单元、发电机以及发动机的冷却效果；在对切换损失大且发热量大的变流器进行冷却的同时，利用电力控制单元的变流器的热量来高效地加热燃料容器和燃料压力调节器中的至少一方。

为达成上述目的，本发明的发动机发电机具有：燃料容器，其将气体燃料以液化状态储存；发动机，其被供给来自该燃料容器的气体燃料；燃料压力调节器，其调节从所述燃料容器供给到所述发动机的气体燃料的压力；发电机，其由所述发动机驱动；和电力控制单元，其控制所述发电机

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 647

所产生的电力，所述发动机发电机的特征在于，所述燃料容器和所述燃料压力调节器中的至少一方接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

根据这样的结构，由于在发动机发电机的运转中，通过燃料的气化等而成为低温的燃料容器和燃料压力调节器中的至少一方接近配置在可与电力控制单元进行热交换的位置，所以，从电力控制单元的散热量增加，换言之，通过燃料容器和燃料压力调节器中的至少一方促进了电力控制单元的冷却，从而抑制了电力控制单元的温度上升。同时，燃料容器和燃料压力调节器中的至少一方被电力控制单元加热，从而抑制了其温度降低。

在本发明的发动机发电机中，也可采用这样的结构，即：所述发动机发电机具有容纳所述燃料容器的容纳室；所述燃料容器与所述容纳室的室壁通过由热的良导体构成的传热部件进行热连接；所述室壁接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

根据这样的结构，由于燃料容器中的从电力控制单元的受热，以及电力控制单元的散热都通过燃料容器的能传递热量的室壁进行，所以，为了在燃料容器与电力控制单元之间进行热交换，燃料容器和电力控制单元的配置就很少受到制约。此外，通过加大室壁或使室壁接近电力控制单元等的室壁的形状或配置，能够增加燃料容器与电力控制单元之间的传热量，从而能够提高燃料容器和电力控制单元相互之间的热利用率。

优选所述电热部件是以与所述燃料容器和所述容纳室的室壁相接触的方式介于所述传热部件与所述容纳室的室壁之间的多个柱状部件。

在本发明的发动机发电机中，所述燃料容器和所述燃料压力调节器中的至少一方与所述电力控制单元通过由热的良导体构成的传热部件进行热连接，或者直接进行热连接。

根据这样的结构，燃料容器和燃料压力调节器中的至少一方与电力控制单元之间的传热通过传热部件利用热传导进行，因此，能够进一步提高相互之间的热的利用率。

所述电力控制单元可以具有变流器。

根据这样的结构，由于变流器的切换损失大，发热量大，所以，通过

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 648

其动作而成为高温的变流器被燃料容器和燃料压力调节器中的至少一方高效地冷却，从而抑制了其温度上升；燃料容器和燃料压力调节器中的至少一方被高温的变流器高效地加热，从而抑制了其温度降低。

优选所述发动机发电机具有箱体，所述箱体形成容纳所述燃料容器、所述发动机以及所述发电机的内部空间；被导入所述内部空间的冷却风以顺次冷却所述燃料容器和所述电力控制单元后，冷却所述发电机和所述发动机的方式形成冷却风通路。

根据这样的结构，被导入箱体内部空间的冷却风被燃料容器冷却而成为更低的温度，该成为低温的冷却风首先冷却电力控制单元，然后冷却发电机和发动机。此外，电力控制单元通过与燃料容器和燃料压力调节器中的至少一方进行热的相互利用，与不进行热的相互利用的情况相比，由于成为低温，所以比冷却电力控制单元后的冷却风的温度还低。

优选采用这样的结构：相对于所述容纳室的室壁，在所述容纳室的相反侧，配置有所述燃料压力调节器和所述电力控制单元，并且，所述电力控制单元位于所述燃料压力调节器的下侧。

此外，可以使所述箱体沿其一侧壁的上部具有空气导入口；所述燃料压力调节器设于所述空气导入口的下游。

发明效果

根据本发明，可以达到如下的效果。即，通过在燃料容器和燃料压力调节器中的至少一方与电力控制单元之间相互利用彼此的热，来抑制电力控制单元的温度上升，因此，能够使电力控制单元的散热结构小型化；此外，由于抑制燃料容器和燃料压力调节器中的至少一方的温度降低，所以，或者可以不需要加热装置来加热燃料容器或燃料压力调节器，或者可以使加热装置的加热量减少，从而能够利用较低温度的加热源等，增加了加热源的选择项，此外，在加热源是电加热器的情况下，能够使其消耗电力减少。

根据本发明的优选实施方式，除了上述效果，还可达成如下的效果。即，通过室壁使燃料容器和电力控制单元的热被相互利用，在此基础上，使燃料容器和电力控制单元的配置自由度变大，此外，可以提高燃料容器

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 649

和电力控制单元相互之间的热的利用率，从而能够进一步高效地进行燃料容器对电力控制单元的冷却，以及电力控制单元对燃料容器的加热。

在本发明的实施方式中，还可进一步达成如下的效果。即，由于可以进一步提高燃料容器和燃料压力调节器中的至少一方与电力控制单元的相互之间的热的利用率，所以能够进一步提高燃料容器和燃料压力调节器中的至少一方对电力控制单元的冷却效果，以及电力控制单元对燃料容器和燃料压力调节器中的至少一方的加热效果。

在本发明的实施方式中，还可进一步达成如下的效果。即，通过温度更低的冷却风能够更高效地冷却电力控制单元，同时，发电机和发动机也能够获得更高的冷却效果。

在本发明的实施方式中，还可进一步达成如下的效果。即，能够高效地冷却发热量大的变流器，并且，能够通过变流器高效地加热燃料容器和燃料压力调节器中的至少一方。

附图说明

图 1 表示本发明的第一实施方式，是应用了本发明的发动机发电机的结构示意图。

图 2 是图 1 的发动机发电机的立体图。

图 3 是在图 2 的发动机发电机中，拆下左盖后的左侧视图，对于前盖、后盖和上盖，是沿图 4 的III-III线的截面图。

图 4 是在图 2 的发动机发电机中，拆下上盖后的俯视图。

图 5 是图 2 的发动机发电机的主视图。

图 6 是图 2 的发动机发电机的燃料切换阀和加热装置中的电路图。

图 7 是表示图 2 的发动机发电机的燃料切换阀的操作位置、燃料供给装置和点火装置之间的关系的表格。

图 8 表示本发明的第二实施方式，是相当于图 3 的图。

图 9 是在本发明的第二实施方式中，相当于图 4 的图。

图 10 表示本发明的其它实施方式，是相当于图 3 的部分的图。

标号说明

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 650

1 … 发动机发电机

3 … 下盖

4 … 上盖

5 … 前盖

6 … 后盖

7 … 左盖

8 … 右盖

9 … 内部空间

12 … 燃料切换阀

16、17、90 … 把持部

18、19、92 … 导入口

20 … 排出口

23、24、91 … 凹部

28、29、93 … 把持用空间

30 … 发动机

40 … 发电机

41 … 电力控制单元

42 … 火花塞

44 … 点火线圈

45 … 冷却风扇

46 … 反冲起动器

47 … 护罩

48 … 风扇罩

49 … 起动器罩

50、51 … 流入口

60 … 容纳部

61 … 盒式高压储气瓶

62 … 燃料压力调节器

63 … 燃料截止阀

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 651

65 … 容纳室

66 … 室壁

68 … 安装传感器

70 … 传热部件

71 … 外部高压气瓶

73 … 燃料压力传感器

74 … 切断开关

75 … 主开关

80 … 加热装置

89 … ECU

C … 箱体

Fa … 燃料供给装置

具体实施方式

以下，参照图 1～图 10 说明本发明的实施方式。

图 1～图 7 表示第一实施方式。参照图 1，应用了本发明的便携式发动机发电机 1 可适当地与设置在该发动机发电机 1 外部的外部燃料系统 Fb 连接。

一并参照图 2、图 3，发动机发电机 1 具有：箱体 C，该箱体 C 大体为长方体的箱状；搬运用的一对把持部 16、17，该把持部 16、17 设置在箱体 C 上，供搬运发动机发电机 1 时把持；发动机 30，该发动机 30 由作为内燃机的燃气发动机构成；燃料供给装置 Fa，该燃料供给装置 Fa 将气体燃料供给到发动机 30；发电机 40，该发电机 40 是由发动机 30 驱动的工作机械；电力控制单元 41，该电力控制单元 41 对发电机 40 所产生的电力进行控制；电子控制单元 89（以下，称为 ECU 89），该 ECU 89 是控制发动机 30 和燃料供给装置 Fa 的控制装置。发动机 30、燃料供给装置 Fa、发电机 40、电力控制单元 41 以及 ECU 89 被箱体 C 包围，从而被容纳在由该箱体 C 形成的内部空间 9 中。由此，箱体 C 构成抑制发动机 30 的运转噪声泄漏到外部的隔音式的箱体 C。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 652

并且，在说明书和权利要求书中，所谓对把持部 16、17 进行把持，包括用手握住把持部 16、17 的情况和将手按在把持部 16、17 上的情况。

参照图 2～图 5，箱体 C 具有：下盖 3 和上盖 4，该下盖 3 和上盖 4 在作为基准方向的上下方向上相对；前盖 5 和后盖 6，该前盖 5 和后盖 6 是在垂直于上下方向的第一方向上相对的一对侧部盖；左盖 7 和右盖 8，该左盖 7 和右盖 8 是在与上下方向和第一方向垂直的第二方向上或是横向上相对的一对侧部盖。这些盖 3～8 都是合成树脂制成的。

在本实施方式中，第一方向与前后方向一致，第一方向上的一个侧方或另一侧方是前方或后方；此外，第二方向与左右方向一致，第二方向上的一个侧方或另一侧方是左方或右方。

当从下方、上方、前方、后方、左方以及右方对箱体 C 进行观察时，此时的箱体 C 的下表面、上表面、前表面、后表面、左表面以及右表面分别是由上述盖 3～8 构成的箱体 C 中的箱体下部 C3、箱体上部 C4、箱体前部 C5、箱体后部 C6、箱体左部 C7 以及箱体右部 C8 的外表面。因此，下盖 3、上盖 4、前盖 5、后盖 6、左盖 7 和右盖 8 分别主要构成箱体下部 C3、箱体上部 C4、箱体前部 C5、箱体后部 C6、箱体左部 C7 以及箱体右部 C8。进而，前表面、后表面、左表面以及右表面是箱体 C 的四个侧面：箱体前部 C5、箱体后部 C6、箱体左部 C7 以及箱体右部 C8 是箱体 C 的四个箱体侧部。

前盖 5 和后盖 6 分别结合到一对作为加强部件的加强板 10、11 上，该加强板 10、11 由金属制成，且配置在内侧并与下盖 3 结合。然后，左盖 7 结合到各加强板 10、11 上；可开闭的右盖 8 在下端部 8b 被枢轴支撑在下盖 3 上，在上端部 8a 被卡止装置（未图示）卡止于上盖 4。此外，在各加强板 10、11 上，在比加强板 10、11 更位于内侧的前盖 5 或后盖 6 上形成一部分（例如凹部 23、24）贯通的孔（参照图 3）。此处，内侧和外侧的意思分别是指靠近内部空间 9 和靠近箱体 C 的外部。

参照图 3、图 5，在构成操作板部 5e 的前盖 5 上设置有：燃料切换阀 12；输出用插座 13，用于对电气的外部负载供给电流；外部燃料用连接器 14，用于与配置在发动机发电机 1 外部的外部高压储气瓶 71（参照图 1）

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 653

进行连接；以及指示灯 15a、15b、15c 等。

参照图 2～图 5，在前盖 5 的上部所包括的上端部 5a 上，在设有第一把持部 16 的同时，还设有一个导入口 18，该导入口 18 在发动机 30 运转过程中将外部空气作为冷却风导入到箱体 C 的内部空间 9。另一方面，隔着发动机发电机 1 和电力控制单元 41 而在前后方向上与前盖 5 相对的后盖 6 上形成有：排出口 20，用于将对电力控制单元 41、发电机 40 和发动机 30 进行冷却后的冷却风排出到外部；排气口 21，用于将发动机 30 的废气排出到外部。

当提起发动机发电机 1 进行搬运时搬运者的手所把持的部分，即第一、第二把持部 16、17，分别设置在箱体前部 C5 和箱体后部 C6 的上部 C5a、C6a 所包括的上端部。第一把持部 16 被设置为第一拐角部件，其设置在与上盖 4 大体相同的高度位置，并设置在上盖 4 的前方且前盖 5 的上方；第二把持部 17 被设置为第二拐角部件，其设置在与上盖 4 大体相同的高度位置，并设置在上盖 4 的后方且后盖 6 的上方。设置在箱体 C 的前上角部和后上角部的上述两拐角部件的整体是形成第一把持部 16 和第二把持部 17 的把持部形成部件。

第一、第二把持部 16、17 都是合成树脂制的相同的部件，分别具有上部 16a、17a 和下垂部 16b、17b，该上部 16a、17a 通过密封部件 22（参照图 3）与上盖 4 相抵，并构成箱体上部 C4 的前后方向上的两端部；该下垂部 16b、17b 从上部 16a、17a 以与前盖 5 和后盖 6 相对的方式向下方延伸。下垂部 16b、17b 向下方延伸，使得在发动机发电机 1 被提起时，能够用手从外侧部分 16b1、17b1 经由最下端 16b2、17b2 直到内侧部分 16b3、17b3 进行把持。而且，两最下端 16b2、17b2 分别位于与前盖 5 和后盖 6 的上端部 5a、6a 在该上端部 5a、6a 的横向全长中在上下方向上重叠的位置，在本实施方式中，位于与前盖 5 和后盖 6 的后述的凹部 23、24 在该凹部 23、24 的横向整体中在上下方向重叠的位置。

第一把持部 16 被设置为到达箱体前部 C5 的横向上的两端部 C5c、C5d，并在横向上的两端部通过焊接等与前盖 5 结合为一体。而且，第二把持部 17 被设置为到达箱体后部 C6 的横向上的两端部 C6c、C6d，并在

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 654

横向上的两端部通过焊接等与后盖 6 结合为一体。箱体前部 C5 的横向上的两端部 C5c、C5d 和箱体后部 C6 的横向上的两端部 C6c、C6d 分别是由左盖 7 和右盖 8 构成的部分，或者是在横向上与箱体左部 C7 和箱体右部 C8 相对应的部分。如图 4 所示，第一、第二把持部 16、17 整体在横向上的宽度（以下，将在横向上的宽度称为横宽）分别与前盖 5 的横宽和后盖 6 的横宽大体相等，此外，还与左盖 7 和左盖 7 在横向上的间隔大体相等。

第一把持部 16 与形成在前盖 5 的上端部 5a 上的凹部 23 一起形成导入口 18。凹部 23 位于比第一把持部 16 更靠近内部空间 9 的位置，并且进入内部空间 9 中。凹部 23 具有：倾斜部 23a，该倾斜部 23a 从操作板部 5e 起，越是向上方越是在前后方向上向内部空间 9 倾斜；里部 23b，该里部 23b 从倾斜部 23a 起大体与上下方向平行地向上方延伸。凹部 23 延伸成大体到达第一把持部 16 在横向上的两端部，并且该凹部 23 具有与第一把持部 16 的横宽相比，虽然稍小但大体相等的横宽。

而且，在最下端 16b2 与倾斜部 23a 之间形成导入口 18 的入口 18a（在图 3 中用双点划线表示），该入口 18a 朝前方并向斜下方敞开；在第一把持部 16 的上部 16a 与里部 23b 的上端部之间，形成导入口 18 的出口 18b（在图 3 中用双点划线表示）。此外，入口 18a 形成在第一把持部 16 的下方，导入口 18 被设置为大体到达箱体前部 C5 在横向上的两端部 C5c、C5d。导入口 18 的横宽大体与前盖 5 的横宽、以及左盖 7 和左盖 7 在左右方向上的间隔大体相等。从而，从入口 18a 流入的冷却风沿前后方向流向内部空间 9，然后沿下垂部 16b 的内侧部分 16b3 和里部 23b 偏向上方而流动，再通过上部 16a 在前后方向上向内部空间 9 偏转，然后从出口 18b 流出到内部空间 9 中。这样，第一把持部 16 和凹部 23 将导入口 18 形成为多处弯折的迷宫状的通路。

此外，在前盖 5 中，左右侧缘部 5c、5d 比操作板部 5e 向前方突出，第一把持部 16 比该左右侧缘部 5c、5d 还稍稍突出。而且，箱体前部 C5 的下部 C5b 位于比两侧缘部 5c、5d 更靠近内部空间 9 的位置。

在本实施方式中，加强板 10 的一部分被配置在导入口 18 中，从而构成冷却风的引导部 10a，以便使冷却风顺畅地流动并被导入内部空间 9。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 655

导入口 18 构成第一把持用空间 28，该第一把持用空间 28 为了在搬运发动机发电机 1 时用手把持第一把持部 16 而被使用。而且，导入口 18 形成在第一把持部 16 的下方，进而，主要由里部 23b 形成的导入口 18 的下游部分 18c 成为进入内部空间 9 的空间。从而，该把持用空间 28 的一部分与箱体上部 C4 相比位于下方，并且是进入内部空间 9 的空间。

另一方面，第二把持部 17 与在后盖 6 的上端部 6a 形成的凹部 24 一起形成第二把持用空间 29，该第二把持用空间 29 为了在搬运发动机发电机 1 时用手把持第二把持部 17 而与第一把持用空间 28 一起被使用。凹部 24 位于比第二把持部 17 更靠近内部空间 9 的位置，并且进入内部空间 9，该凹部 24 具有：倾斜部 24a，该倾斜部 24a 从排出口 20 起，越是向上方越是在前后方向上向内部空间 9 倾斜；里部 24b，该里部 24b 从倾斜部 24a 起大体与上下方向平行地向上方延伸。凹部 24 延伸成大体到达第二把持部 17 在横向上的两端部，并且该凹部 24 具有与第二把持部 17 的横宽相比，虽然稍小但大体相等的横宽。

加强板 11 的一部分延伸到与上盖 4 接触的位置，从而构成封闭部 11b，该封闭部 11b 在前后方向上对第二把持用空间 29 在前后方向上靠近内部空间 9 的部分进行大体地封闭。因此，实质上，外部空气不会通过第二把持用空间 29 而作为冷却风导入到内部空间 9。

而且，第一把持部 16 和第二把持部 17 被配置成在箱体 C 中具有垂直于前后方向的作为对称面的平面；凹部 23 和凹部 24、以及第一把持用空间 28 和第二把持用空间 29 被配置成关于该对称面大体面对称。

参照图 1 和图 3，发动机 30 是单气缸、OHC（顶置凸轮轴）型的四冲程空冷发动机，该发动机 30 具有发动机主体 30a，该发动机主体 30a 包括：气缸 31，其与可以往复移动的活塞 35 配合；曲轴箱 32，其结合在气缸 31 的下端部；气缸盖 33，其与气缸 31 一体成形，从而与活塞 35 之间形成燃烧室；以及气缸盖罩 34，其结合在气缸盖 33 的上端部；发动机主体 30a 被固定在下盖 3 上。气缸 31 和曲轴箱 32 支撑曲轴 36，且该曲轴 36 可旋转并被配置成具有平行于前后方向的旋转中心线，该曲轴 36 在活塞 35 的驱动下旋转。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 656

一并参照图 2 和图 4，发动机 30 具有进气装置 37，该进气装置 37 具有化油器 37b 和进气管 37c，该进气管 37c 与气缸盖 33 连接以便将进气导入到燃烧室。化油器 37b 是一个混合气形成装置，用于形成空气与气体燃料的混合气，所述空气来自空气滤清器 37a，该空气滤清器设有取入口 37a1，用于将从导入口 18 导入到内部空间 9 的冷却风的一部分取入；所述气体燃料是从燃料供给装置 Fa 或外部燃料系统 Fb 供给的。设置在化油器 37b 中的节气门 37b1 由步进电动机 37d 驱动，该步进电动机 37d 由具有微型计算机的 ECU 89 控制，该节气门 37b1 控制发动机 30 的输出，使得曲轴 36 以预先设定的旋转速度旋转。

发动机 30 具有排气装置 38，该排气装置 38 具有：排气管 38a，该排气管 38a 连接在气缸盖 33 上，以便来自燃烧室的废气流入管中；和消声器 38b，该消声器 38b 与排气管 38a 连接。

此外，混合气经过设置在气缸盖 33 上并由气门装置开闭的进气门 39a 而流入燃烧室，该混合气通过保持在支架 44（参照图 3）上的火花塞 42 来点火并燃烧，然后通过产生的燃烧压驱动活塞 35，从而使曲轴 36 被旋转驱动。燃烧气体作为废气，经过由气门装置开闭的排气门 39b 后，通过排气管 38a 流入消声器 38b，由消声器 38b 降低排气音量之后，经过与形成在后盖 6 上的排气口 21 相面对的排气尾管 38c 而排放到外部大气中。

参照图 1 和图 3，被发动机 30 旋转驱动的发电机 40 具有转子 40a 和定子，所述转子 40a 具有磁体，并且该转子 40a 被固定在作为发动机 30 的输出轴的曲轴 36 的轴端部；所述定子具有线圈，并且该定子被配置在转子 40a 的径向内侧并固定在曲轴箱 32 上。具有火花塞 42 的点火装置具有点火线圈 44（参照图 6），由发电机 40 产生的电力对电容器充电后，供给该点火线圈 44 的初级侧；响应于在曲轴 36 的特定的旋转位置产生的点火信号，使点火线圈 44 中产生的高电压施加给火花塞 42。

此外，被曲轴 36 旋转驱动的冷却风扇 45 结合在转子 40a 上而与转子 40a 一体旋转，从而在发动机 30 的运转中，经由导入口 18 将外部空气作为冷却风吸引到箱体 C 内。此外，发动机 30 通过作为起动装置的反冲起动器 46 的动作而被起动。反冲起动器 46 与冷却风扇 45 相连接，从而，

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 657

通过用与反冲起动器 46 的起动绳 46a 相连接的旋钮拉动起动绳 46a 的操作来驱动曲轴 36 旋转。

参照图 2～图 4，为了提高对运转噪声的隔音效果和冷却风的冷却效果，发动机主体 30a 和排气管 38a 被护罩 47 所覆盖，该护罩 47 在发动机主体 30a 和排气管 38a 之间形成冷却风的导风通路。合成树脂制的护罩 47 被固定在发动机主体 30a 上，同时，在与护罩 47 一体成形的托架 47a 中，被固定在上盖 4 上。此外，冷却风扇 45 被结合在护罩 47 前端部的合成树脂制的风扇罩 48 所覆盖；反冲起动器 46 被结合在风扇罩 48 前端部的起动器罩 49 所覆盖。冷却风扇 45 从形成在起动器罩 49 上的流入口 50 及形成在起动器罩 49 与风扇罩 48 之间的流入口 51 吸引内部空间 9 的空气，并将冷却风输送到护罩 47 内。

配置在冷却风扇 45 和反冲起动器 46 的前方以对发电机 40 产生的电力进行控制的电力控制单元 41 具有：变流器 41a，用于控制该电力的电压和频率（参照图 6）；以及散热翼片 41b，其作为散热器，用于散发包括变流器 41a 在内的电气部件所产生的热量。

而且，在箱体 C 的内部空间 9 中，电力控制部件 41、反冲起动器 46、冷却风扇 45、发电机 40、发动机主体 30a 以及消声器 38b 以该顺序，作为整体向后方，也是在从导入口 18 朝向排出口 20 的冷却风的流动方向上，串连配置在曲轴 36 的旋转中心线上。

参照图 1，燃料系统 F 向发动机 30 供给作为燃料的气体燃料，该燃料系统 F 具有：燃料供给装置 Fa，其配置在箱体 C 或箱体 C 的内部空间 9 中，是发动机发电机 1 所具有的内部燃料系统；和外部燃料系统 Fb，其配置在箱体 C 的外部。

参照图 1～图 4，燃料供给装置 Fa 具有盒式高压储气瓶 61 和燃料压力调节器 62，所述盒式高压储气瓶 61 被配置在设于箱体 C 内的作为燃料容器设置部的容纳部 60 中，是单个或多个作为第一燃料源（或主体侧燃料源）的第一燃料容器。在本实施方式中，燃料压力调节器 62 对从两个盒式高压储气瓶 61 和后述的外部高压储气瓶 71 流出的气体燃料的压力进行减压，同时，调节气体燃料的压力，以便向化油器 18b 供给与发动机 30

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 658

的负载相对应的燃料量。燃料供给装置 Fa 还具有：加热装置 80，用于对盒式高压储气瓶 61 和燃料压力调节器 62 进行加热；燃料切换阀 12，其作为燃料切换装置，设置在操作板部 5e 上；燃料配管组，其包括连接器 14，并且在箱体 C 的内部空间 9 中将盒式高压储气瓶 61、燃料压力调节器 62 以及化油器 18b 等相互连接；以及燃料截止阀 63，其使从燃料系统 F 向发动机 30 的气体燃料的供给停止。

在盒式高压储气瓶 61 中，以液化状态储存沸点较高的气体燃料，例如丁烷。此外，通过将盒式高压储气瓶 61 的燃料供给部插入在设于容纳部 60 的连接器 64（参照图 2）中，盒式高压储气瓶 61 就被可装拆地支撑在容纳部 60 中。

外部燃料系统 Fb 具有外部高压储气瓶 71、连接外部高压储气瓶 71 和连接器 14 的配管 A5、以及减压器 72，所述外部高压储气瓶 71 设置在发动机发电机 1 的外部，是作为第二燃料源（或者外部燃料源）的第二燃料容器。在比盒式高压储气瓶 61 具有更大燃料容量（即，所储存的燃料量多）的外部高压储气瓶 71 中，以液化状态储存有比第一气体燃料沸点更低的第二气体燃料，例如丙烷。该外部高压储气瓶 71 例如是家庭用丙烷高压气瓶。

容纳部 60 由形成容纳室 65 的室壁 66 构成，该容纳室 65 用于容纳两个盒式高压储气瓶 61。室壁 66 包括：第一侧壁 66a，其由热的良导体，例如铝等金属构成；第二侧壁 66b，其由右盖 8 的一部分构成；以及底壁 66c，容纳室 66 的上部在内部空间 9 敞开。两个盒式高压储气瓶 61 和容纳部 60 在沿前后方向与电力控制单元 41、燃料压力调节器 62 以及流入口 50、51 重叠的位置上，被设置得靠近右盖 8。配置在盒式高压储气瓶 61 与电力控制单元 41 及燃料压力调节器 62 之间的第一侧壁 66a 被设置成，其上部根据冷却风来讲位于导入口 18 的出口 18b 的下游，并且，位于在上下方向与出口 18b 重叠的位置。而且，第一侧壁 66a 的上端部位于内部空间 9 的大体最上部。此外，盒式高压储气瓶 61、第一侧壁 66a、燃料压力调节器 62 以及电力控制单元 41 位于在左右方向上与出口 18b 重叠的位置。

在第一、第二侧壁 66a、66b 上，为了防止或抑制由发动机 30 的运转

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 659

引起的振动传递到盒式高压储气瓶 61 上而导致盒式高压储气瓶 61 振动，设置由弹性材料构成的作为防振部件的支撑体 67，使其与盒式高压储气瓶 61 的外周面接触。

在容纳部 60 中设置有安装传感器 68，该安装传感器 68 用于检测盒式高压储气瓶 61 的有无或安装状态。安装传感器 68 被安装在设于容纳室 65 外部的安装部件 69 上，并贯通第一侧壁 66a 而位于容纳室 65 内。安装传感器 68 例如由具有接触片 68a 的微动开关构成，其通过使接触片 68a 接触盒式高压储气瓶 61 来检测盒式高压储气瓶 61 已被正确地安装。

各盒式高压储气瓶 61 接近电力控制单元 41 来进行配置，以便能够与电力控制单元 41 进行热交换。更具体地讲，盒式高压储气瓶 61 通过由热的良导体，例如铝等金属构成的传热部件 70 来与第一侧壁 66a 进行热连接。多个是柱状部件的传热部件 70 在其一端部接触盒式高压储气瓶 61，在另一端部接触第一侧壁 66a。而且，第一侧壁 66a 以邻接的状态与电力控制单元 41 接近配置，以便通过在内部空间 9 中的经由冷却风的热传导能够与电力控制单元 41 进行热交换。因此，各盒式高压储气瓶 61 被配置成经由用传热部件 70 热连接的第一侧壁 66a 能够进行与电力控制单元 41 的热交换。

以液化状态向燃料压力调节器 62 供给来自盒式高压储气瓶 61 的第一气体燃料，并且以气体状态向燃料压力调节器 62 供给来自外部高压储气瓶 71 的第二气体燃料，该燃料调压器 62 被配置在电力控制单元 41 和流入口 50、51 的正上方，并与两个盒式高压储气瓶 61、容纳部 60 的第一侧壁 66a、电力控制单元 41 以及流入口 50、51 在前后方向上重叠。而且，燃料压力调节器 62 以与电力控制单元 41 邻接的状态而接近配置，以便通过在内部空间 9 中的经由冷却风的热传导能够与电力控制单元 41 进行热交换。（在图 4 中，为了方便，燃料压力调节器 62 用双点划线表示。）进而，燃料压力调节器 62 具有使以液化状态流入的第一气体燃料气化的作为蒸发器的功能。

参照图 1，在燃料供给装置 Fa 中，由两个盒式高压储气瓶 61、连接两个盒式高压储气瓶 61 和燃料切换阀 12 的配管 A1、连接燃料切换阀 12 和燃料压力调节器 62 的配管 A2、燃料压力调节器 62、连接燃料压力调节

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 660

器 62 和化油器 18b 的配管 A3、以及设置在配管 A3 上的燃料截止阀 63 构成从盒式高压储气瓶 61 向发动机 30 供给第一气体燃料的第一燃料系统；此外，由连接连接器 14 和燃料切换阀 12 的配管 A4、连接燃料切换阀 12 和燃料压力调节器 62 的配管 A2、燃料压力调节器 62、连接燃料压力调节器 62 和化油器 18b 的配管 A3、以及燃料截止阀 63 构成从外部高压储气瓶 71 向发动机 30 供给第二气体燃料的第二燃料系统。

因此，箱体 C 内的配管 A1～A4 构成燃料配管组。此外，燃料压力调节器 62、配管 A3 以及燃料截止阀 63 在第一、第二燃料系统中是公共的公共燃料系统。

作为燃料切断装置的燃料截止阀 63，例如由在没有驱动电流被供给时为开阀状态的常开电磁阀构成，其根据第一气体燃料的压力由 ECU 89 进行开闭控制。更具体地讲，为了检测来自盒式高压储气瓶 61 的压力，在燃料压力调节器 62 上设置燃料压力传感器 73，该燃料压力传感器 73 用于检测从盒式高压储气瓶 61 到达燃料压力调节器 62 的第一气体燃料的压力。然后，当由燃料压力传感器 73 检测出压力超过上限压力 P1 的压力时，ECU 89 使燃料截止阀 63 闭阀以切断公共燃料系统。该上限压力 P1 是根据如下观点预先设定的，该观点是，在盒式高压储气瓶 61 处于过热状态时等，盒式高压储气瓶 61 内的第一燃料气体的压力成为过大的状态下，避免发动机 30 的运转，从而安全地使用发动机发电机 1。

燃料切换阀 12 将供给发动机 30 的气体燃料在通过第一燃料系统供给的第一气体燃料和通过第二燃料系统供给的第二气体燃料之间进行切换。燃料切换阀 12 可以在以下位置间进行操作：第一位置，燃料切换阀 12 在该位置将第一燃料系统与发动机 30 连接起来，以便将第一气体燃料供给发动机 30（在图 5 中，是“盒式”的位置，用单点划线表示。）；第二位置，燃料切换阀 12 在该位置将第二燃料系统与发动机 30 连接起来，以便将第二气体燃料供给发动机 30（在图 5 中，是“外部”的位置，用双点划线表示。）；停止位置，燃料切换阀 12 在该位置切断第一燃料系统和第二燃料系统与发动机 30，从而停止向发动机 30 供给气体燃料（在图 5 中，是“关断”的位置，用实线表示。），并且，第一位置与第二位置之间的切换总是

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 661

经过停止位置而进行。

一并参照图 6，此外，燃料切换阀 12 进行第一气体燃料与第二气体燃料间的燃料的切换，同时，还兼用作控制发动机 30 的运转和停止的发动机运转开关、和控制点火装置及加热装置 80 的动作和非动作的控制开关。因此，燃料切换阀 12 根据其操作位置对控制点火装置的动作和非动作的断流开关 74 进行开闭，并对控制加热装置 80 的动作和非动作的主开关 75 进行开闭。

加热装置 80 具有：电加热器 81a、81b，其作为加热源，对应每个盒式高压储气瓶 61 而设置在容纳部 60 中；电加热器 82，其作为加热源，设置在燃料压力调节器 62 中；温度传感器 83a、83b、84，其分别检测各盒式高压储气瓶 61 的温度和燃料压力调节器 62 的温度；温度传感器 85a、85b、86，其分别检测电加热器 81a、81b、82 的温度；继电器 87a、87b、88，其根据由温度传感器 83a、83b、84 和温度传感器 85a、85b、86 所检测出的温度，根据 ECU 89 的指令，开闭电加热器 81a、81b、82 的加热电路；指示灯 15a、15b（也参照图 5），其显示电加热器 81a、81b 的动作状态。

电加热器 81a、81b、82 分别加热两个盒式高压储气瓶 61 和燃料压力调节器 62，以促进液化状态的第一气体燃料的气化。由此，能够防止由第一气体燃料气化等引起的盒式高压储气瓶 61 和燃料压力调节器 62 的温度的过度降低，从而防止第一气体燃料的压力的过度降低，使得第一气体燃料稳定地供给发动机 30。

一并参照图 7，当燃料切换阀 12 位于第一位置或第二位置时，处于能够向发动机 30 供给第一气体燃料或第二气体燃料的状态，而且，从断流开关 74 断开时起，点火装置就处于可动作状态，发动机 30 处于可运转状态。（即，燃料切换阀 12 作为发动机运转开关，成为接通状态。）此外，当燃料切换阀 12 处于停止位置时，则停止向发动机 30 供给第一气体燃料或第二气体燃料，而且，从断流开关 74 闭合时起，点火装置就处于非动作状态，发动机 30 停止。（即，燃料切换阀 12 作为发动机运转开关，成为关断状态。）

另一方面，加热装置 80 只在燃料切换阀 12 位于第一位置时，由于主

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 662

开关 75 闭合而成为可动作状态，于是，通过对盒式高压储气瓶 61 和燃料压力调节器 62 进行加热的各电加热器 81a、81b、82，根据盒式高压储气瓶 61 和燃料压力调节器 62 的温度来进行加热控制。此外，当燃料切换阀 12 位于第二位置和停止位置时，由于第一气体燃料不供给发动机 30，所以，主开关 75 断开，从而加热装置 80 成为非动作状态，于是盒式高压储气瓶 61 和燃料压力调节器 62 的加热被停止。

下面，对如上构成的实施方式的作用和效果进行说明。

将燃料切换阀 12 从停止位置操作到第一位置，从而第一气体燃料处于可供给发动机 30 的状态，在该状态下，操作反冲起动机 46，从而发动机 30 起动，然后开始自力运转。然后，由发动机 30 驱动的发电机 40 所产生的电力被电力控制单元 41 控制，并被供给到插座 13 上所连接的电气设备。同时，由发动机 30 驱动的冷却风扇 45 通过流入口 50、51 吸引内部空间 9 的空气。通过该冷却风扇 45 的吸引作用，外气通过导入口 18 而被作为冷却风导入到内部空间 9。

来自导入口 18 的冷却风从内部空间 9 的最上部流入内部空间 9，其一部分通过热传导与第一侧壁 66a 和燃料压力调节器 62 进行了热交换后，流到下方以冷却电力控制 41b，进而，在与第一侧壁 66a 和燃料压力调节器 62 进行了热交换后，通过流入口 50、51 而被冷却风扇 45 吸引。然后，冷却风被冷却风扇 45 输送到护罩 47 内，在护罩 47 内对发动机主体 30a 和排气管 38a 进行了冷却后，冷却消声器 38b，并从排出口 20 被排放到外部。

当通过发动机 30 的运转，盒式高压储气瓶 61 的第一气体燃料的剩余量变得很少等，从而需要切换到外部高压储气瓶 71 的第二气体燃料时，将燃料切换阀 12 临时操作到停止位置，从而发动机 30 被停止。此时，通过断流开关 74 的动作能够使发动机 30 快速地停止。接着，将燃料切换阀 12 操作到第二位置。由此，第二气体燃料成为可供给发动机 30 的状态，然后通过反冲起动机 46 的操作使发动机 30 起动。

此处，在发动机发电机 1 的前盖 5 上形成有凹部 23，该凹部 23 位于比第一把持部 16 更靠近内部空间 9 的位置，第一把持部 16 和凹部 23 共同形成导入口 18，导入口 18 构成第一把持用空间 28，进而，在后盖 6 上

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 663

形成有凹部 24，该凹部 24 位于比第二把持部 17 更靠近内部空间 9 的位置，第二把持部 17 和凹部 24 共同构成第二把持用空间 29。

从而，由于冷却风的导入口 18 还兼用作把持用空间 28，所以第一把持用空间 28 被形成为形成内部空间 9 的前盖 5 本身，而且，由于形成第一、第二把持用空间 28、29 的一方的部分就是进入箱体 C 的内部空间 9 的凹部 23、24，所以，与将整个把持用空间形成在发动机发电机的箱体外部的情况相比，能够防止或抑制第一、第二把持部 16、17 从箱体 C 的前盖 5 和后盖 6 突出，从而第一、第二把持部 16、17 并不占用特别大的空间，因此能够使发动机发电机 1 小型化，使保管空间小。而且，由于第一、第二把持部 16、17 的存在不明显，所以第一、第二把持部 16、17 很少使发动机发电机 1 的美观受损，从而能够提高发动机发电机 1 的外观性。再者，由于冷却风的导入口 18 还兼用作第一把持用空间 28，所以不必分别设置导入口 18 和第一把持用空间 28，因此，与将把持用空间与导入口分开设置的情况相比，能够减少对箱体 C 的外观设计的制约。另外，由于第一、第二把持用空间 28、29 位于作为箱体侧部的前盖 5 和后盖 6 上，所以使发动机发电机的搬运变得容易。

此外，在发动机 30 的运转中，由于第一把持部 16 被通过导入口 18 的冷却风吹拂而冷却，所以在把持第一、第二把持部 16、17 以搬运运转中的发动机发电机 1 时，把持部不会被过分加热，从而在发动机发电机 1 的运转过程中也能够会把持部 16、17 进行把持。

第一、第二把持部 16、17 具有向下方延伸的下垂部 16b、17b，以便能够从外侧部分 16b1、17b1 经由最下端 16b2、17b2 直到内侧部分 16b3、17b3 进行握持，从而能够握住下垂部 16b、17b，因此，第一、第二把持部 16、17 的把持变得容易，从而发动机发电机 1 的搬运变得容易。

此外，通过利用具有下垂部 16b 的第一把持部 16 和凹部 23，使导入口 18 形成迷宫状的通路，因此不会因使导入口 18 成为迷宫状而使结构复杂化。而且，由于内部空间 9 通过迷宫状的导入口 18 连通到外部，所以能够能够大幅降低运转噪声的泄漏量。其结果是，不使成本增加就能够减轻通过导入口 18 泄漏到外部的运转噪声。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 664

第一把持部 16 设置在箱体前部 C5 上；导入口 18 的入口 18a 形成在第一把持部 16 的下方；第一把持部 16 和导入口 18 被设置为到达箱体前部 C5 在横向上的两端部。从而，由于在横向上把持第一把持部 16 的位置的自由度增大，所以能够选择易于把持的位置，以使发动机发电机 1 的搬运变得容易。此外，不损害外观上的美观性就能够加大导入口 18 中的冷却风的吸气面积，而且，通过跨过横向宽范围而流入内部空间 9 的冷却风能够抑制空气在内部空间 9 中的滞留，因此能够提高发动机 30、发电机 40 和电力控制单元 41 的冷却效果。

通过使导入口 18 设置在前盖 5 的上部，当发动机刚停止后处于热浸（hot soak）时，发动机 30、发电机 40 和电力控制单元 41 周围的热气通过对流而上升到内部空间 9 的上部。因此，热气易于从导入口 18 流出，从而促进箱体 C 的内部空间 9 的自然换气，由此能够促进发动机刚停止后的发动机 30、发电机 40 和电力控制单元 41 的冷却。

在前盖 5 中，左右侧缘部 5c、5d 比操作板部 5e 向前方突出，第一把持部 16 比该左右侧缘部 5c、5d 还稍稍突出，而且，箱体前部 C5 的下部 C5b 位于比两侧缘部 5c、5d 更靠近内部空间 9 的位置。因此，发动机发电机 1 即使以前盖 5 接触墙壁等的外部部件的状态被放置时，也由于在左右侧缘部 5c、5d 之间，向下方敞开的空间和下垂部 16b、17b 比两侧缘 5c、5d 突出而在侧缘部 5c、5d 与上述外部部件之间形成间隙，所以能够将充分量的外部空气作为冷却风导入至导入口 18 中。

盒式高压储气瓶 61 和燃料压力调节器 62 被配置成接近电力控制单元 41，以便与电力控制单元 41 进行热交换。因此，在发动机发电机 1 的运转中，由于燃料的气化等而变成低温的盒式高压储气瓶 61 和燃料压力调节器 62 通过经由冷却风的热传递能够与电力控制单元 41 进行热交换。因此，从电力控制单元 41 的散热量增加，换言之，通过盒式高压储气瓶 61 和燃料压力调节器 62 来促进电力控制单元 41 的冷却，以抑制电力控制单元 41 的温度上升。同时，盒式高压储气瓶 61 和燃料压力调节器 62 被电力控制单元 41 加热，以抑制其温度降低。其结果是，在盒式高压储气瓶 61 及燃料压力调节器 62 与电力控制单元 41 之间，通过相互利用彼此的热量，能够

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 665

抑制电力控制单元 41 的温度上升，因此能够使作为电力控制单元 41 的散热结构的散热翼片 41b 小型化。此外，由于抑制了盒式高压储气瓶 61 和燃料压力调节器 62 的温度降低，所以能够使加热装置 80 的加热量减少，从而能够使作为加热源的电加热器 81a、81b、82 的消耗电力减少。

盒式高压储气瓶 61 与形成容纳室 65 的第一侧壁 66a 通过传热部件 70 热连接；第一侧壁 66a 接近电力控制单元 41 而配置，以便能够与电力控制单元 41 进行热交换，从而盒式高压储气瓶 61 中的从电力控制单元 41 的受热，以及电力控制单元 41 的散热都通过传递盒式高压储气瓶 61 的热量的第一侧壁 66a 进行。因此，由于在盒式高压储气瓶 61 与电力控制单元 41 之间进行热交换，所以能够减小对盒式高压储气瓶 61 和电力控制单元 41 的配置的制约。此外，通过加大第一侧壁 66a、或者使第一侧壁 66a 与电力控制单元 41 更加接近等的第一侧壁 66a 的形状或配置，能够使盒式高压储气瓶 61 与电力控制单元 41 之间的传热量增加，从而能够提高盒式高压储气瓶 61 与电力控制单元 41 之间的相互的热量的利用率。其结果是，能够在通过第一侧壁 66a 而相互利用盒式高压储气瓶 61 和电力控制单元 41 之间的热量的基础上，加大盒式高压储气瓶 61 和电力控制单元 41 的配置的自由度，此外能够提高盒式高压储气瓶 61 和电力控制单元 41 的相互的热量的利用率，从而能够更加高效地进行盒式高压储气瓶 61 对电力控制单元 41 的冷却，以及电力控制单元 41 对盒式高压储气瓶 61 的加热。

经过导入口 18 被导入内部空间 9 的冷却风的至少一部分通过第一侧壁 66a 依次冷却了盒式高压储气瓶 61、燃料压力调节器 62 以及电力控制单元 41 后，对发电机 40 和发动机 30 进行冷却，从而，被导入内部空间 9 的冷却风被盒式高压储气瓶 61 和燃料压力调节器 62 冷却为更低的温度，该成为低温的冷却风首先冷却电力控制单元 41，然后冷却发电机 40 和发动机 30。因此，能够更加有效地冷却电力控制单元 41，并且发电机 40 和发动机 30 也能够得到更高的冷却效果。

由于变流器 41a 的切换损失大，发热量大，所以，由于其动作而成为高温的变流器 41a 被盒式高压储气瓶 61 和燃料压力调节器 62 有效地冷却，从而抑制了变流器 41a 的升温；盒式高压储气瓶 61 和燃料压力调节器 62

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 666

被高温的变流器 41a 有效地加热，从而抑制了其温度降低。其结果是，发热量大的变流器 41a 被有效地冷却，且盒式高压储气瓶 61 和燃料压力调节器 62 被变流器 41a 有效地加热。

燃料压力调节器 62 在上下方向和左右方向上处于与导入口 18 重叠的位置，并且配置在电力控制单元 41 的正上方，从而，从导入口 18 流入内部空间 9 的冷却风由于燃料压力调节器 62 而朝向电力控制单元 41 偏转方向，因此，通过从导入口 18 刚流入内部空间 9 的冷却风，能够进一步促进电力控制单元 41 的冷却。

流入口 50、51 在前后方向上位于与第一侧壁 66a 和燃料压力调节器 62 重叠的位置，从而，通过与第一侧壁 66a 和燃料压力调节器 62 的热交换而被冷却了的冷却风从流入口 50、51 流入，因此，促进了发动机主体 30a 和消声器 38b 的冷却。

下面，参照图 8、图 9 对本发明的第二实施方式进行说明。该第二实施方式在第二把持部 17 形成冷却风的导入口这一点上与第一实施方式不同，其它基本具有相同的结构。因此，对相同部分的说明加以省略或简化，以不同点为中心进行说明。并且，对与第一实施方式的部件相同的部件或对应的部件，根据需要使用了相同的标号。

第二把持部 17 与凹部 24 共同形成作为第二导入口的导入口 19。在下垂部 17b 的最下端 17b2 与倾斜部 24a 之间，形成朝向后方并与后方平行敞开的导入口 19 的入口 19a；在第二把持部 17 的上部 17a 与里部 24b 的上端部之间形成导入口 19 的出口 19b。此外，入口 19a 形成在第二把持部 17 的下方，导入口 19 被设置为大体到达箱体后部 C6 在横向上的两端部 C6c、C6d。导入口 19 的横宽与作为第一导入口的导入口 18 的横宽相等，进而与后盖 6 的横宽大体相等。

因此，从入口 19a 流入的冷却风沿前后方向朝内部空间 9 流动后，沿下垂部 17b 的内侧部分 17b3 和里部 24b 偏向上方流动，进而，通过上部 17a 而沿前后方向朝内部空间 9 偏转方向后，从出口 19b 流出到内部空间 9 中。这样，第二把持部 17 与凹部 24 形成使第二导入口 19 在多个部位弯曲的迷宫状的通路。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 667

此外，加强板 11 的一部分配置在导入口 19 中，从而构成冷却风的引导部 11a，以使冷却风顺畅地流动并被导入内部空间 9。

而且，导入口 19 构成第二把持用空间 29，该第二把持用空间 29 在搬运发动机发电机 1 时，为了用手把持第二把持部 17 而被使用。导入口 19 形成在第二把持部 17 的下方，并且，主要由里部 24b 形成的导入口 19 的下游部分 19c 进一步成为进入内部空间 9 的空间，因此，第二把持用空间 29 的一部分是比箱体上部 C4 位于下方，并且进入内部空间 9 的空间。

根据该第二实施方式，除了能够达到与第一实施方式相同的效果外，还能够达到如下的作用和效果。

即，第一、第二把持部 16、17 分别设置于在箱体 C 中隔着发电机 40 和发动机 30 而相对的前盖 5 和后盖 6 上，第一、第二把持部 16、17 与前盖 5 的凹部 23 及后盖 6 的凹部 24 共同分别形成一对导入口 18、19，从而，冷却风从两侧夹持发动机 30 和发电机 40 而流入内部空间 9 内，因此，与只有一个导入口的情况相比，由于刚流入内部空间 9 后的较低温度的冷却风流过发动机 30 和发电机 40 的周围，所以能够促进发动机 30 和发电机 40 的冷却。此外，在发动机刚停止后处于热浸时等，由于发动机 30、发电机 40 以及电力控制单元 41 周围的热气通过对流而上升到内部空间 9 的上部，所以，易于从分别位于箱体前部 C5 和箱体后部 C6 的上部 C5a、C6a 的两导入口 18、19 流出到外部，而且，与导入口只有一个的情况相比，更易于流出，从而能够进一步促进箱体 C 的内部空间 9 的自然换气。其结果是，通过来自一对导入口 18、19 的冷却风，能够提高发动机 30、发电机 40 以及电力控制单元 41 的冷却效果，而且能够促进发动机刚停止后的发动机 30、发电机 40 和电力控制单元 41 的冷却。

两导入口 18、19 在电力控制单元 41、发电机 40、发动机主体 30a 和消声器 38b 串行排列的方向上相对设置，从而，来自靠近电力控制单元 41 的导入口 18 的冷却风，与第一实施方式相同，顺次冷却电力控制单元 41、发电机 40、发动机主体 30a 和消声器 38b；另一方面，来自靠近发动机 30 的导入口 19 的冷却风的大部分流过护罩 47 的周围而从流入口 50、51 被冷却风扇 45 吸引后，被输送到护罩 47 内，以顺次冷却发电机 40、发动机

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 668

主体 30a 和消声器 38b。其结果是，由于发电机 40 和发动机 30 通过几乎没有被电力控制单元 41 加热的冷却风来进行冷却，所以能够提高发电机 40、发动机主体 30a 和消声器 38b 的冷却效果。

以下，针对变更上述实施方式的一部分结构后的实施方式，对其变更后的结构进行说明。

第一把持用空间 28 并不是如上述实施方式那样，基本上只由导入口 18 构成，如图 10 所示，也可以由内部空间 9 的一部分和第一导入口 92 来构成第一把持用空间 93。更具体地讲，第一把持部 90 与前盖 5 的凹部 91 共同形成第一导入口 92，同时，与构成前盖 5 或箱体 C 的其它盖 4 等同样地，也形成内部空间 9。即，作为用手把持的部分的下垂部 90b 的内侧部分 90b1 形成内部空间 9。此时，由第二把持部和后盖形成的第二把持用空间既可以与第一实施方式同样地被封闭，也可以与第一把持用空间 93 同样地，由内部空间 9 的一部分、和由第二把持部及后盖的凹部共同形成的第二导入口来构成。此外，在图 10 中，如双点划线例示的那样，也可以不在前盖 5 和后盖上分别形成用于形成第一导入口和第二导入口的凹部。

如果这样，由于冷却风的导入口 92 兼用作第一把持用空间 93，所以，第一把持用空间 93 被形成为形成内部空间 9 的前盖 5 本身，进而，将箱体 C 的内部空间 9 作为第一把持用空间 93 的一部分来利用，因此，与将把持用空间的整体形成在箱体 C 的外部的情况相比，能够防止或抑制第一把持部 90 从箱体 C 的前盖 5 突出。其结果是，以发动机发电机 1 的小型化和保管空间的缩小这点为首，在减少对箱体 C 的外观设计的制约等方面上，也与第一实施方式起到同样的效果。

在上述实施方式中，箱体 C 主要由 6 个盖构成，但也可以由 6 个以外的数量的盖构成。

第一、第二把持部 16、17 和导入口 18、19、92 也可以在箱体前部 C5 或箱体后部 C6 中设置在上端部以外的上部、下部、或设置在上下方向的上部与下部的中间部，此外也可以设置在箱体上部 C4 中。导入口 18、19、92 也可以以形成第一、第二把持用空间 28、29、93 为前提，沿横向被分割为多个。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 669

在上述实施方式中，第一、第二把持部由把持部形成部件的整体构成，但各把持部也可以将构成箱体 C 的箱体结构部件，例如前盖 5、后盖 6 或上盖 4 作为把持部形成部件，来一体地成型为把持部形成部件，并由其一部分构成，或者由与上述箱体结构部件不同的其它部件来构成，并一体地结合在该箱体结构部件上。第一、第二把持部也可以是能用手按住的形状。

盒式高压储气瓶 61、室壁 66 或燃料压力调节器 62 中的至少一个也可以通过由热的良导体构成的传热部件，或者直接地热连接到电力控制单元 41 的散热翼片 41b 上。从而，由于盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方与电力控制单元 41 之间的传热是通过传热部件利用热传导而进行，所以能够进一步提高相互的热量利用率。其结果是，由于盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方与电力控制单元 41 之间的相互的热量利用率进一步提高，所以，由盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方对电力控制单元 41 的冷却效果、以及由电力控制单元 41 对盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方的加热效果进一步提高。

盒式高压储气瓶 61 和燃料压力调节器 62 中的任何一个也可以对应电力控制单元 41 以能够与电力控制单元 41 进行热交换的方式进行配置。

用于配置盒式高压储气瓶 61 的燃料配置部也可以不必由容纳部 60 构成，因此，在与电力控制单元 41 之间也可以不设置室壁 66。

第一气体燃料也可以以气化状态供给燃料压力调节器 62。第 2 气体燃料也可以是丙烷以外的气体燃料，例如也可以是城市煤气，此外，第二燃料源也可以是供给第二气体燃料的管道。

加热装置 80 的加热源也可以是电加热器以外的热源，例如，也可以利用发动机废气的热等，发动机的余热。此外，由于在盒式高压储气瓶 61 及燃料压力调节器 62 与电力控制单元 41 之间相互利用彼此的热，所以通过电力控制单元 41 的热量抑制盒式高压储气瓶 61 和燃料压力调节器 62 的降温，因此能够利用较低温度的加热源等，从而增加了加热源的选择项，甚至不需要对盒式高压储气瓶 61 或燃料压力调节器 62 加热的加热装置。

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 670

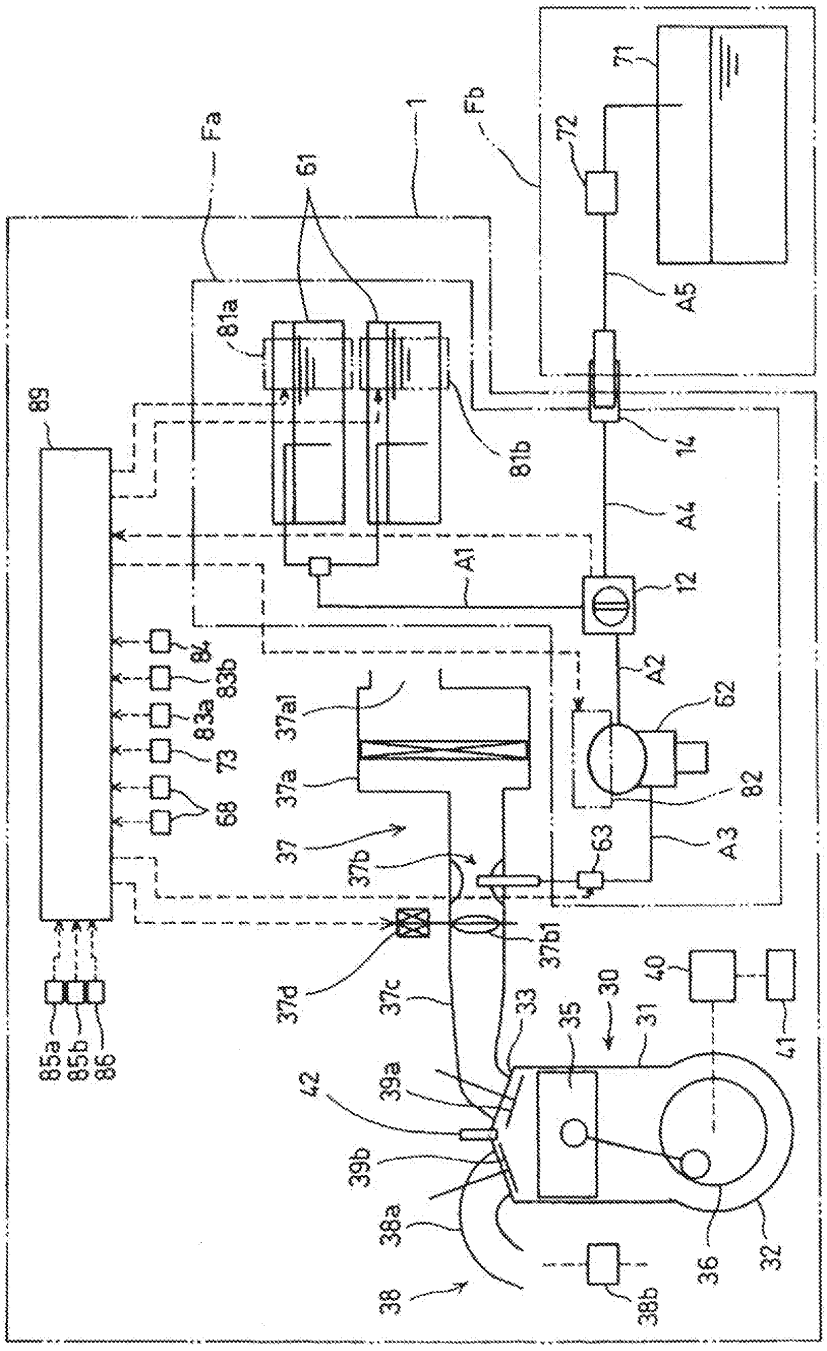


图 1

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 671

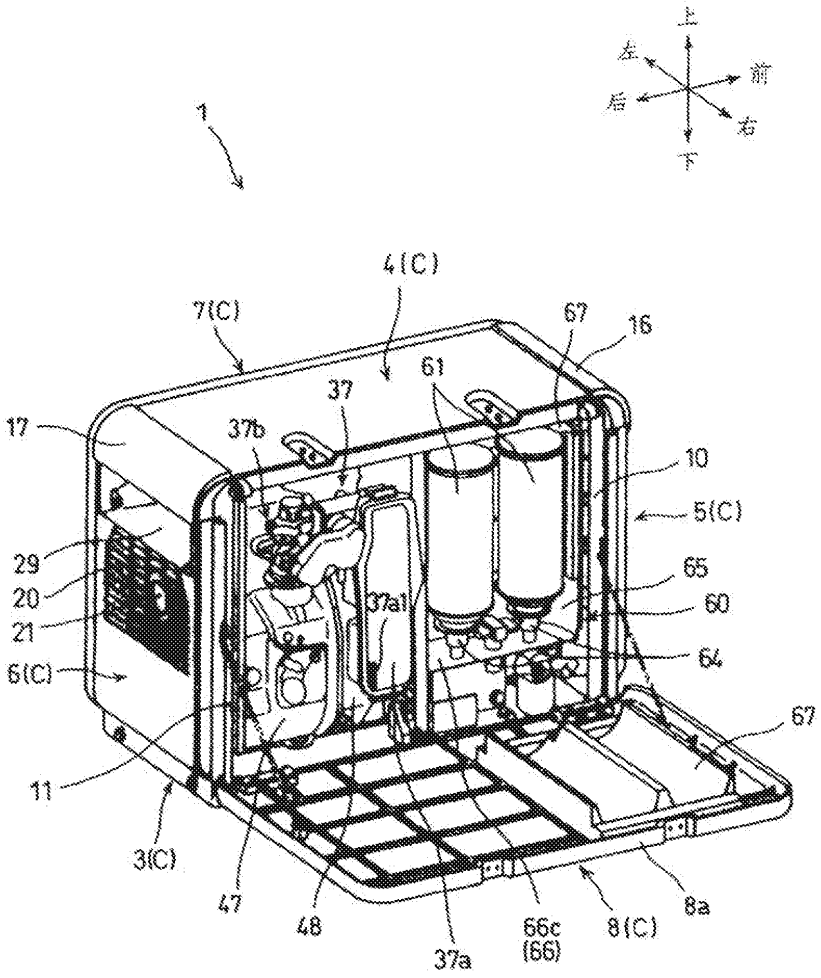


图 2

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 672

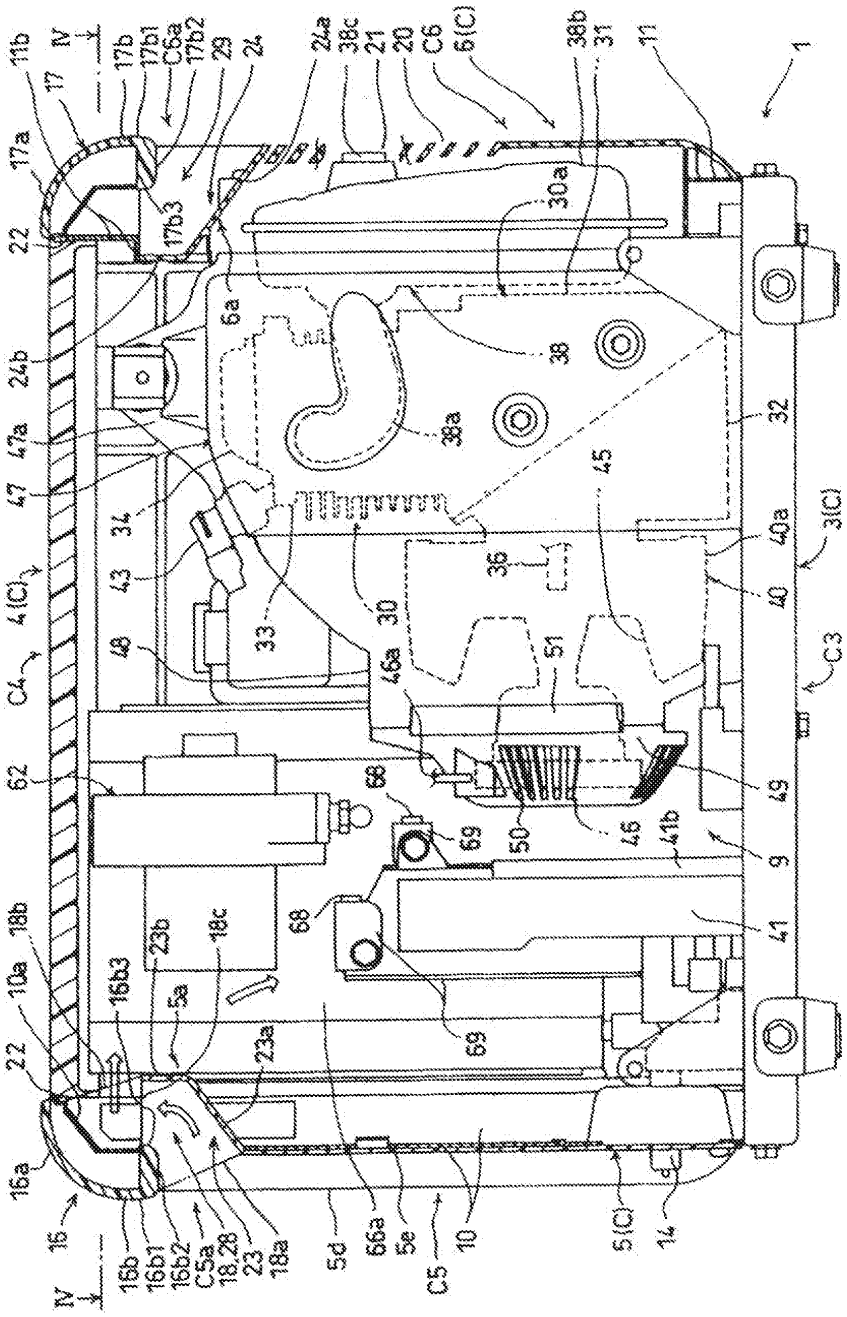


图 3

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 673

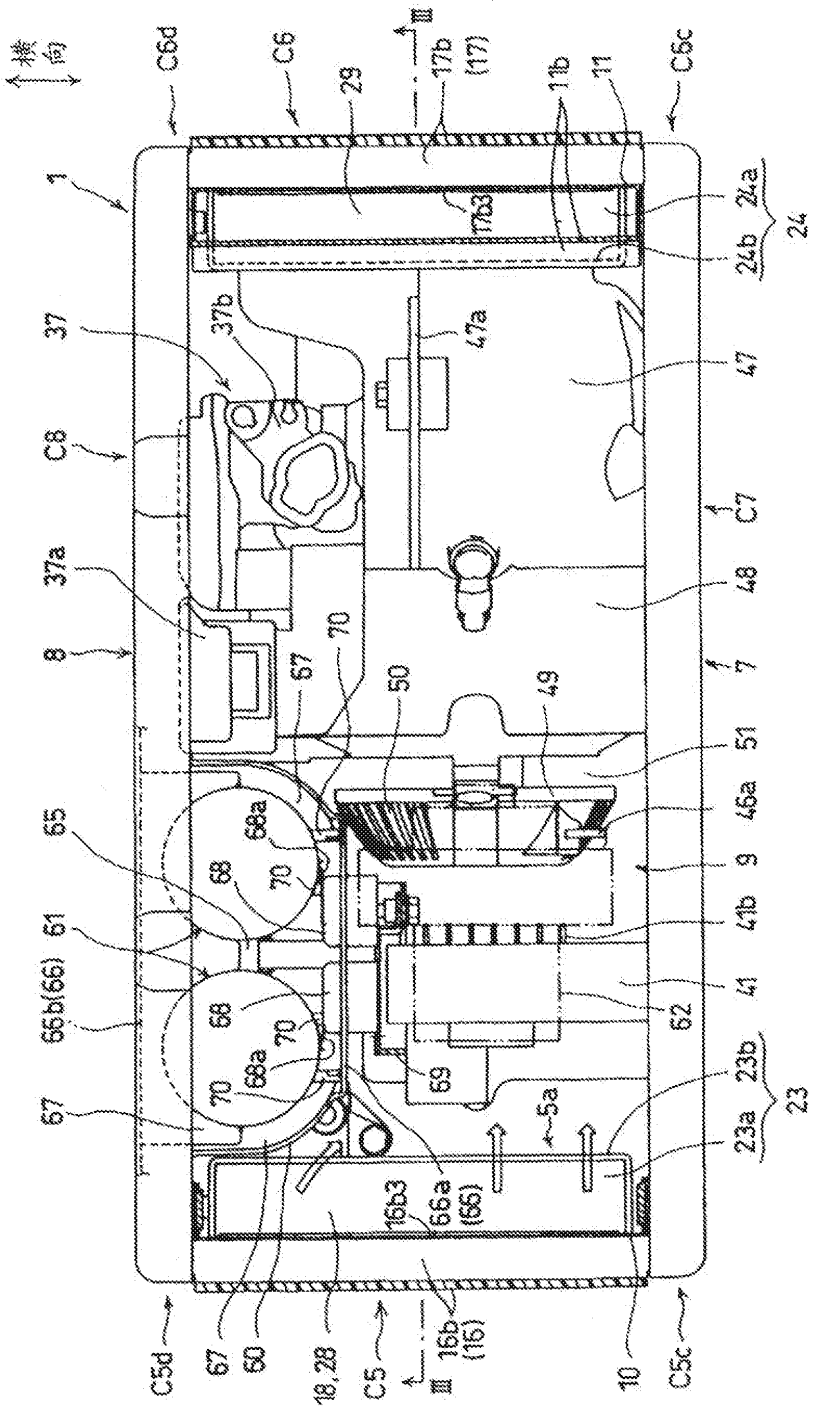


图 4

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 674

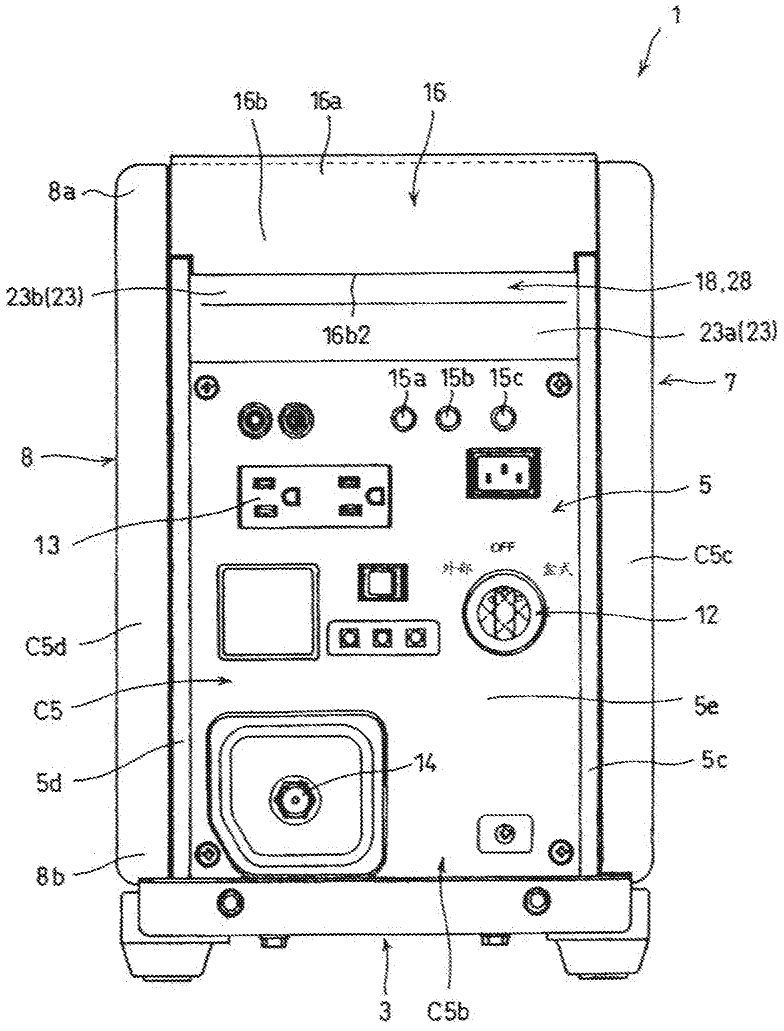


图 5

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 675

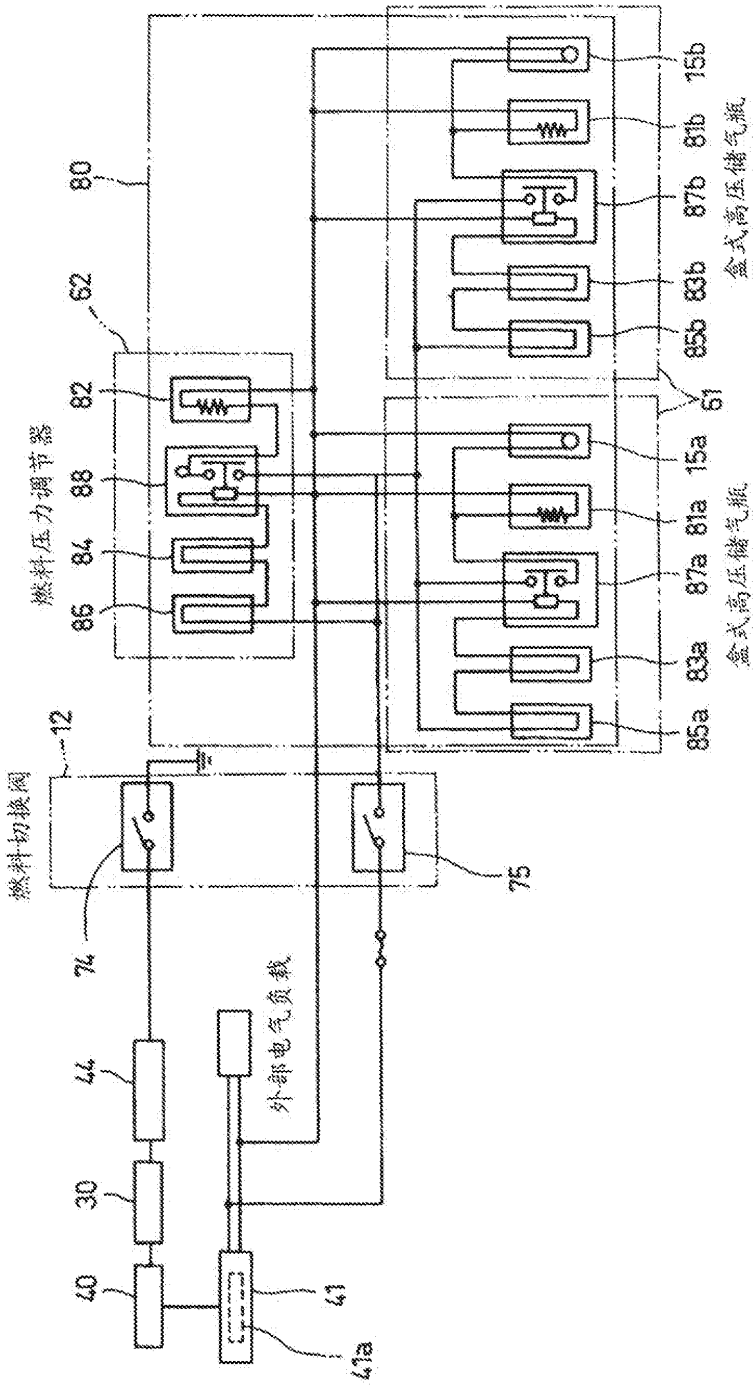


图 6

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 676

	燃料切换阀		
	第1位置	停止位置	第2位置
向发动机的气体燃料供给状态	盒式高压储气瓶的气体燃料（丁烷）的供给	供给停止	外部气体容器的气体燃料（丙烷）的供给
点火装置的动作状态	动作（断流开关断开）	非动作（断流开关接通）	动作（断流开关断开）
加热装置的动作状态	动作（加热器的主开关接通）	非动作（加热器的主开关断开）	非动作（加热器的主开关断开）

图 7

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 677

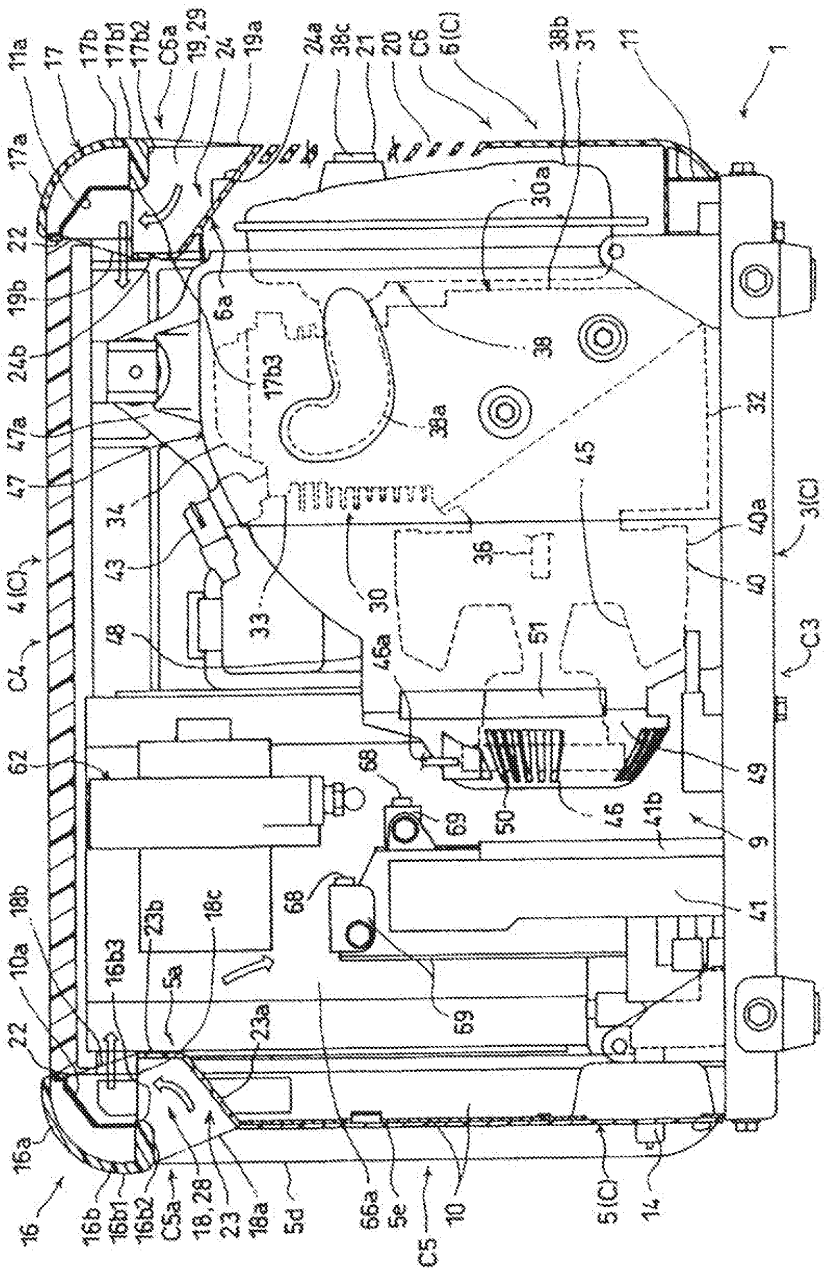


图 8

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 678

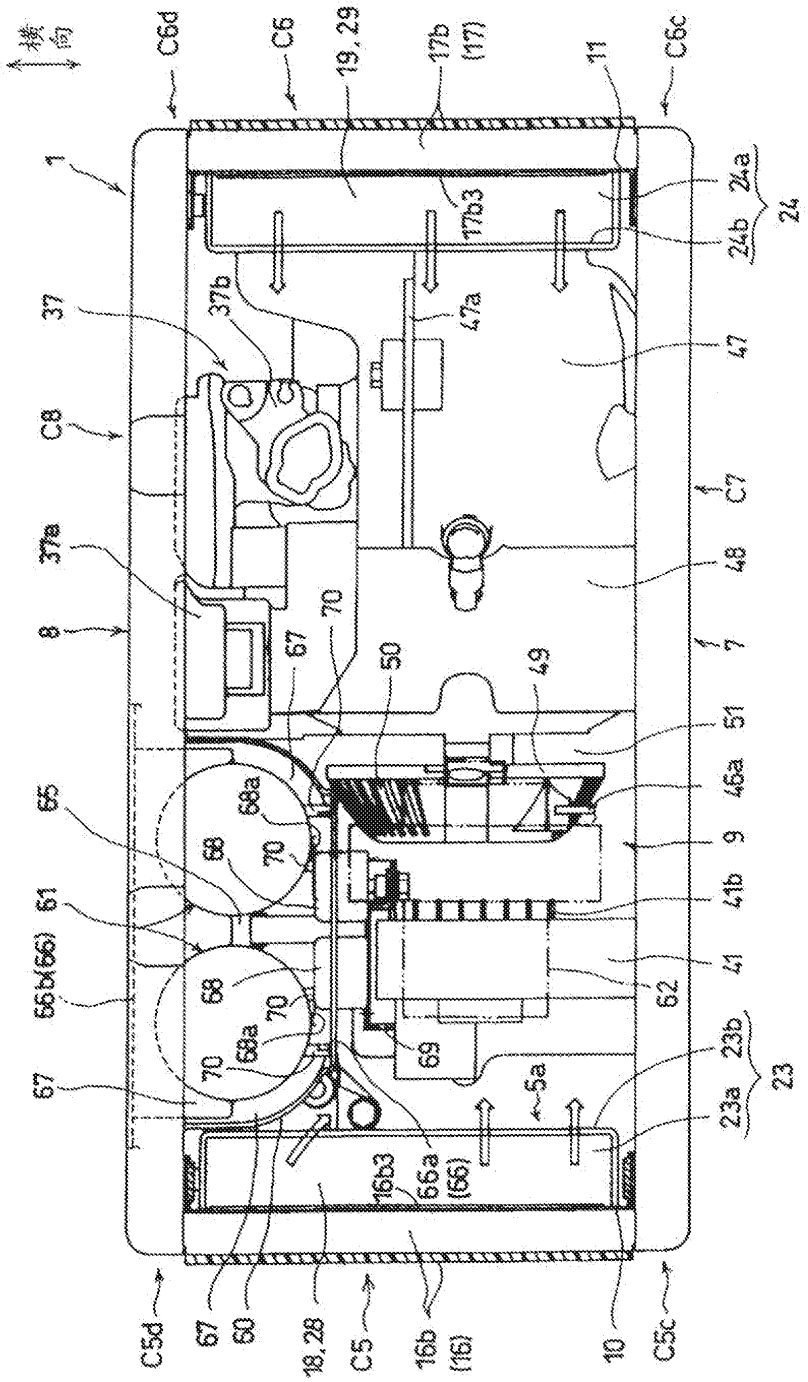


图 9

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 679

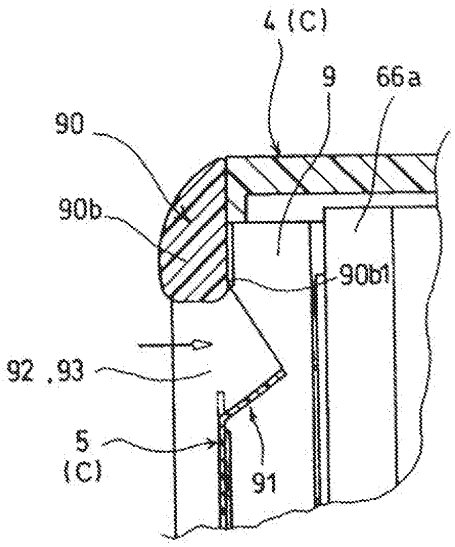


图 10

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 680

Electronic Acknowledgement Receipt

EFS ID:	32782612
Application Number:	14738060
International Application Number:	
Confirmation Number:	9670
Title of Invention:	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE
First Named Inventor/Applicant Name:	Mark J. Sarder
Customer Number:	26629
Filer:	Kevin Roger Rosin./Robyn Templin
Filer Authorized By:	Kevin Roger Rosin.
Attorney Docket Number:	CET1090.019
Receipt Date:	01-JUN-2018
Filing Date:	12-JUN-2015
Time Stamp:	14:38:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SuppIDS.pdf	1034258 cb455398a06e191d450e5a5b2d27d2f94af273a4	no	4
Warnings:					

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2	Transmittal Letter	IDSCertificationStatement.pdf	101310 e9f6cb5fe8bade27a7f1ba7ae8e78b4e042cb9eb	no	1
Warnings:					
Information:					
3	Foreign Reference	FPD1-CN1981121A.pdf	7320128 7958455bc3c299daabda6566d34902d733ecf318	no	40
Warnings:					
Information:					
		Total Files Size (in bytes):	8455696		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Customer No. 26629 Patent
Confirmation No. 9670 Attorney Docket No. CET1090.019

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	14/738,060
Filed	:	June 12, 2015
For	:	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

I hereby certify that, on the date shown below, this correspondence is being:

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37 CFR 1.8(a) **37 CFR 1.10**

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Date: May 15, 2018 /Robyn L. Templin/
Signature

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO OFFICE ACTION MAILED FEBRUARY 22, 2018

Dear Sir:

Responsive to the Office Action mailed February 22, 2018, please consider the following remarks:

In the Claims

1. (Original) A mechanical fuel lockout switch for a dual fuel engine comprising:

a mechanical fuel valve actuateable between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line and a second fuel source through a second fuel line; and

a fuel lockout apparatus coupled to the mechanical fuel valve;

wherein the mechanical fuel lockout switch:

communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and

communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position.

2. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 1, wherein the fuel lockout apparatus prevents actuation of the mechanical fuel valve to the first position when the second fuel source communicates with the dual fuel engine.

3. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 1, wherein the fuel lockout apparatus is configured to:

prevent the second fuel source from coupling to the second fuel line while the mechanical fuel valve is in the first position; and

permit the second fuel source to couple to the second fuel line while the mechanical fuel valve is in the second position.

4. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 3, wherein the fuel lockout apparatus comprises a flange rigidly coupled to the mechanical fuel valve that covers an inlet of the second fuel line while the mechanical fuel valve is in the first position and uncovers the inlet of the second fuel line while the mechanical fuel valve is in the second position.

5. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 4, wherein the mechanical fuel valve rotates between the first position and the second position and the flange rotates transversely across the inlet of the second fuel line.

6. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 4, further comprising;

a first end of a quick-disconnect hose coupling attached to the inlet of the second fuel line; and

a second end of the quick-disconnect hose coupling attached to the second fuel source to mate with the first end of the quick-disconnect hose coupling to couple the second fuel source to the second fuel line.

7. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 1, wherein the mechanical fuel valve and the fuel lockout apparatus operate together to ensure that fuel from the first fuel source and fuel from the second fuel source are not simultaneously delivered to the dual fuel engine.

8. (Original) The mechanical fuel lockout switch for a dual fuel engine of claim 7, wherein the first fuel source provides liquid fuel from a liquid fuel tank to the dual fuel engine and the second fuel source provides gaseous fuel from a pressurized fuel container to the dual fuel engine.

9. (Original) A dual fuel generator and fuel delivery system comprising:

a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising:

a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure; and

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 685

a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator; and

a mechanical fuel valve actuateable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

10. (Original) The dual fuel generator and fuel delivery system of claim 9 further comprising a fuel lockout apparatus coupled to the mechanical fuel valve; and

wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator.

11. (Original) The dual fuel generator and fuel delivery system of claim 9, wherein mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator; and further comprises:

a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurize fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.

12. (Original) The dual fuel generator and fuel delivery system of claim 11, wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.

13. (Original) The dual fuel generator and fuel delivery system of claim 11, wherein the fuel lockout apparatus further comprises a fuel inlet cover that actuates with the mechanical fuel valve to cover an inlet of the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line and to uncover mechanical fuel lockout switch the inlet of the gaseous fuel line when the mechanical fuel valve closes the liquid fuel line.

14. (Original) The dual fuel generator and fuel delivery system of claim 9, further comprising:

a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and

a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.

15. (Original) The dual fuel generator and fuel delivery system of claim 9, further comprising a regulator mounting device secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.

16. (Original) The dual fuel generator and fuel delivery system of claim 15, wherein the primary pressure regulator is mounted on the regulator mounting device.

17. (Original) The dual fuel generator and fuel delivery system of claim 16, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

wherein the regulator mounting device secures to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.

18. (Original) The dual fuel generator and fuel delivery system of claim 9, wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.

19. (Original) A method of assembling a mechanical fuel lockout switch for an internal combustion engine comprising:

providing an internal combustion engine configured to operate on a fuel from a first fuel source and a different fuel from a second fuel source;

coupling a mechanical fuel valve to the internal combustion engine actuateable between a first position and a second position to selectively control fuel flow to the internal

combustion engine from the first fuel source through a first fuel line and the second fuel source through a second fuel line; and

coupling a fuel lockout apparatus to the mechanical fuel valve;

wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the first fuel source to the internal combustion engine and prevents the second fuel source from coupling to the internal combustion engine, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the second fuel source to couple to the internal combustion engine, and interrupts the first fuel source communication with the internal combustion engine.

20. (Original) The method of claim 19, wherein the fuel lockout apparatus prevents actuation of the mechanical fuel valve to the first position when the second fuel source is coupled to the internal combustion engine.

21. (Original) The method of claim 20, wherein the fuel lockout apparatus is further configured to:

prevent coupling of the second fuel source to the second fuel line while the mechanical fuel valve is in the first position; and

permit coupling of the second fuel source to the second fuel line while the mechanical fuel valve is in the second position.

22. (Original) The method of claim 19, wherein the fuel lockout apparatus comprises a fuel inlet cover configured to actuate in unison with the mechanical fuel valve to cover a fuel inlet on the internal combustion engine for the second fuel source when the mechanical fuel valve is in the first position and uncover the fuel inlet when the mechanical fuel valve is in the second position.

23. (Original) The method of claim 19, further comprising coupling a fuel regulator system to the second fuel source to reduce fuel pressure therefrom and deliver fuel to the second fuel line at a pressure required for operation of the internal combustion engine.

24. (Original) The method of claim 23, further comprising mounting the fuel regulator system to the second fuel source located off-board the internal combustion engine.

25. (Original) The method of claim 23, further comprising:

coupling one end of a quick-disconnect hose coupling to an inlet on the internal combustion engine for the second fuel source; and

coupling a mating end of the quick-disconnect hose coupling to an outlet of the fuel regulator system.

26. (Original) The method of claim 19, further comprising providing gasoline in a liquid fuel tank as the first fuel source and LPG in a pressurized fuel container as the second fuel source.

REMARKS

Claims 1-26 are pending in the present application. In the Office Action mailed February 22, 2018, the Examiner rejected claims 1 and 7 under 35 U.S.C. §102(a)(1) as being anticipated by Sugimoto et al. (US Pub. 2007/0137591). The Examiner next rejected claims 1, 7, 8, 19, 22, and 26 under 35 U.S.C. §102(a)(1) as being anticipated by Pursifull et al. (US Pub. 2011/0168133). Claims 9, 14-18, and 23-25 were rejected under 35 U.S.C. §103 as being unpatentable over Pursifull et al. in view of Sugimoto et al.

Claims 2-6, 10-13, 20, and 21 were indicated as containing allowable subject matter. Such indication is appreciated.

Rejection under 35 U.S.C. §102(a)(1) as being anticipated by Sugimoto et al.

Claim 1

The Examiner rejected claim 1 under 35 U.S.C. §102(a)(1) as being anticipated by Sugimoto et al. (US Pub. 2007/0137591) – hereinafter "Sugimoto."

Claim 1 calls for a mechanical fuel lockout switch for a dual fuel engine provides for the selection of a desired fuel to operate the engine. The mechanical fuel lockout switch includes a mechanical fuel valve and a fuel lockout apparatus. The mechanical fuel valve actuates between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line and a second fuel source through a second fuel line. The fuel lockout apparatus couples to the mechanical fuel valve ensuring individual communication of the fuel sources to the engine. The mechanical fuel lockout switch communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position.

In rejecting claim 1, the Examiner asserted that Sugimoto discloses "a mechanical fuel valve 12 actuatable between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source 61 through a first fuel line A1 and a second fuel source 71 through a second fuel line A5 (Fig. 1, shown lines and valve)" and "a fuel lockout apparatus 63 (a fuel cutoff is coupled via the regulator 62 to the valve 12) coupled to the mechanical fuel valve." *Office Action*, February 22, 2018, p. 3-4. The Examiner further asserted that Sugimoto teaches that "mechanical fuel lockout switch: communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual

fuel engine when the mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position (Para. [0082], the switch has multiple positions which allow valve 12 connect either of the lines A1 or A4 to line A2 and also activate lockout apparatus 63)." *Id.* at 4.

Applicant respectfully disagrees with the rejection. Specifically, Sugimoto does not anticipate that which is called for in claim 1, as anticipation under pre-AIA 35 U.S.C. §102(a)(2) requires that "[t]he identical invention must be shown [in the reference] in as complete detail as is contained in the ... claim." *MPEP §2131* (citing *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). As will be set forth in detail here below, Sugimoto does not disclose each and every element of claim 1 and thus does not anticipate the claim, as "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *MPEP §2131* (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987)).

Sugimoto discloses an engine operated generator 1 that includes an engine 30 that powers an electric generator 40. *Sugimoto*, ¶¶[0041], [0042]. A fuel system F for supplying the fuel gas to the engine 30 has an internal fuel system Fa (fuel bottles 61) and an external fuel system Fb (external fuel bottle 71) disposed outside the case C of the generator. *Sugimoto*, ¶[0070]. The fuel supply system Fa includes a fuel pressure regulator 62, a fuel system selector valve 12, a connector 14, and a fuel cutoff valve 63. *Sugimoto*, ¶[0071]. The fuel pressure regulator 62 reduces the pressure of the fuel gas supplied from fuel bottles 61 and the external fuel bottle 71 and regulates the pressure of the fuel gas so that the fuel gas may be supplied to a carburetor 18b at fuel supply rate varying in proportion to load on the engine 30. *Sugimoto*, ¶[0071]. The fuel system selector valve 12 is placed on the operating panel 5e and is operated to select a fuel supply line. *Sugimoto*, ¶[0071]. The fuel pipes interconnect the fuel bottles 61, the fuel pressure regulator 62 and the carburetor 18b. The fuel cutoff valve 63 stops the flow of the fuel gas from the fuel system F to the engine 30. *Sugimoto*, ¶[0071].

In the fuel supply system Fa, a first fuel system for supplying the first fuel gas from the fuel bottles 61 to the engine 30 is constituted by the fuel bottles 61, a pipe A1 connecting the fuel bottles 61 to the fuel system selector valve 12, a pipe A2 connecting the fuel system selector valve 12 to the fuel pressure regulator 62, the fuel pressure regulator 62, a pipe connecting the fuel pressure regulator 62 to the carburetor 18b, and the fuel cut-off valve 63 placed in the pipe A3. *Sugimoto*, ¶[0079]. A second fuel system for supplying the second fuel gas from the

external fuel bottle 71 to the engine 30 is constituted by a pipe A4 connecting the connector 14 to the fuel cutoff valve 12, the pipe A2 connecting the fuel system selector valve 12 to the fuel pressure regulator 62, the fuel pressure regulator, the pipe A3 connecting the fuel pressure regulator 62 to the carburetor 18b, and the fuel cutoff valve 63. *Sugimoto*, ¶[0079].

The fuel cutoff valve 63, namely, a fuel cutoff means, is, for example, a normally-open solenoid valve which closes when energized. *Sugimoto*, ¶[0081]. The ECU 89 controls the fuel cutoff valve 63 on the basis of the pressure of the first fuel gas. *Sugimoto*, ¶[0081]. More specifically, the fuel pressure regulator 62 is provided with a pressure sensor 73 for measuring the pressure of the first fuel gas flowing from the fuel bottle 61 to the fuel pressure regulator 62. *Sugimoto*, ¶[0081]. When the pressure of the first fuel gas measured by the pressure sensor 73 is higher than an upper limit pressure P1, the ECU 89 closes the fuel cutoff valve 63 to disconnect the common fuel system from the fuel bottle 61. *Sugimoto*, ¶[0081]. The fuel system selector valve 12 connects either the first fuel system that supplies the first fuel gas to the engine 30 or the second fuel system that supplies the second gas to the engine 30 selectively to the fuel pressure regulator 62. *Sugimoto*, ¶[0082]. The fuel system selector valve 12 can be set in a first position, where the knob of the fuel system selector valve 12 is at a first position marked with "Internal fuel" to connect the first fuel system to the engine 30 to supply the first fuel gas to the engine 30, and in a second position, where the knob of the fuel system selector valve 12 is at a second position marked with "External fuel" to connect the second fuel system to the engine 30 to supply the second fuel gas to the engine 30. *Sugimoto*, ¶[0082].

However, there is no disclosure provided in Sugimoto of a fuel lockout apparatus *coupled to* the mechanical fuel valve, as called for in claim 1. That is, while the Examiner has asserted that Sugimoto discloses "a fuel lockout apparatus 63 (a fuel cutoff is coupled via the regulator 62 to the valve 12) coupled to the mechanical fuel valve," *Office Action*, supra at 4, such an assertion distorts what is disclosed in Sugimoto. Instead, Sugimoto only discloses fuel system selector valve 12 positioned at a junction of pipes A1 and A4 and fuel cut-off valve 63 placed in the pipe A3, *Sugimoto*, ¶[0079], and that fuel cutoff valve 63 is a normally-open solenoid valve that is controlled by ECU 89 on the basis of the pressure of the first fuel gas. *Sugimoto*, ¶[0081]. This positioning of fuel cut-off valve 63 and fuel system selector valve 12 at separate locations along/on pipes A1, A2, A3, A4 can be clearly seen in FIG. 1 of Sugimoto, as fuel cut-off valve 63 is shown therein as being separated from fuel system selector valve 12. Additionally, the control/operation of the fuel cut-off valve 63 and fuel system selector valve 12 are separate from one another, as fuel cutoff valve 63 is opened/closed by ECU 89 based solely on the basis of the

pressure of the first fuel gas – without any regard to the position of fuel system selector valve 12. *Sugimoto*, ¶[0081]. Accordingly, fuel cut-off valve 63 and fuel system selector valve 12 are neither mechanically coupled or operationally coupled, such that there is simply no disclosure in Sugimoto that fuel cut-off valve 63 is *coupled to* fuel system selector valve 12 as called for in claim 1.

As Sugimoto fails to disclose a fuel lockout apparatus coupled to the mechanical fuel valve, Sugimoto cannot be said to anticipate that which is called for in claim 1, as anticipation under pre-AIA 35 U.S.C. §102(a)(2) requires that "[t]he identical invention must be shown [in the reference] in as complete detail as is contained in the ... claim." *MPEP §2131* (citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). Applicant therefore respectfully requests withdrawal of the rejection of claim 1 and the claims dependent therefrom.

Rejection under 35 U.S.C. §102(a)(1) as being anticipated by Pursifull et al.

Claims 1 and 19

The Examiner rejected claims 1 and 19 under 35 U.S.C. §102(a)(1) as being anticipated by Pursifull et al. (US Pub. 2011/0168133) – hereinafter "Pursifull."

In rejecting claims 1 and 19, the Examiner asserted that Pursifull discloses "a mechanical fuel valve 120 actuatable between a first position and a second position to selectively control fuel flow to the dual fuel engine 102 from a first fuel source 112 through a first fuel line 119 and a second fuel source 134 through a second fuel line 140 (Para. [0025], the valve 120 is a three-way mechanical selection valve)" and "a fuel lockout apparatus (Controller 128, pumps 136 114, and solenoid valves 118 126) coupled to the mechanical fuel valve (Fig. 1, the lockout apparatus is coupled to the valve 120 via controller 128 and fuel lines 119/140)." *Office Action*, supra at 5. The Examiner further asserted that Pursifull teaches that "mechanical fuel lockout switch: communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position (Para. [0025], [0028], and [0066], the three-way valve and lockout apparatus determine connection of the first or second fuel to the dual fuel engine 102)." *Id.*

Applicant respectfully disagrees with the rejection. Specifically, Pursifull does not anticipate that which is called for in claims 1 and 19, as anticipation under pre-AIA 35 U.S.C.

§102(a)(2) requires that "[t]he identical invention must be shown [in the reference] in as complete detail as is contained in the ... claim." *MPEP §2131* (citing *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). As will be set forth in detail here below, Pursifull does not disclose each and every element of claims 1 and 19 and thus does not anticipate the claims, as "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *MPEP §2131* (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987)).

Pursifull discloses an engine system 100 that includes an internal combustion engine 102 having one or more cylinders 104 that may receive fuel from one or more fuel injectors 106 that inject fuel in proportion to a pulse width of a signal received from a controller 128. *Pursifull*, ¶[0021]. Fuel may be delivered to the fuel injector 106 from a fuel rail 108 by a fuel system 110. *Pursifull*, ¶[0021]. The fuel system 110 may include a fuel tank 112 and a fuel pump 114 operable by controller 128 to pump fuel from the fuel tank 112 to the fuel rail 108. *Pursifull*, ¶[0022]. A delivery check valve 116 may be positioned downstream of the fuel pump 114 to force fuel pumped from the fuel pump at a predetermined pressure to the fuel rail 108 so that fuel does not return along the same path to the fuel pump. *Pursifull*, ¶[0023]. A first solenoid valve 118 may be positioned downstream of delivery check valve 116 to control the flow of fuel to fuel rail 108 or from the fuel rail to a return line 119. *Pursifull*, ¶[0023]. In some embodiments, fuel system 110 may be what is known as a multi-fuel system that selectively provides a plurality of different types of fuel to the fuel rail 108 based on the mode of operation, such as gasoline and/or liquid propane. *Pursifull*, ¶[0024]. A three-way valve 120 may be positioned upstream of the fuel rail 108 and downstream of the first solenoid valve 118 and the return line 119 to selectively control the flow of a desired type of fuel to the fuel rail 108. *Pursifull*, ¶[0025]. The state of the three-way valve 120 may be controlled by controller 128 to vary which type of fuel is delivered to the fuel rail 108. *Pursifull*, ¶[0025]. Fuel in the fuel rail 108 may be returned to the fuel tank 112 via the return line 119, with an ejector 124 positioned in the return line 119 to provide a single fuel rail evacuation stage. *Pursifull*, ¶[0026]. A return check valve 122 is positioned in the return line 119 downstream of the ejector 124 to force fuel returning from the fuel rail 108 at a predetermined pressure to ejector 124 so that fuel is evacuated from the fuel rail 108. *Pursifull*, ¶[0027]. A second solenoid valve 126 is positioned upstream of the outlet of the ejector 124 and downstream of the fuel tank 112 that may be controlled by controller 128 evacuate the fuel rail 108. *Pursifull*, ¶[0028].

In a method for controlling for controlling a multi-fuel system as described in Pursifull, the method may include operating in the fuel rail pressurization mode where a determination is made if a first fuel from a first fuel stage or a second fuel from a second fuel is selected for delivery to the fuel rail 108. *Pursifull*, ¶[0066]. If the first fuel is selected, operating in the fuel rail pressurization mode may include, switching the three-way valve 120 to the first fuel stage, opening the solenoid valve 118 positioned downstream of the fuel pump 114 and upstream of the fuel rail 108, closing the solenoid valve 126 positioned upstream of the ejector 124 and downstream of the fuel tank 112, and operating the fuel pump 114 to deliver the first fuel from the fuel tank to the fuel rail. *Pursifull*, ¶[0066]. If the second fuel is selected, operating in the fuel rail pressurization mode may include switching the three-way valve 120 to the second fuel stage, and, operating the fuel pump 136 to deliver the second fuel from the fuel tank 134 to the fuel rail 108. *Pursifull*, ¶[0066].

However, there is no disclosure provided in Pursifull of a fuel lockout apparatus *coupled to* the mechanical fuel valve, as called for in claims 1 and 19. That is, while the Examiner has asserted that Pursifull discloses "a fuel lockout apparatus (Controller 128, pumps 136 114, and solenoid valves 118 126) coupled to the mechanical fuel valve (Fig. 1, the lockout apparatus is coupled to the valve 120 via controller 128 and fuel lines 119/140)," *Office Action*, supra at 5, such an assertion distorts what is disclosed in Pursifull. Instead, Pursifull only discloses that controller 128 functions to control pumps 136, 114, solenoid valves 118, 126, and three-way valve 120 based on whether a first or second fuel is selected for use by the engine. *See Pursifull*, ¶[0066]. This controlling of various valves/pumps by controller 128 does **not** teach a coupling of a fuel lockout apparatus and mechanical fuel valve, as called for in claims 1 and 19 – as a control/operation of these components by a common controller is not a "coupling" as would be understood by one skilled in the art. Accordingly, there is simply no disclosure in Pursifull that three-way valve 120is *coupled to* any fuel lockout apparatus – however defined by the Examiner – as called for in claims 1 and 19.

As Pursifull fails to disclose a fuel lockout apparatus coupled to the mechanical fuel valve, Pursifull cannot be said to anticipate that which is called for in claims 1 and 19, as anticipation under pre-AIA 35 U.S.C. §102(a)(2) requires that "[t]he identical invention must be shown [in the reference] in as complete detail as is contained in the ... claim." *MPEP §2131* (citing *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). Applicant therefore respectfully requests withdrawal of the rejection of claims 1 and 19 and the claims dependent therefrom.

Rejection under 35 U.S.C. §103 over Pursifull et al. in view of Sugimoto et al.

Claim 9

The Examiner rejected claim 9 under 35 U.S.C. §103 as being unpatentable over Pursifull in view of Sugimoto. In rejecting claim 9, the Examiner relied on Pursifull as disclosing the claimed "dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line" and "mechanical fuel valve actuateable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line." *Office Action*, supra at 7. The Examiner admitted that Pursifull does not disclose the claimed fuel regulator system located off board the dual fuel generator, and thus relied on Sugimoto as disclosing a fuel regulator system including "a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure" and "a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator." *Id.* at 7.-8. Applicant respectfully disagrees with the rejection.

Claim 9 specifically calls for a fuel regulator system located *off board* the dual fuel generator, with the fuel regulator system including a primary pressure regulator coupled to a service valve of the pressurized fuel source and a secondary pressure regulator coupled to the primary pressure regulator. Thus, according to claim 9, each of the primary pressure regulator and the secondary pressure regulator is located *off board* the dual fuel generator. Sugimoto – alone or in combination with Pursifull – fails to teach a fuel regulator system where both a primary pressure regulator and secondary pressure regulator are located off board the dual fuel generator. That is, while pressure reducing device 72 is included as part of external fuel system Fb that is off-board generator 1, *Sugimoto*, ¶[0073], the fuel pressure regulator 62 referenced by the Examiner is *on-board* generator 1 - as the fuel pressure regulator 62 is located between pipe A2 and pipe A3 on generator 1.

In light of the above, Sugimoto – alone or in combination with Pursifull – fails to teach or suggest a fuel regulator system located *off board* the dual fuel generator, with the fuel regulator system including a primary pressure regulator coupled to a service valve of the pressurized fuel source and a secondary pressure regulator coupled to the primary pressure regulator, i.e., each of the primary pressure regulator and the secondary pressure regulator is located *off board* the dual

Petitioner MWE Investments, LLC, et al.
Exhibit 1003, Page 696

fuel generator, as called for in claim 9. Claim 9 is therefore patentably distinct from that which is disclosed in Sugimoto and Pursifull and Applicant respectfully requests withdrawal of the rejection of claim 9 and the claims dependent therefrom.

Conclusion

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-26.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

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Attorney Docket No.: CET1090.019

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General Authorization and Extension of Time

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-2623. Should no proper payment be enclosed herewith, as by credit card authorization being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-2623. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extensions under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-2623. Please consider this a general authorization to charge any fee that is due in this case, if not otherwise timely paid, to Deposit Account No. 50-2623.

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(Not for submission under 37 CFR 1.99)

Application Number	14738060
Filing Date	2015-06-12
First Named Inventor	Mark J. Sarder et al.
Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.019

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	Attorney Docket Number	CET1090.019

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