

# Safety Manual for Propane Powered Floor Care Equipment



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ENVIRONMENTAL SOLUTIONS

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# Propane Safety

## Introduction

Propane is a flammable gas whose vapors are heavier than air. As is the case with gasoline, propane can explode if the proper cautions are not heeded. Propane is odorized with an agent having a distinct odor that is recognizable at very low concentrations. This helps in identifying leaks, even when they are small.

Awareness and basic safety precautions are required when working with propane. As long as these precautions are followed, risk is negligible. Ignorance, however, could pose needless risk.

The two greatest hazards with propane powered floor care machines are:

**Carbon Monoxide Poisoning:** This is the most frequently reported incident associated with propane powered floor care machines and is caused by excessive exhaust emissions. The symptoms are headache, dizziness and nausea. A major cause involves engines with poor preventive maintenance practices, usually those with dirty air filters and machines operated in confined areas without adequate ventilation. Another cause may be substandard, inexpensive machines with no emissions control technology and improperly set carburetion.

**Overfilled Fuel Cylinders:** Nearly all fire related incidents reported result from bringing a cylinder into a building without first checking for overfill. This action is dangerous, unwise, and unnecessary.

Operating a propane powered floor care machine is not difficult and is safe. However, as in operating any piece of equipment, whether it be an automobile, lawnmower, power boat, etc., safely operating a propane powered floor care machine does require a basic knowledge of the equipment, its safety features, safe work practices and routine maintenance of the machine.

## Why Use Propane?

1. Propane is a clean burning, efficient and reliable fuel.
2. It has the unique characteristic of being a gas at atmospheric pressure and liquid when stored in a cylinder under moderate pressure. Upon release of the pressure it easily vaporizes to become a gas. It is in the gaseous state that it mixes with air and can power vapor draw engines used on floor care machines.
3. Propane is economical. It is also portable, which makes it preferable over electric units for locations having few electrical outlets.
4. Propane is extremely concentrated in its liquid state. One cubic foot of liquid propane will expand to 270 feet (82 m) of gaseous vapor at atmospheric pressure.

5. Propane is environmentally friendly. Because of its molecular structure it burns cleanly and produces low hydrocarbon and carbon monoxide emissions, far below the standards set by EPA. The OSHA limit is 50 parts per million of carbon monoxide over an 8 hour period. A properly maintained propane powered floor machine produces less than 10 parts per million carbon monoxide in the ambient or surrounding air, much less than is experienced in normal automobile traffic.
6. Propane gas is heavier than air. If it leaks or vents from the cylinder it will settle close to the floor and stay there.
7. Propane is non-toxic, unlike gasoline, diesel, methanol and ethanol. Propane is only a slight risk to health.
8. Propane has odor added for easy detection. Since raw propane has no odor, a small amount of an odorant, ethyl mercaptan, is added to give propane its characteristic pungent odor.

## Fire Safety

Be aware of the potential dangers of fire or explosion when using propane, and take normal fire-safety precautions.

- **Fire:** There is a possibility of fire from LPG vapor leaking or venting from fuel cylinders or carburetion equipment.
- **Explosion:** LPG vapor concentrated or confined to a small, restricted space may explode or ignite.
- Propane may experience a **BLEVE**, a boiling liquid expanding vapor explosion.

## Emissions

All propane powered floor care machines produce emissions. Most are harmless, but some are dangerous and can be fatal. Carbon monoxide (CO) poses the greatest risk, since CO can be lethal within as little as 30 minutes exposure at 3,000 parts per million (ppm) concentration.

Carbon monoxide is an invisible, odorless, colorless gas created when fossil fuels (such as gasoline, wood, coal, propane, oil and methane) burn incompletely. In the home, heating and cooking equipment are possible sources of carbon monoxide. Vehicles running in an attached garage could also produce dangerous levels of carbon monoxide. Any internal combustion engine not maintained properly can also produce harmful levels of CO.

# 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. A copy of this publication is available through the NFPA in Quincy, MA (1-800-334-3555).

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.

# Propane Safety

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 detective 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.

# Propane Safety

## Operator Certification

Certification is recommended for all operators of propane powered floor care equipment. Certification of operators results in a safer work environment, a reduction in engine equipment repair and maintenance, longer machine life and fewer insurance claims.

Operators of propane powered floor machines are expected to operate their equipment safely and responsibly. They are responsible for the proper handling and storage of propane cylinders, identifying potential hazards associated with their jobs and avoiding these hazards at all times. Training in this area cannot be left to chance.

Onyx Environmental Solutions offers a Propane Operators Certification Training Course throughout the year at various sites in the US.

The program includes:

1. Properties of propane
2. The propane cylinder and its components
3. Proper filling of propane cylinders
4. Transporting and storing propane cylinders
5. Attaching the cylinder to the floor care machine
6. Routine maintenance of the propane powered floor care machine.
7. Routine maintenance of the propane powered floor care machine
8. Special precautions to address safety matters.

## Propane Cylinders

Propane cylinders are constructed of either aluminum or steel. We recommend aluminum because it is lighter and guards against rusting. The cylinder used on propane powered floor machines is classified as a 4E240 cylinder. It's rated capacity is 20 lbs. and this designation refers to the model of the cylinder. Actual propane capacity achieved during filling can be less than, equal to, or slightly more than 20 lbs.

The propane cylinder used on the floor machine is a motor fuel cylinder as listed by the Department of Transportation. Unlike the common 20-lb propane outdoor grill cylinders (which are not legal for use on propane buffers), the motor fuel cylinder has a number of safety systems designed into it to ensure your safety at all times.

There are two types of 20 lb. motor fuel cylinders.

- Liquid draw
- Vapor draw

The liquid draw cylinder is used on larger vehicles like forklifts. These machines have special vaporizing carburetors to allow the propane to change from a liquid to a gas before being burned in the combustion chamber.

The vapor draw cylinder is used on small machines like the propane powered floor care machines. The vacuum generated by the engine draws up the propane gas vapor through the fuel system. The propane powered floor care machine does not have an evaporating system and will freeze up if liquid propane is introduced to it. It is necessary that special attention be paid to ensure that neither the liquid nor the vapor draw cylinders be overfilled.

## The EnviroGard Cylinders

EnviroGard offers only aluminum safety fill cylinders that guard against overfilling with a unique safety stop fill valve that automatically limits the content to 80% capacity.

Our cylinders meet DOT standards, are UL classified and CGA approved, and feature a quick connect fitting.

## Refueling Cylinders

The proper filling of propane cylinders is a subject so important that it warrants special attention. Propane cylinders should only be filled by qualified propane dealers.

Most important, propane cylinders should be filled no more than 80% of their rated capacity. The other 20%, which is about 4" (10 cm) from the top of the cylinder, is called the vapor space or headspace. This vapor can be compressed without causing the pressure relief valve to open and vent gas to the area around the cylinder. If there is no headspace to allow for fuel expansion, the pressure relief valve will open, releasing propane gas into the atmosphere. This is a very dangerous and volatile situation as there is always the possibility that enough of the vented gas could find its way down to the floor and come in contact with a pilot light from a furnace, hot water heater, or other source of ignition.

Always wear gloves when filling a propane cylinder. The boiling point, or temperature at which liquid propane changes into a gas, is -44° F (-42° C). Exposing unprotected skin to propane gas or liquid could result in frostbite injury.

All new cylinders should be vented and purged of air per manufacturer's instructions before use. Never bleed propane cylinders indoors.

# *Propane Safety*

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## **Storing Cylinders**

When not in use, propane cylinders always should be stored outside in an upright position in a secure, tamperproof, steel mesh storage cabinet. This cabinet may be located next to the building but with at least five feet (1.5 m) of space between the cabinet and the nearest building opening (door or window).

Do not install the cabinet near a stairway or street elevator as vented propane gas will seek a lower level since it is heavier than air and could find its way into the basement of the building. Do not store cylinders full or empty inside a building or inside a vehicle.

Although it is unlikely that propane will vent from a stored cylinder, if it should, the vapor could come in contact with an ignition source such as a spark from a power tool or other appliance and create a flash fire. Do not smoke or use a device with an open flame when handling or transporting propane cylinders.

## **Transporting Cylinders**

When transporting cylinders to a propane dealer or to a job, make sure the cylinders are securely fastened and standing in an upright position with the service valve closed. A cylinder rattling around in the back of a vehicle and banging into other objects constitutes a hazard. Avoid dropping or banging cylinders against sharp objects. The propane cylinders are sturdily constructed but a series of hard jolts could cause damage.

Please note that any cylinder that has been filled is always considered full, no matter how little propane gas remains in it. This is because even when all liquid has evaporated into vapor there is still some propane gas vapor left in the cylinder. Because this remaining fuel is flammable, an empty cylinder should be treated with the same careful procedures as one that is filled to the 80% level with liquid propane. The only time that a cylinder is considered empty is when it is new, before it has been filled with propane.

When transporting a propane powered floor care machine, the propane cylinder may be strapped onto the machine as long as the machine itself is firmly secured in the vehicle. Of course, spare cylinders should always be secured in an upright position.

# Using Propane Powered Floor Care Equipment

All machines manufactured by Onyx Environmental Solutions come with a detailed Operator's Manual. Safety dictates that before using any new equipment, it is important that all operators read and understand the Operator's Manual.

## Basic Safety Guidelines

- Allow only qualified and trained personnel to operate equipment.
- Follow maintenance and operating instructions.
- Check oil level before starting.
- Keep nuts and bolts tightened and hose connections snug.
- Never alter or reconstruct the fuel system. To do so may be dangerous.
- Use only UL, CTC/DOT listed cylinders, like the Onyx Environmental Solutions cylinder.
- Store the fuel cylinder outside and away from heat and direct sunlight.
- Never leave the machine running unattended.
- Check pad holder for cracks each time the pad is changed.
- Have the machine serviced by a Certified Technician, including an emission check, every three months.
- Before attempting any service on the machine, turn the ignition switch OFF and remove the key to avoid accidental start-up.
- Operate in a well-ventilated area.
- Keep hands and feet clear of rotating pads and brushes.
- Do not allow the floor care machine to operate without moving the machine. It may burn the floor and damage the floor covering.
- Only use replacement parts from the manufacturer.
- Post a Material Data Safety Sheet (MSDS) for propane.

Propane Powered machines should not be used:

- In nursing homes, hospitals, day-care centers, etc.
- By unqualified or untrained personnel.
- Unless properly maintained and adjusted
- On areas with obstructions such as thresholds, floor outlet boxes, etc.
- In areas where loose tiles or other objects are present.
- In rooms without proper ventilation.

## Operating Guidelines

Always read and understand the Operator's Manual for your machine before operating it.

### *Machine Inspection*

Regular maintenance of propane powered floor care machines is a must to keep them in good, safe working condition. Every time the machine is used, the following checkout procedure should be followed.

1. Check for overfilled cylinders. Check cylinders, and vent if necessary. Do this before taking the cylinder inside to use. Never take an overfilled cylinder inside.
2. Check the recoil dust filter. The recoil dust filter should be cleaned or replaced after each use of the machine and after each hour of continuous operation. If neglected, the engine will overheat and carbon monoxide emissions will elevate.
3. Check the oil level. The oil level should always be within the safe levels indicated on the dipstick. Add oil if necessary, but never overfill. Overfilling could cause irreparable damage to the engine.
4. Check the condition of the pad or brushes and pad holder. If the pad is dirty, it should be cleaned. Flipping the pad and using both sides will increase pad life. If the pad is torn or worn down more than 1/8" (0.3 cm), it should be replaced.
5. Enter checks in a daily maintenance log to maintain a detailed record for the machine.

## Appendix: Noise and Vibration

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Although propane powered floor machines manufactured by Onyx Environmental Solutions meet OSHA Time Weighted Average (TWA) standard for noise, we still recommend that hearing protection be worn by the operator.

Onyx Environmental Solutions measures and rates the operator-ear sound pressure level for hand-guided floor treatment and floor cleaning machines for industrial use. All tests are performed in accordance with European Machinery Directive (98/37/EC).

Onyx Environmental Solutions measures and rates the vibration at the machine-hand contact surface of hand-guided machines that are provided with handles in accordance with European Machinery Directive (98/37/EC).

## Appendix: Glossary

**Air-fuel ratio:** The % of air combined with the % of fuel to make the combustible gas. If the mixture is heavy with propane it is termed "rich". If it is heavy with air it is said to be "lean".

**Ambient air:** [1] The air in the environment of the operator and/or others. [2] The air in the "breathing zone" of the operator.

**Carb (California Air Resource Board):** CARB has recommended and the State of California has passed legislation that limits emission levels for the outdoor power equipment industry. At present these are the most restrictive limits set by any controlling organization.

**CO (Carbon Monoxide):** Carbon Monoxide is a colorless/odorless gas. It replaces oxygen in the blood. The blood then cannot deliver oxygen to the cells in the body. The symptoms of Carbon Monoxide Poisoning are headaches, dizziness, and nausea. It can lead to asphyxiation and death. The OSHA limits for CO are 50 ppm TWA.

**Catalytic muffler:** Muffler containing a catalyst to promote the reaction required to reduce the CO, HC and NOx to levels that are safe.

**EPA (Environmental Protection Agency):** This federal agency is charged with enforcing the federal clean air act, which applies to outdoor air quality.

**Exhaust Emissions:** Total amount of gases exhausted from internal combustion engines while running. 94.5% of the emissions are non-toxic. 5.5% of the emissions are toxic and are composed of 0.1% Oxides of Nitrogen (NOx); 0.1% Hydrocarbons (HC); 5.3% Carbon Monoxide (CO).

**HC (Hydrocarbons):** Some Hydrocarbons have a narcotic effect. Some cause irritation to mucous membranes. Some could be classified as cancer causing. Others react with NOx in sunlight forming smog, which can irritate the eyes and respiratory tract.

**Indoor air quality:** The quality of the air inside enclosures, (rooms or buildings). Indoor air quality may be degraded by the presence of engine exhaust, dust, sewer gases, contaminated air conditioning, chlorine, cellulose, chemical processing odors, etc.

**NOx (Oxides of Nitrogen):** Oxides of Nitrogen forms smog and acids, which are irritants to the respiratory system and can cause lung tissue damage. The OSHA limit for NOx is 25 ppm TWA.

**OSHA (Occupational Safety & Health Act):** Inspectors for OSHA are responsible for monitoring general air quality indoors where people are employed.

**Outdoor air quality:** The quality of air outside of enclosures. Outdoor air quality maybe degraded by the presence of smog, exhaust from internal combustion engines, factory smokestacks, home heating systems, etc.

**Oxygen Sensor:** A sensor placed in the exhaust stream which generates an output signal from an electrochemical reaction that is dependent on the concentration of oxygen in the exhaust.

**TWA (Time Weighted Average):** The average exposure over a specified period. EXAMPLE: OSHA TWA limit for CO is 50 ppm exposure for 8 continuous hours.

TWA is difficult to measure but can be easily calculated from the CO reading in ambient air using the following formula:

$$TWA = \frac{173.6 \times C \times D \times R \times N \times T}{A \times H}$$

Where C = % CO in ambient air; D = engine size in cubic inches; R = engine RPM while operating; N = number of cylinders; T = operating time in hours; A = area of store in square feet; H = ceiling height of store in feet.

Example: A store has 25,000 sq. ft. area and 10-foot ceilings with the ventilation turned off and doors closed. A 30.1 cubic inch, 2 cylinder propane powered buffer is used for 2 hours at 3600 rpm engine speed. The CO reading is 0.01% (100 ppm) which is the average of the reading taken after the first hour of operation and that taken after the second hour of operation.

TWA = 3.0 ppm, which is far below the 50 ppm OSHA limit.

# Appendix: ***Suggested Guidelines for Propane Powered Floor Care Machines***

## **Purpose**

To ensure the safety of all persons occupying or visiting buildings in which propane powered floor care machines are being used to maintain floors, the following guidelines will be followed by all floor care contractors.

## **Training**

1. All operators of propane powered floorcare machines will be properly trained and certified in the safe operation of propane powered floor care machines. They are required to have, on their person, a valid certification card indicating what training they have successfully completed. The employer (contractor) is responsible for documenting training.
2. Each person engaged in installing, repairing, or servicing an LP-Gas engine fuel system shall be properly trained and certified for the necessary procedures. (NFPA 58 8-1.4)

## **Fire Safety**

1. An MSDS (Material Safety Data Sheet) for propane shall be posted in all buildings where propane will be used.
2. A lockable ventilated metal locker or rack (cage), will be supplied and used to store fuel cylinders outside in accordance with NFPA 58 5-4.2.1(b).
3. Each fuel cylinder will be checked for "over-fill" before it is taken into the building. NO over-filled cylinders will be taken into the building.
4. All fuel cylinders will be stored OUTSIDE in the storage locker (cage) when not in use. Absolutely no fuel cylinders will be stored inside the building. The propane powered floor care machine may be kept in the building when not being used but the fuel cylinder MUST be removed from the machine and stored outside in the cage.
5. No more than two fuel cylinders will be allowed in the building for each machine being used at any time (one on the machine and one if the crew is "locked in" and cannot get outside for a refill during their shift).

## **Propane Powered Floor Care Machines**

1. Only UL listed propane powered floor care machines will be used. Those with component listing only will NOT be allowed.
2. Each propane powered floor care machine will be maintained in a "Safe" condition at all times. To assure compliance, the following is required of each propane powered floor care machine used.
  - a. Each machine will be serviced monthly or after every 100 hours of use.
  - b. A "Machine Maintenance Record" will be kept on each machine showing:
    - Serial number
    - Service performed
    - Hour meter reading
    - Condition of the machine and fuel system
    - PPM (parts per million) of carbon monoxide as recorded IN the exhaust muffler or tail pipe at full throttle before any adjustments have been made.
    - PPM of carbon monoxide as recorded IN the muffler or tail pipe at full throttle after any adjustments have been made (CARBON MONOXIDE READINGS AT THIS POINT WILL NEVER EXCEED 1500 PPM).
3. One copy of the "Machine Maintenance Record" of each machine used in the building will be filled with the Manager of the Building/Store. Failure to do this could terminate the contract.
4. Dust and air filters must be inspected and cleaned before each operation of the machine. At no time is the machine to be operated with a dirty filter or without the filter in place.

## ***Suggested Guidelines***

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### **Safety IAQ (Indoor Air Quality)**

1. Propane powered floor care machines are not to be operated in any buildings unless the air conditioning/heating ventilation system is in operation.
2. Carbon monoxide readings of ambient air (at the operator's breathing level) while operating the propane powered floor care machine will be taken once each month and recorded on a logbook provided by the building/store manager. Each test session shall be no less than 60 seconds in length and shall be done while operating the propane powered floor care machine during a routine work period.
3. Periodic, unannounced tests of ambient air should be made by the building management with a "Data-Logger" designed to read and log the carbon monoxide in ppm (parts per million) at 1 (one) minute intervals with a range of 0 to 1000 ppm. Each test session shall be no less than 15 minutes in length and shall be done while operating the propane powered floor care machine during a routine work period. Air sampling should be done in the "breathing range" of the operator.
4. If find any readings of ambient air carbon monoxide greater than 24 ppm at any time it will be necessary to discontinue the use of the propane powered floor care machine until it has been properly serviced and certified as complying with the guidelines.

### **Testing Equipment Requirements**

There is a great number of instruments offered on the market to test for toxic gases. Only those designed to read carbon monoxide resulting from combustion of propane gas in an internal combustion engine are considered acceptable for testing exhaust emissions from propane powered floor care 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.

### **Enforcement**

If found to be operating, or allowing employees to operate, machines in violation of any part of these guidelines the following discipline will be exercised:

1. First offense: loss of one (1) week's income from the store where violation occurred.
2. Second offense: loss of contract for the store where violation occurred.
3. Third offense: Loss of entire contract with the chain (named).

## ***Appendix: Crisis Management***

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It is our sincere desire that the information presented in this section will never be called into practical application. However, in the event of a crisis situation, the following steps are recommended.

1. Notify the appropriate assistance agencies (Medical Emergency, Police, Fire Department, etc.) Alert these agencies of the involvement or suspected involvement of propane gas. This will allow them to use appropriate safety precautions in dealing with problems at the site.
2. Notify your Onyx Environmental Solutions Distributor.
3. The Onyx Environmental Solutions Distributor should then notify the Onyx Environmental Solutions Customer Service (800-858-3533).

### **What is a Crisis?**

For our purposes, a crisis is an event or occurrence involving injury to a person and/or property caused, or possibly caused, by a propane powered floor care machine.

In the event of a “crisis”, upon being notified, the Distributor on site should contact Onyx Environmental Solutions immediately.

Distributors should promptly attempt to get all the facts involved in the accident by filling out a Onyx Environmental Solutions Accident or Claim Investigation Report. Immediately secure all equipment and/or chemical product alleged to be involved in the incident. If acquisition of these items is not possible, make every effort to arrange for the local Fire Marshall or police authorities to “quarantine” the items.

Immediately upon being notified of an accident, Onyx Environmental Solutions Customer Service will assess the seriousness of the matter. Initial findings will be communicated to Onyx Environmental Solutions immediately.

All persons involved in the crisis should fully cooperate with the officials involved in any subsequent investigation.

Constant contact needs to be maintained with Onyx Environmental Solutions for guidance and direction at all times.



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## INVESTIGATION OF ACCIDENT OR CLAIM

Go to the scene of the accident and try to get answers to all the following questions. Your questions should be addressed to all witnesses and you should also try to get a copy of all accident reports prepared by **anyone** (property owner, store manager, public officials, etc.).

1. Who was involved in the accident? Get names and addresses of all persons who were, or **may have been** damaged, including date of birth (DOB) and Social Security Number (SSN) if available.
2. Where did the incident take place? State location specifically, including the exact place of the incident (fresh produce area, soft drink aisle, warehouse, etc.)
3. When did the incident take place? State date and exact time, if known.
4. Describe the incident in as detailed manner as possible.
5. Get names and addresses of all persons who witnessed the incident.



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6. If any of the witnesses are reasonably accessible by phone or in person, get their statements. Try to determine exactly what happened.
  
7. If the claimant is reasonably accessible in person or by phone, ask him/her to describe the accident in as detailed a manner as he/she recalls. Never make any statement that could be construed as an admission of liability – just get the facts.
  
8. Try to obtain copies of any accident reports that may have been prepared by the person in charge of the premises and attach to this report.
  
9. If any Onyx Environmental Solutions equipment was involved, try to get possession of it. Preserve it in the same condition as received and call Onyx Environmental Solutions for further instructions. Do not make any comment as to potential causes or corrections.
  
10. The following additional information should be obtained in all **slip/fall incidents** (since you know that it is virtually impossible for any properly maintained floor treated with Onyx Environmental Solutions chemical products **exclusively** to be slippery, it is **most** important that you try to think of all possibilities that could have caused the alleged incident) in order to determine the possible causes for the incident.
  - a. Were Onyx Environmental Solutions chemical products **the only chemicals** used on the floor at or prior to the time of the incident?
  
  - b. What were the weather conditions like at the time of the accident, or within a few hours earlier?  
 Clear  
 Cloudy  
 Precipitation (snow, rain, sleet, etc.)
  
  - c. Was the floor of the accident location properly maintained and clean? Check all that apply:  
 Clean  
 Wet  
 Dry  
 Free of debris



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- d. Was the location of the accident at or near a store area that could be responsible for unusual debris, paper, liquid, matter, etc.? Try to determine from what direction the claimant was walking when the incident took place since he/she may have picked up some slippery debris on the soles of his/her shoes. Check out those areas carefully.
- e. Check the janitorial supply closet for evidence as to possible use of oil-treated dust mops or cleaning solutions containing ammonia, degreaser or any oil distillates.
- f. What kind of shoes did the injured person wear? Were they new? High heels? Rubber or leather soles?
- g. What is the age of the claimant? Does the claimant appear in good health? Any signs of alcohol and/or drug impairment or any medical condition that may have been a cause of the accident?
- h. Check all applicable statement about the store  
\_\_\_\_\_ Record of slip resistance tests  
\_\_\_\_\_ Record of daily or weekly floor maintenance  
\_\_\_\_\_ Adeqate walk-off mats
11. On the basis of your investigation, provide your personal opinion as to what causes may have contributed to the accident.

The above investigation conducted by:

Signature \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

Submit report immediately to:  
Onyx Environmental Solutions, Inc.  
137 Cross Center Rd. Ste 246  
Denver, NC 28037  
1.800.858.3533 or 1.704.827.9368  
FAX 1.704.820.2892

*Onyx Environmental Solutions, Inc.*

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