



Patent Official #20130283768

MANUAL

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For technical support and ecoBrew™

Contact

Captain Ted Spath, President

+1-317-445-3873

Fax +1-877-792-8363

Capt.ted@clean-exhaust.com

www.clean-exhaust.com

peace of mind is available to all yachts with **clean-exhaust** service and support

June 2018

The **ProMinent Beta^R** is a microprocessor-fed diaphragm solenoid metering pump. The Feed Rate is determined by Stroke Length and Stroke Frequency. The Stroke Length is adjusted from 0% to 100% with a 10:1 turndown. *It is highly recommended by the **clean-exhaust** Crew that the Stroke Length does not go below 30%.* The Stroke Frequency is the number of pulses per minute adjusted in 10% increments from 10-100 with an external contact input for pulse control with a range of 1:64-64:1. The Beta^R b^R can be simply adjusted during operation.

Fuel hose should be used on this system due to temperature fluctuation and psi indications. (specifications tubing/ fuel hose are on page 19)

The delivery of ecoBrew™ should be directly into the cooling water line fresh out of the heat exchangers as far up the line from the spray ring or elbow as possible. This should be done in such a way that when the pump is off, the ecoBrew™ drains naturally into the cooling line from the top. A check valve outside of the pump is not necessary. The system is designed for the ecoBrew™ to drain naturally into the line.

For maximum immediate results from **clean-exhaust**, a comprehensive cleaning of the vessel's exhaust system by an exhaust specialist is recommended.

Some vessels have filled their exhaust system with ecoBrew™ to clean the system.

Pipe cleaning with ecoBrew™ N1

“I thought I would share the photos of the exhaust cleaning we did. The first picture is before cleaning then the second is after 48hours of the entire exhaust line being filled with one bottle of ecoBrew™ (sitting for 48 hours with no movement in the pipes) the 3rd one is after manual cleaning by hand. I am sure that if there was a circulation going through the pipe it would have given an even better result.”

Captain David Pott



When the system is first turned on, all vessels will see an immediate difference in particulate and discharge in the surrounding water. **If an initial cleaning is not done, clean-exhaust** needs about 3 months to be fully functional. We attribute this to cleaning the vessel's entire exhaust system. Some vessels have experienced an oily discharge and flakes for the first few months with some of the residue being a tarlike substance. After the initial cleaning, two things will happen...

1. The vessel's exhaust becomes free from noticeable soot
2. Less ecoBrew™ will be needed

Full satisfaction with clean-exhaust's results will not be realized until the vessel's exhaust system has its initial cleaning.

To adjust clean-exhaust

1. Turn the load to 30% (**never use less than a 30% load**) and 30 ppm (pulse per minute)
2. Keep turning up the ppm, 10 ppm at a time, allowing 5 minutes between adjustments until smoke disappears from the vessel's exhaust and small white bubbles appear in the underwater discharge.
3. If 70 ppm is reached and results are not evident, start turning up the % of load dial until results are evident.
4. Once the vessel's exhaust system has no visible smoke and small white bubbles, an additional increase of values might be necessary so clean-exhaust can overcome the immediate discharge and start cleaning the vessel's exhaust system.
5. Maintaining high levels of ecoBrew™ injections are recommended until the vessel's exhaust system and muffler are totally clean. Some vessels with particularly dirty exhaust systems have used 100% load and 100ppm. This strategy will increase the vessel's short- term usage of ecoBrew™. Be prepared for this initial high usage.
6. **For optimum performance, clean-exhaust needs to be on whenever the generator is running.** If the generator is running and clean-exhaust is off, the carbon build up will begin a new cycle.

Monthly maintenance

- ✓ Check the metering diaphragm for damage
- ✓ Check for firmly fixed hydraulic lines to the liquid end
- ✓ Check for a correctly seated section valve and discharge valve
- ✓ Check the tightness of the entire liquid end...particularly around the leakage hole
- ✓ Check for correct flow: Allow the pump to prime briefly then turn the multifunctional switch to "Test"
- ✓ Check for intact electrical connections
- ✓ Check the integrity of the housing
- ✓ Check for tight dosing head screws

Per MARPOL Annex V Amendments October 2012

"Cleaning agents and additives used in washing down decks and hulls may be discharged into the sea provided that they are not harmful to the marine environment. Products considered suitable for discharge are those which are not defined as a harmful substance by the criteria set out in MARPOL Annex III and do not contain any carcinogenic, mutagenic or repro-toxic components. In addition, ships will need to maintain records showing that any cleaning agent or additive used was not harmful to the marine environment. IMO recommends that the supplier provides a signed and dated statement to their effect, either as part of a Material Safety Data Sheet (MSDS) or as a stand-alone document."

MARPOL Annex III and V Approved March 2015

Note: ecoBrew™ is an agent that is not harmful to the marine environment

ecoBrew



The US EPA states, “The ingredients in ecoBrew meet the EPA’s Safer choice standards.”

- ✓ performs well
- ✓ cost-effective
- ✓ non-toxic
- ✓ non-flammable
- ✓ biodegradable
- ✓ safe for the environment

Product Specifications:

- Container – 5 liters to be mixed with 15 liters of fresh water
- Color – Blue
- Fragrance – None
- pH – 11.0 – 11.3
- Viscosity – Water thin (<50cps)
- Foaming – Moderate
- Biodegradable – Complete
- Solubility in Water – 100%
- Weight per Gallon – 8.40 pounds
- Three Year Shelf Life

FIRST AID:

GENERAL: Remove contaminated clothing. **SKIN:** Wash affected areas thoroughly with soap and water. If irritation develops, seek medical attention. **EYES:** In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of fresh water. If irritation develops, seek medical attention. **INGESTION:** Rinse mouth and then drink plenty of water. Induce vomiting. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions. Immediate medical attention required. **INHALATION:** Remove the affected individual into fresh air and keep the person calm. Assist in breathing if necessary. Immediate medical attention required.

Safety Data Sheet
Date of issue 20 May 2017

1. PRODUCT AND COMPANY IDENTIFICATION

Product identifier

Product Name ecoBrew N-1

Other means of identification

SDS# JC-022-019

Details of the supplier of the safety data sheet

Company Name Clean Exhaust Systems, Inc.
8403 N Illinois
Indianapolis, IN 46260

Emergency telephone number

Emergency Telephone INFOTRAC 1-800-535-5053

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status

This product has been classified in accordance with the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Oral	Not classified
Acute toxicity - Dermal	Not classified

Label elements

Emergency Overview

Appearance Clear

Physical state Liquid

Odor Typical

Precautionary Statements - Response

Immediately call a POISON CENTER or doctor/physician
Specific Treatment (See Section 4 on the SDS)
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting
Immediately call a POISON CENTER or doctor/physician
Drink plenty of water

Precautionary Statements - Disposal

Disposal should be in accordance with applicable regional, national and local laws and regulations

Hazards not otherwise classified (HNOC)

Other Information

Unknown Acute Toxicity 5.004% of the mixture consists of ingredient(s) of unknown toxicity

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Weight-%	Trade Secret
Fatty Alcohols, C12-14,Ethoxylated, Propoxylated	68439-51-0	10-30	*

*The exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST AID MEASURES

First aid measures

Eye contact	Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.
Inhalation	Remove to fresh air.
Ingestion	Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects, both acute and delayed

Symptoms	Any additional important symptoms and effects are described in Section 11: Toxicology Information.
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Indication of any immediate medical attention and special treatment needed

Note to physicians	Treat symptomatically.
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5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

No Information available.

Explosion data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions	Ensure adequate ventilation, especially in confined areas.
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Environmental precautions

Environmental precautions	See Section 12 for additional ecological information.
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Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so.
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Methods for cleaning up	Pick up and transfer to properly labeled containers.
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7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling	Handle in accordance with good industrial hygiene and safety practice.
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Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a dry, cool and well-ventilated place.

Incompatible materials None known based on information supplied.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Appropriate engineering controls

Engineering Controls Showers, Eyewash stations & Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection No Information available. Avoid contact with eyes.

Skin and body protection No Information available. Wear protective gloves and protective clothing if needed.

Respiratory protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state Liquid
Appearance Clear
Color Blue
Odor Typical
Odor threshold No Information available

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH	11.0-11.3	
Specific Gravity	1.0134	
Viscosity	No Information available	
Melting point/freezing point	No Information available	
Flash point	Above 200°F	
Boiling point / boiling range	>= 100 °C / 212 ° F (at 760 mm Hg)	
Evaporation rate	No Information available	
Flammability (solid, gas)	No data available	
Flammability Limits in Air		
Upper flammability limit:	No Information available	
Lower flammability limit:	No Information available	
Vapor pressure	No Information available	
Vapor density	No Information available	
Water solubility	Complete	
Partition coefficient	No Information available	
Autoignition temperature	No Information available	
Decomposition temperature	No Information available	

Other Information

Density Lbs/Gal 9.2
VOC Content (%) No Information available

10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical stability

Stable under recommended storage conditions.

Possibility of Hazardous Reactions

None under normal processing.

Conditions to avoid

Extremes of temperature and direct sunlight.

Incompatible materials

None known based on information supplied.

Hazardous Decomposition Products

None known based on information supplied.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation	No data available. Avoid breathing vapors or mists.
Eye contact	No data available. Avoid contact with eyes.
Skin Contact	No data available. Prolonged or repeated contact may dry skin and cause irritation.
Ingestion	No data available. Not an expected route of exposure. Do not taste or swallow.

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Fatty Alcohols, C12-14, Ethoxylated, Propoxylated 68439-51-0	= 3530 mg/kg (Rat)	-	-

Information on toxicological effects

Symptoms No Information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization	No Information available.
Germ cell mutagenicity	No Information available.
Carcinogenicity	No Information available.
Reproductive toxicity	No Information available.
STOT - single exposure	No Information available.
STOT - repeated exposure	No Information available.
Aspiration hazard	No Information available.

Numerical measures of toxicity - Product Information

Unknown Acute Toxicity 5.004% of the mixture consists of ingredient(s) of unknown toxicity

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral) 18,933.00 mg/kg

12. ECOLOGICAL INFORMATION

Ecotoxicity

7.26% of the mixture consists of component(s) of unknown hazards to the aquatic environment

Persistence and degradability

No Information available.

Bioaccumulation

No Information available.

Other adverse effects

No Information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging Do not reuse container.

14. TRANSPORT INFORMATION

The basic description below is specific to the container size. This information is provided for at a glance DOT information. Please refer to the container and/or shipping papers for the appropriate shipping description before tendering this material for shipment. For additional information, please contact the distributor listed in section 1 of this SDS.

DOT Not regulated

15. REGULATORY INFORMATION

International Inventories

TSCA Complies
DSL/NDSL Complies

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	No
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

U.S. EPA Label Information

EPA Pesticide Registration Number Not Applicable

16. OTHER INFORMATION

<u>NFPA</u>	Health hazards 0	Flammability 0	Instability 0	Physical and Chemical Properties Yes
<u>HMIS</u>	Health hazards 0	Flammability 0	Physical hazards 0	Personal protection X

Issue Date 20-May-2017

Revision Date 20-May-2017

Revision Note

No Information available

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

ProMinent Solenoid Metering Pump Beta 1000

To see full manual on line visit

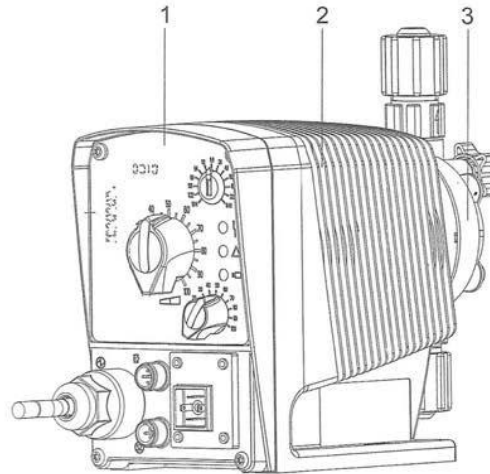
http://prominent.us/promx/pdf/986356_ba_be_026_04-12_en_beta-b_en_low.pdf

NOTE: The clean-exhaust ProMinent pump has a high working pressure of 145 psi or 10 bar

Note: Installation of the dosing pump should be in a location that is below the injection point on the engine to avoid any possibility of forming a syphon in the unlikely event of a malfunction of the pump's check valves.

Overview of equipment and control elements

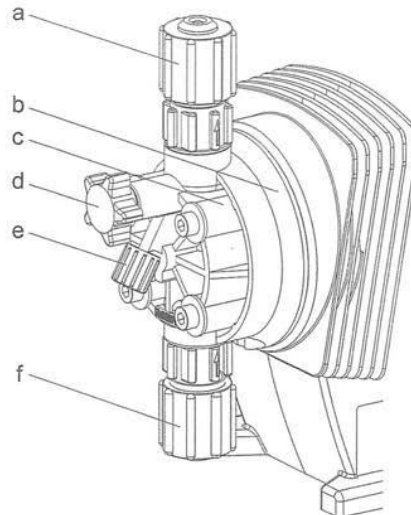
Overview of equipment



P_BE_0013_SW

Fig. 2: Complete overview

- 1 Control unit
- 2 Drive unit
- 3 Liquid end



P_BE_0008_SW

Fig. 3: Overview of liquid end (PV)

- a Discharge valve
- b Backplate
- g Dosing head
- d Bleed valve
- e Bypass hose nozzle
- f Suction valve

Control elements

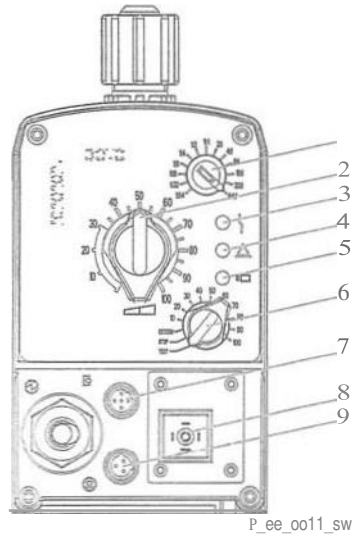


Fig. 4

1. Pulse Control Switch
2. Stroke length adjustment knob
3. Fault indicator (red)
4. Warning indicator (yellow)
5. Operating indicator (green)
6. Multi- functional switch
7. External control terminal
8. Relay connection (optional)
9. Level Switch terminal

Pulse Control Switch

Extern Contact operating mode via the pulse control switch a single contact (at the "external control" terminal) can be used to trigger a series of strokes or to support an incoming series of contacts.

Stroke length adjustment knob

The stroke length adjustment knob can be used to adjust the stroke

Multifunctional switch

The multi-function switch can be used to set the following functions, operating modes and stroke rate.

The operating modes that can be set are:

- Test (priming function)
- Stop
- Extern (Contact)
- Manual (setting stroke rate in 10% increments)

Functional description

Liquid End

The dosing process is performed as follows: The diaphragm is pressed into the dosing head; the pressure in the dosing head closes the suction valve and the feed chemical flows through the discharge valve out of the dosing head. The diaphragm is now drawn out of the dosing head; the discharge valve closes due to the negative pressure in the dosing head and fresh feed chemical flows through the suction valve into the dosing head. One cycle is completed.

Drive Unit

The diaphragm is driven by an electromagnet, which is controlled by an electronic controller.

Capacity

The capacity is determined by the stroke length and the stroke rate.

The stroke length is adjusted by the stroke length adjustment knob within a range of 0 ... 100 %. A stroke length of between 30 ... 100 % (SEK type: 50 ... 100 %) is recommended to achieve the specified reproducibility!

Data	Value	Unit
Recommended stroke length, standard type	30 ... 100	%
Recommended stroke length, SEK type	50 ... 100	%

The stroke rate can be set within a range of 10 ... 100 % using the multifunctional switch.

Self-Bleeding

Self-bleeding liquid ends (SEK types) are capable of independent priming when a discharge line is connected and diverting existent air pockets via a bypass. During operation they are also capable of conveying away gases which are produced, independently of the operating pressure in the system. It is also possible to dose precisely in a depressurised state due to the integral back pressure valve.

Operating Modes

The operating modes are selected by means of the multifunctional switch.

"Manual" operating mode

As soon as the stroke rate has been set by the multifunctional switch, the pump finds itself in "Manual" operating mode. 100 % corresponds to 180 strokes/min.

Functional and Fault Indicators

Fault indicator (red)	<p>The fault indicator lights up if the liquid level in the chemical feed container falls below the second switching point of the level switch (20 mm residual filling level in the chemical feed container).</p> <p>This LED flashes in the event of an undefined operating mode.</p>
Warning indicator (yellow)	<p>The warning indicator lights up if the fluid level in the chemical feed container falls below the first switching point of the level switch.</p>
Operating indicator (green)	<p>The operating indicator lights up if the pump is ready for operation and there are no fault or warning alerts. It goes out quickly as soon as the pump has performed a stroke.</p>

"External control" terminal

The "external control" terminal is a five-pole panel terminal. It enables the following functions and operating modes to be used:

- ▣ Pause
- ▣ External contact
- ▣ Auxiliary frequency (external frequency changeover)



The two- and four-pole cables used to date can continue to be used. The "Auxiliary frequency" function can, however, only be used with a five-pole cable.

4

"Level Switch" terminal

A 2-stage level switch with pre-warning and end switch-off can be connected.

Troubleshooting

Safety notes



WARNING!

Warning of dangerous or unknown feed chemical

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Observe the safety data sheet for the feed chemical.
- Drain and flush the liquid end before working on the pump.



CAUTION!

Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Depressurise the system before commencing any work on hydraulic parts.

Faults without a fault alert

Fault description	Cause	Remedy	Personnel
Pump does not prime in spite of full stroke motion and bleeding	Minor crystalline deposits on the ball seat due to the valves drying out	Take suction hose out of the storage tank and thoroughly flush out the liquid end	Technical personnel
	Major crystalline deposits on the ball seat due to the valves drying out	Dismantle the valves and clean them - refer to "Repair"	Technical personnel
Fluid is escaping from the backplate	The screws in the dosing head are too loose	Tighten the screws in the dosing head crosswise - refer to "Repair" for tightening torque.	Instructed personnel
	The metering diaphragm is not tight	Replace the metering diaphragm - refer to "Repair".	Technical personnel
Green LED display (operating display) does not light up	The wrong mains voltage or no mains voltage is connected	Connect the pump correctly to the specified mains voltage - according to the specification on the nameplate	Electrician

13.2 Fault alerts

Fault description	Cause	Remedy	Personnel
Red LED indicator (fault indicator) lights up and the pump stops	The liquid level in the storage tank has reached "liquid level low 2nd stage".	Fill the storage tank	Instructed personnel
	The multifunctional switch is not turned to "Extern" but an external cable is connected and the pump has the identity code feature "Control type" - "1" "with lock".	Either turn the multifunctional switch to "Extern" or remove the Extern cable from the pump	Technical personnel

clean-exhaust tubing

A1-15 EPA & CARB COMPLIANT FUEL LINE



365 Series

Trident Barrier Lined A1-15 Fuel Hose for both gasoline (including ethanol blends) and diesel (including bio diesel blends). The #365 series exceeds ABYC H-24 & H-33, SAE J1527, ISO 7840, USCG Type A1-15; CARB Executive Order and EPA Certified low permeation Type A1-15; and is NMMA Type Accepted & CE certified. This hose is built with the best fuel, fire and age resistant formulation and a unique "Barrier Liner" on inside surface of the tube, so fuel is not in direct contact with rubber. Provides extraordinary resistance to fuel permeation, aging, and also to fire, heat, cold, and the ozone. Also provides excellent bend-ability.

Specifications

Construction:

Tube: Nylon Internal Barrier, NBR

Cover: NBR/PVC Blend

Reinforcement: Polyester 2 spiral

Lengths: 250' (76 m), and 500' (152 m) **Reels,** 100' (30.5 m), 50' (15 m), and 25' (7.6 m) **Boxed**

ID: .25 inch

OD Burst Pressure: 810 psi

Working Pressure: 100 psi

Temperature Range: -20 F to 212 F (-28 C to 100 C)

clean-exhaust

Parts List

Metering Pump	Beta #100
Two Stage Float Switch	095
Pump Repair Kit	652
Vent Valve	365
Knob for Vent Screw	832
Ceramic Weight for Float Switch	004
External Control Cable 6'	300
Fault Indicating Relay	311
Flex Tubing Trident	A1-15

ecoBrew™ 4 gallons \$720.00

For replacement or warranty issues contact

Ted Sputh

Capt.ted@clean-exhaust.com

+1 317 445 3873

Fax +1 877 792 8363

2 year [clean-exhaust](#) warranty on all parts

Warranty is void if ecoBrew™ is not used in the system or installation pictures are not presented to the clean-exhaust office if system is self- installed

3 possible **clean-exhaust** installations...feasible installations are endless



clean-exhaust the **green** solution to marine diesel exhaust pollution

The **clean-exhaust** crew wishes you fair winds, calm seas, and clean exhaust

Diesel engines produce very little carbon monoxide as they burn the fuel in excess air even at full load, at which point the quantity of fuel injected per cycle is still about 50 percent lean of stoichiometric.

This is a list of chemical components that have been found in diesel exhaust.

Contaminant	Note
acetaldehyde	IARC Group 2B carcinogens
acrolein	IARC Group 3 carcinogens
aniline	IARC Group 3 carcinogens
antimony compounds	Toxicity similar to arsenic poisoning
arsenic	IARC Group 1 Carcinogens, endocrine disruptor
benzene	IARC Group 1 Carcinogens
beryllium compounds	IARC Group 1 Carcinogens
biphenyl	It has mild toxicity.
bis(2-ethylhexyl)phthalate	endocrine disruptor
1,3-butadiene	IARC Group 2A carcinogens
cadmium	IARC Group 1 Carcinogens, endocrine disruptor
chlorine	
chlorobenzene	It has "low to moderate" toxicity.
chromium compounds	IARC Group 3 carcinogens
cobalt compounds	
cresol isomers	
cyanide compounds	
dibutyl phthalate	endocrine disruptor
1,8-dinitropyrene	Carcinogen
dioxins and dibenzofurans	
ethyl benzene	
formaldehyde	IARC Group 1 Carcinogens
inorganic lead	endocrine disruptor
manganese compounds	
mercury compounds	IARC Group 3 carcinogens
methanol	It may cause blindness.
methyl ethyl ketone	It may cause birth defect.
naphthalene	IARC Group 2B carcinogens
nickel	IARC Group 2B carcinogens
3-Nitrobenzanthrone	One of the strongest carcinogens known
4-nitrobiphenyl	
phenol	endocrine disruptor
phosphorus	
polycyclic organic matter, including polycyclic aromatic hydrocarbons (PAHs)	
propionaldehyde	
selenium compounds	IARC Group 3 carcinogens
styrene	IARC Group 2B carcinogens
toluene	IARC Group 3 carcinogens
xylene isomers and mixtures: o-xylenes, m-xylenes, p-xylenes	IARC Group 3 carcinogens

experience the clean @ www.clean-exhaust.com

NOTES