

Propane Safety

Regulations

NFPA

Operating a propane powered floor care machine requires compliance with certain safety regulations. The National Fire Protection Agency (NFPA) Standard for Storage and Handling of LP Gas is the appropriate authority for safe propane use.

Among its regulations, NFPA #58 requires that all personnel employed in the handling of propane gas be trained in its proper handling and operating procedures. It also requires them to carry a written certification from their employer or training supervisor to attest to such training. Although this is directed mainly to those who fill and transport liquid propane gas, Onyx Environmental Solutions recommends that operators of propane powered floor care machines in public places be trained and certified as well.

With regard to operation of propane powered floor care equipment, even though NFPA 58 8-4.5 says "these machines shall be permitted to be used in buildings frequented by the public, including the times when such buildings are occupied by the public," Onyx Environmental Solutions suggests usage when occupancy of a given work area is minimal.

NFPA is a non-profit organization that was established in 1896 to create fire protection standards. Today, it is nationally recognized as the final authority in fire safety related matters. In fact, NFPA #58 regulations have been adopted by virtually all municipalities and stand as the basis for the propane gas safety regulations.

CARB / EPA

The California Air Resource Board (CARB) and Environmental Protection Agency (EPA) also set limits for propane powered engines used outdoors, but CARB/EPA approval does not signify that the engine is safe to use indoors.

CGA

The Canadian Gas Association (CGA) has set a limit of 1500 ppm CO in exhaust flow.

OSHA

For propane powered machines used indoors, the Occupational Health and Safety Administration (OSHA) has established a limit of 50 ppm CO for 8-hour time weighted average (TWA) in ambient air and is considering a limit of 800 ppm CO in exhaust flow.

DOT

The Department of Transportation (DOT) has established regulations regarding the safety of fuel cylinders including the ones used on propane powered floor care machines.

Local Agencies

Local law enforcement agencies such as the local Fire Marshall also rely on independent testing labs such as UL and CGA before giving their approval of the use of some equipment. These labs thoroughly test equipment and submit their stamp of approval only after rigorous testing. While not being required by all law enforcement agencies, the stamp of approval by these agencies further assures the operator that he or she is working with and around safe equipment.

The EnviroGard Emissions Monitoring System

All Onyx Environmental Solutions propane burnishers and strippers are equipped with the EnviroGard Emissions Monitoring System. This system provides a unique, state of-the-art, fail-safe means for ensuring emissions safety to operators and other personnel in environments where propane equipment is used.

EnviroGard employs a sensor in the exhaust path between the engine and the catalytic muffler to detect the oxygen content of the exhaust before it is passed through the catalyst. The oxygen sensor does not react to nor does it measure the CO content of the exhaust. It responds only to oxygen content.

The oxygen sensor produces an electrochemical signal that is sent to the EnviroGard Control Module. If the magnitude of this signal is not within the preset control limits, the Control Module will activate the shut down sequence and the engine will stop running.

The control limits are preset in the Control Module at the Onyx Environmental Solution factory. The air-fuel ratio is then tuned before shipping such that the CO content in the tail pipe, as measured by a digital CO detector, is not greater than 15 ppm for machines with 16 HP water-cooled Kawasaki engines and not greater than 20 ppm for machines with 17 HP air-cooled Kawasaki engines.

The Control Module is set to ignore the readings from the oxygen sensor during the first three minutes the engine is running. This period allows:

1. The sensor to reach a stable operating temperature.
2. The catalyst in the muffler to reach the temperature necessary to reduce the levels of CO, nitrogen oxides (NOx) and hydrocarbons (HC) in the exhaust.

The most common event in which the Control Module shuts down an engine is when the air filter becomes dirty enough to restrict the air intake flow, which changes the air-fuel ratio such that the oxygen sensor signal is outside the control limits. Once the air filter is properly cleaned, operation of the machine can be resumed.

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In accurate adjustments of the air-fuel ratio by technicians in the field will also result in the Control Module shutting down the engine. The recommended settings for the air-fuel ratio for both full throttle and idle are provided by Onyx Environmental Solutions in the Operator's Manual included with each machine.

For additional information on the **EnviroGard Emissions Monitoring System** and floor care machines equipped with this technology, please contact Onyx Environmental Solutions Customer Service at 1-800-858-3533.

CO Detectors for Technicians

Onyx Environmental Solutions recommends that all operators of propane powered equipment wear Carbon Monoxide Indicator badges as an extra precaution. The plastic indicator contains a colored indicator button which darkens in the presence of Carbon Monoxide. The relative darkness of the indicator button indicates the level of CO in the ambient atmosphere. Most indicator badges have a useful life of 30 days, depending on the concentration of contaminants, humidity, and temperature.

Testing

There are a great number of instruments offered on the market to test for toxic gases. Only those designed to read carbon monoxide resulting from combustion engines are considered acceptable for testing exhaust emissions from propane powered floor machines.

Some instruments are used to read "ambient air" and may be damaged if used to take readings in the muffler or tail pipe. Selecting the proper instrument is an important part of meeting the testing requirements.

Generally speaking, units capable of reading in ppm, (parts per million), at ranges from 0 to 1000 are adequate for checking ambient air (air in the breathing zone of the operator). Instruments capable of testing carbon monoxide in the exhaust should be able to read from 0 to at least 2000 ppm and should be certified by the manufacturer for that purpose.

Some instruments and systems used for these purposes are:

AMBIENT AIR MONITORING

DRAGER Model 190: Manufactured by National Drager.

SENSIDYNE gas sampling system with YB-11038 Sensidyne detector tubes

DRAGER gas sampling system with YB-4620 Drager detector tubes

GAS-TECH Model CO-95

ENERAC POCKET 60: Manufactured by Energy Efficiency System

ENGINE EXHAUST ANALYZERS

HORIBA GAS ANALYZER

ENERAC 2000 COMBUSTION ANALYZER

ENERAC POCKET 60

DATA LOGGERS

INDUSTRIAL SCIENTIFIC CORP. MODEL STX-70

CO MONITOR, Data-Logger

BIOSYSTEMS INC. "TEXILOG" Data-Logger

All instruments used for testing must be calibrated at intervals recommended by the manufacturer. The monitor, model number and date of calibration will be recorded with all test results.

Hazard Communication

It is necessary to post a Material Safety Data Sheet for propane. You will notice on this sheet that propane is highly flammable and it has a slight health risk. Because propane is odorized, it is easily detected at levels of just a few parts per million, which is much less than the exposure limit of 1000 parts per million.

If you smell propane while operating a propane floor care machine, do the following:

1. Stop the engine: Pull the throttle to the stop position (if present) or turn the key switch to the off position.
2. Shut off the service valve on the propane cylinder.
3. Move the floor machine to a well-ventilated area.
4. Remove the cylinder from the machine and take it outside the building.
5. If the cylinder is leaking, contact a DOT approved repair shop to determine the cause of the leak and have the shop, not you, repair it.

If a fire occurs while the machine is being operated do the following:

1. Stop the engine: pull the throttle to the stop position (if present) or turn the key switch to the off position.
2. Shut off the service valve on the propane cylinder if possible. Be careful not to get burned.
3. Move the machine outside if possible. If not possible, move it to a well-ventilated area away from flammable materials.
4. Do not attempt to extinguish the flame from a gas leak. If you do, the gas will build up in the area and could re-ignite. Starve the fire by shutting off the supply of gas.
5. Have the machine and cylinder inspected before using them again.