GRAINPRO® FIBC HERMETIC POUCH
GAS-HERMETIC FUMIGATION

INSTRUCTION MANUAL

MA4074TSD0119-2

GRAINPRO
STORING THE FUTURE

"A GREEN, NOT ONLY FOR PROFIT COMPANY"

scan me

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1. INTRODUCTION

The efficient conservation of grains depends basically on the ecological conditions of storage; the physical, chemical and biological characteristics of the grain, the storage period, and the type and functional characteristics of the storage facility. Losses due to fungi must be prevented for both economic and health safety reasons because of aflatoxins and mycotoxins.

To deal effectively with infestation, changes in moisture, mold growth and oxidation while storing agricultural commodities, GrainPro® has developed an Ultra-Hermetic™ solution specially designed as hermetic envelope for FIBC (Flexible Intermediate Bulk Container) or big bags. The GrainPro® FIBC Hermetic Pouch-GHF handles up to two big bags stacked on a pallet. This allows users to safely store grains in big bags in warehouses using modified atmosphere technology. The hermetic liner allows ease of mechanical operations using forklift when relocating several stacks in various locations. With a hermetic liner design for big bags, labor cost is also reduced when stacks need to be transferred to the container van for transit by eliminating additional installation. Not only does the hermetic liner reduce operational costs, it also improves use of space inside the container by 20% over previous hermetic designs.

The GrainPro® FIBC Hermetic Pouch-GHF can also be used as a fumigation chamber by flushing carbon dioxide (CO_2) into the inlet port at the bottom while a few centimeters opening of the portion of zip-lock serves as an exhaust to expel the air. The flushed CO_2 reduces the oxygen (O_2) level for the immediate preservation of stored product quality and control of infestation.

Light as well as easy to handle and operate, the gastight GrainPro® FIBC Hermetic Pouch-GHF enables the maintenance of unbreathable, low oxygen environment for extended periods. GrainPro® FIBC Hermetic Pouch-GHF is both a storage and a transport solution, making sure that commodity is insect-free and without the risk of moisture absorption and oxidation.

1.1. FEATURES:

1.1.1. "Green" fumigation technology, ideal for organic fumigation using CO_2
1.1.2. Effectively eliminates insect infestation while products are in transit
1.1.3. Reduces the oxidation of commodities and development of microorganisms
1.1.4. Designed for easy installation
1.1.5. Inhibits and controls mold growth producing aflatoxins and infestation
1.1.6. Eliminates fumigation costs
1.1.7. Retains shape of inner container such as conventional FIBC for efficient use of transport and container space.
1.1.8. A green technology for storage or organic produce (safe for organic storage as secondary packaging).

1.2. PRODUCT GUARANTEE:

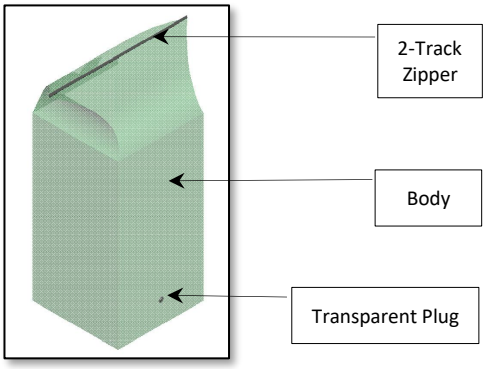
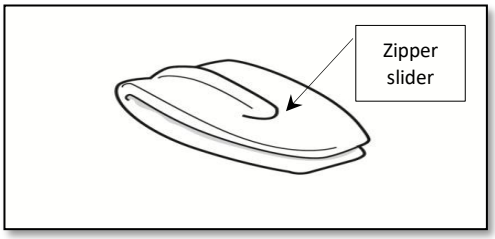
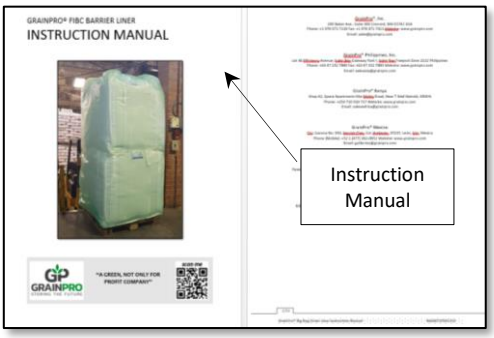
1.2.1. In accordance with the terms and conditions herewith, GrainPro®, Inc. guarantees the quality of this product per its written warranty provided it is used according to the instructions in this manual.
1.2.2. Please read and understand the manual thoroughly before using the GrainPro® FIBC Hermetic Pouch-GHF.

1.3. COMMENTS, COMPLAINTS, AND/OR CLARIFICATIONS:

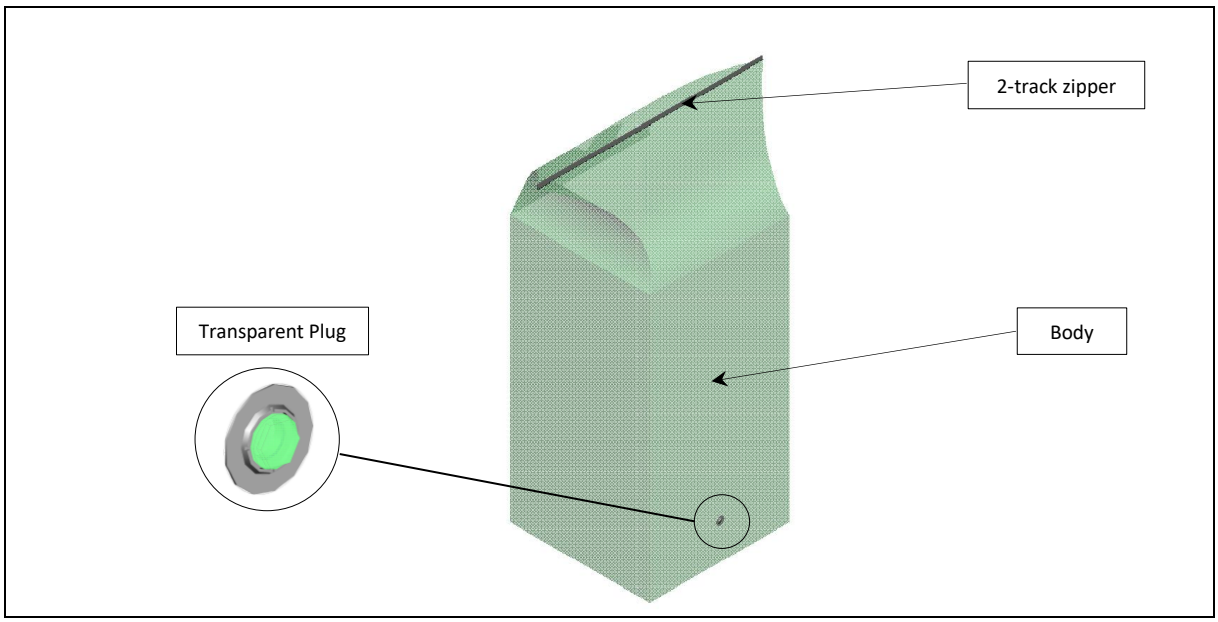
1.3.1. Please contact **customercare@grainpro.com**
we shall be glad to address any of your concerns.

2. CHECKLIST

Please inspect your GrainPro® FIBC Hermetic Pouch-GHF package to ensure it includes the following items:

PART NAME	DESCRIPTION	IMAGE
2.1. GRAINPRO® FIBC Hermetic Pouch-GHF	2.1.1. High strength PE with barrier layer	
2.2. ZIPPER SLIDER	2.2.1. For zipper sealing 2.2.2. One (1) piece	
2.3. WARNING STICKER	2.3.1. One (1) piece	
2.4. INSTRUCTION MANUAL	2.4.1. Installation instructions 2.4.2. Maintenance instructions 2.4.3. Frequently asked questions 2.4.4. Warranty clause	

3. COMPONENTS



4. SPECIFICATIONS

PARAMETERS	FIBC Hermetic Pouch-1-GHF	FIBC Hermetic Pouch-2-GHF
Material	High Strength PE with Barrier Layer	High Strength PE with Barrier Layer
Thickness, microns	100±5%	100±5%
Color	Green (Pantone 3385)	Green (Pantone 3385)
Material weight, g/m^2	97.5	97.5
Oxygen Transmission Rate (OTR), $cc/m^2/day$ at 0.1 MPa	<9	<9
Water Vapor Transmission Rate (WVTR), $g/m^2/day$	<4	<4
Product life, years	2	2
Warranty, year	1	1
Sealing mechanism	2-track PE Zipper	2-track PE Zipper
Capacity, in tonnes*	1	2
Dimensions, cm (inch)	115 x 115 x 110 (45 x 45 x 43)	115 x 115 x 220 (45 x 45 x 87)
Product weight (per piece), kg (lb)	1.5 (3.3)	2 (4.4)
Packed dimensions, cm (inch)	110 x 55 x 8 (43 x 22 x 3) per 8 pieces	110 x 55 x 8 (43 x 22 x 3) per 5 pieces
Packed volume, m^3 (ft^3)	0.05 (1.8) per 8 pieces	0.05 (1.8) per 5 pieces
Packed weight without pallet, kg (lb)	12 (26.45) per 8 pieces	10 (22.05) per 5 pieces

*Based on maize

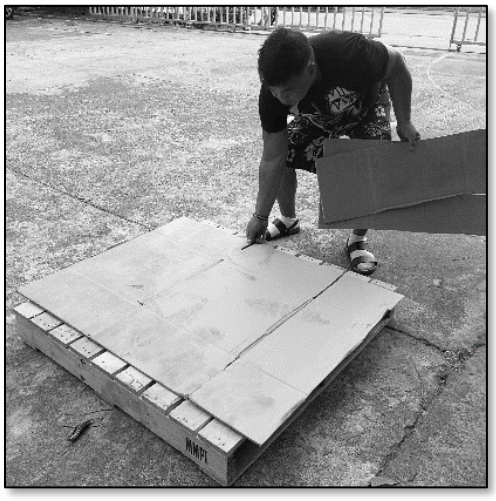
5. INSTALLATION

5.1. PREPARATION

5.1.1. Check the moisture content (MC) of the commodity to be stored to ensure the MC is at a safe level.

5.1.2. Ensure that pallet is free of any sharp objects or protruding nails that may damage the liner.

5.1.3. Place a mat or thick cardboard on the pallet where the FIBC Hermetic Pouch-GHF will be placed as additional protection.



5.1.4. Carefully open the package and unfold the FIBC Hermetic Pouch-GHF at the prepared site.

5.1.5. Roll the sides of the liner to prevent damage during loading when using the forklift.

5.1.6. Make sure the bottom is stretched by pulling the corners.

5.1.7. Place one or two big bags inside the FIBC Hermetic Pouch-GHF using a forklift. Two stacked big bags can fit in the FIBC Hermetic Pouch-GHF if the 2-meter high version is used.

5.2. PLASTIC VALVE INSTALLATION FOR CO_2 OR O_2 READING

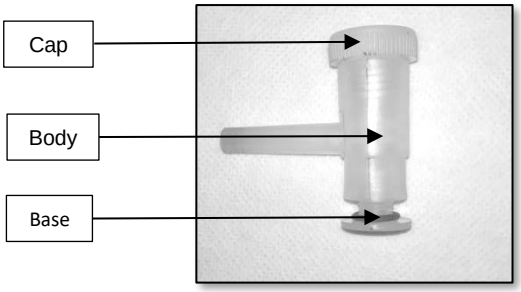
Install plastic valve before sealing or zipping the liner. Conduct PDT after sealing. CO_2 or O_2 reading (optional) is taken upon arrival of the container to verify the integrity of the FIBC Hermetic Pouch hermeticity. After use, close the plastic valve.

5.2.1. Plastic valve components:

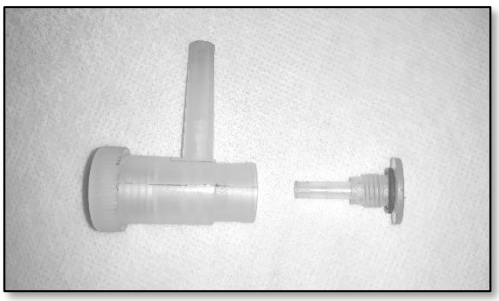
Cap – To open and close the valve

Body – Where tube or hose is inserted for PDT and CO_2 or O_2 reading

Base – Use for piercing the liner

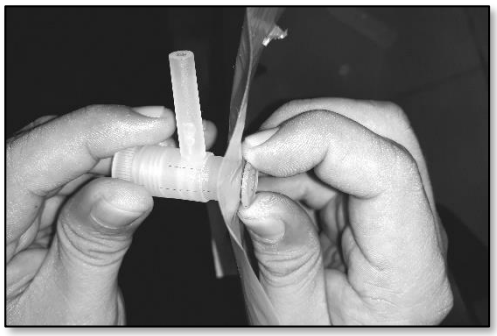


5.2.2. Dismantle the plastic valve by unscrewing the base.



5.2.3. Pierce the FIBC Hermetic Pouch-GHF using the plastic valve. Piercing is done from the inner side of the liner (approximately 20 cm from the zipper).

5.2.4. Screw the plastic valve body. The cap of the plastic valve should be positioned outside the loaded FIBC Hermetic Pouch.

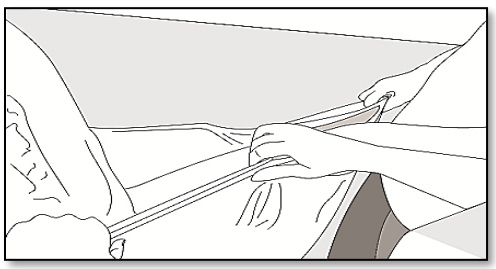


5.3. SEALING

5.3.1. Unroll the sides of the liner towards the top of big bags.

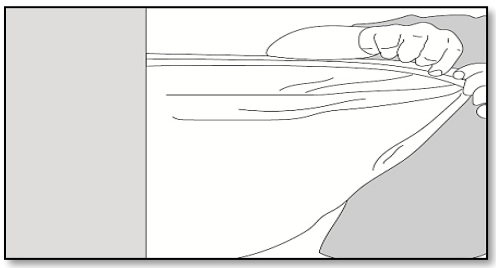
5.3.2. Raise the FIBC Hermetic Pouch after stacking one or two big bags.

5.3.3. Pull the ends of the zipper together for sealing.

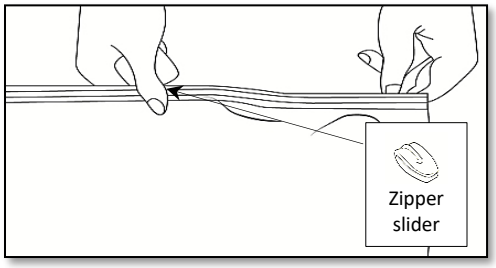


5.3.4. Positioning of zipper slider:

a) Manually zip a few centimeters enough to initially engage the slider.



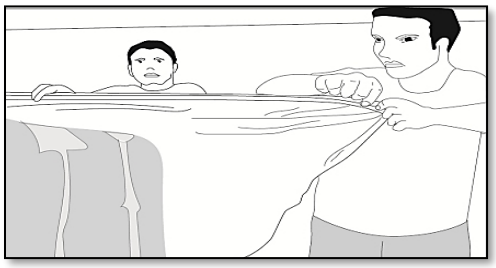
b) Insert and position the slider on the manually zipped portion of the zip lock.



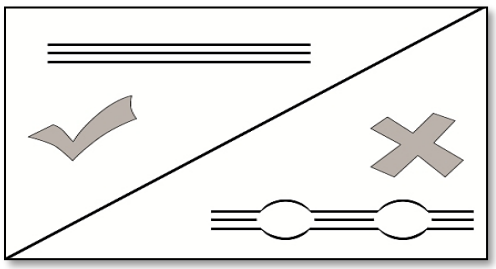
5.3.5. Two persons are required for easy zipping.

a) One person does the zipping and the other person holds the other end steadily, making both sections of the zipper straight to avoid misalignment.

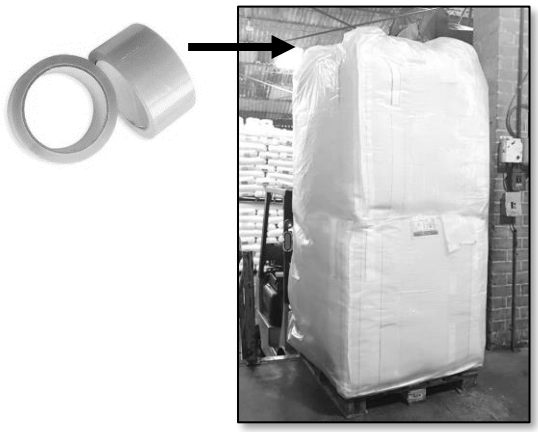
b) Moving the slider while the zipper or slider is curved forces one of the zipper sections to elongate.



c) If uneven zipper ends are observed, both ends should be slightly stretched. Then do the zipping from end to end.

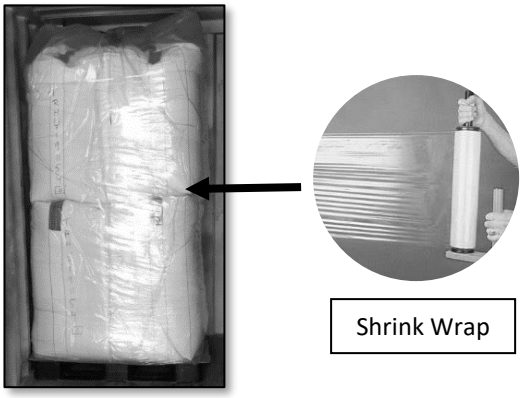


5.3.6. Fold extra liner and secure using adhesive tape.



5.3.7. Make sure that there will be no folds or slacks along the liner.

5.3.8. Recommended: If possible, carbon dioxide flushing must be done 1 day before placing the shrink wrap. This is to allow efficient penetration of carbon dioxide gas into the commodity.



Shrink Wrap

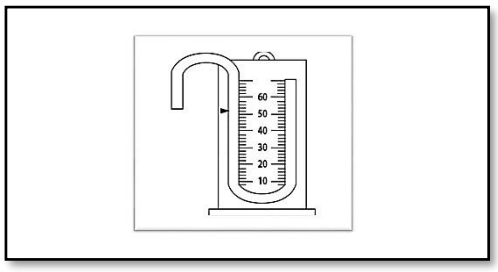
5.3.9. Place warning sticker.

5.4. PRESSURE (VACUUM) DECAY TEST

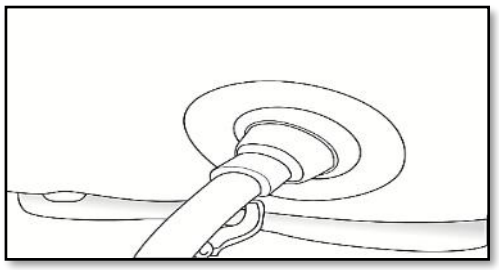
5.4.1. After zipping, perform a pressure (vacuum) decay test (PDT) to ensure gas-tightness:

a. Use digital manometer.

b. Either, a commercially available or improvised U-tube manometer can be used to monitor the pressure.



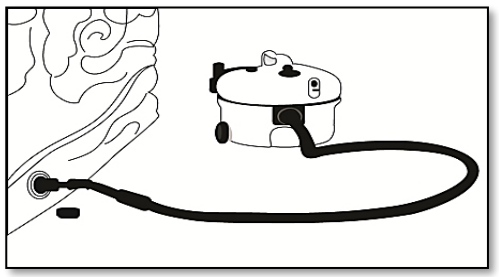
5.4.2. Connect the manometer hose to the flexible adapter hose previously installed in the FIBC Hermetic Pouch.



5.4.3. Twist the plastic valve cap to open.

5.4.4. Use a vacuum pump (at least 2.3-cubic meters per minute:

a. Create at least -250 Pascals (Pa) or -25 millimeters' water (mm H_2O) vacuum. Insert the vacuum pump into the transparent plug.



b. For it to be considered sufficiently airtight, the initial vacuum should not be decreased by more than one-half (½) of the final vacuum (created by the vacuum pump) within five (5) minutes.

c. If the PDT test failed, check for holes/tears and poorly sealed zippers then repeat the PDT procedures

5.4.5. After conducting PDT, twist the plastic valve to close.

5.5. CARBON DIOXIDE (CO_2) SAFETY

5.5.1. Carbon dioxide does not support life. It can act as a simple asphyxiant by diluting the concentration of oxygen in air below the levels necessary to support life. As it is heavier than air it will tend to concentrate at lower levels.

5.5.2. Avoid breathing gas. Do not get in eyes, on skin, or on clothing. Wear leather safety gloves and safety shoes when handling cylinders.

5.5.3. Protect cylinders from physical damage. Do not drag, roll, slide or drop. While moving cylinder, always keep the removable valve cover in place. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.

5.5.4. Never insert an object (e.g., wrench, screwdriver, and pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier.

5.5.5. Close the cylinder valve after each use; keep closed even when empty.

5.5.6. Never apply flame or localized heat directly to any part of the cylinder. High temperatures may damage the cylinder and could cause the pressure relief device to fail.

5.6. PROCEDURE FOR PURGING WITH CARBON DIOXIDE (CO_2)

5.6.1. Calculation:

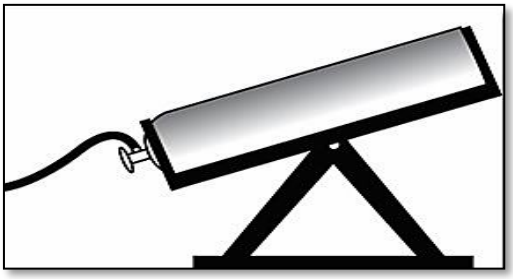
a) Total Volume – Volume Occupied by the Commodity.
b) For every 2.0 kg CO_2, 1 cubic meter of gas is being released.
c) Formula: (1 minus bulk density) x Volume (in m^3) x 2

COMMODITY	BULK DENSITY MT/m^3	AMOUNT OF CARBON DIOXIDE (CO_2) FOR PURGING, kg	
		FIBC Hermetic Pouch-1-GHF	FIBC Hermetic Pouch-2-GHF
Barley	0.62	1.2	2.4
Cashew nuts	0.50	1.6	3.2
Chia seeds	0.68	1.0	2.0
Chickpeas	0.74	0.8	1.7
Cocoa beans	0.56	1.4	2.8
Coffee beans	0.59	1.3	2.6
Cotton seed	0.40	1.9	3.8
Cowpea	0.75	0.8	1.6
Maize	0.72	0.9	1.8
Millet	0.63	1.2	2.4
Mung bean	0.75	0.8	1.6
Oats	0.43	1.8	3.6
Paddy	0.60	1.3	2.6
Paddy, rice bran	0.55	1.4	2.9
Peanuts, shelled	0.64	1.2	2.3
Rice, milled	0.80	0.6	1.3
Rye	0.72	0.9	1.8
Sesame	0.59	1.3	2.6
Sorghum	0.72	0.9	1.8
Soybean	0.75	0.8	1.6
Sunflower	0.41	1.9	3.8
Wheat	0.77	0.7	1.5

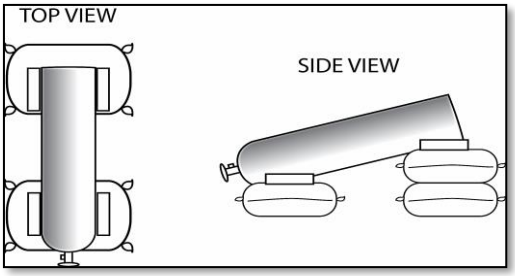
5.6.2. CO_2 application:

a) Make sure that enough CO_2 is available on site and proper pressure hose with threaded ends is on hand. The weight of the CO_2 in the cylinder is supplied by the industrial companies (i.e. 22 kg standard capacities which may be used to calculate the number of cylinders required). CO_2 cylinders are available with or without siphon (dip tube). For rapid flushing, the cylinder without siphon should be inverted.

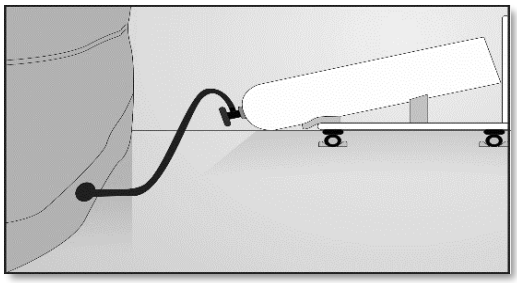
b) For rapid flushing, the cylinder should be inverted using mechanical inverter. However, the cylinders with siphon should be in an upright position during flushing.



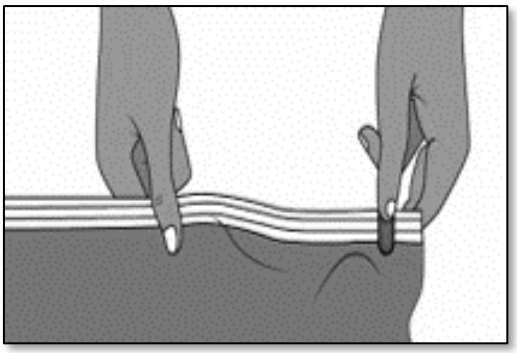
c) If a mechanical inverter is not available, a makeshift inverter can be made using sandbags or other improvised technique. The cylinder should be inverted with its top resting on one sandbag and the bottom end resting on pile of two or three sandbags high.



d) A standard high-pressure hose (optional; available from GrainPro) should be connected to the cylinder. This hose should be guaranteed to withstand a pressure of 88 atmospheres (1,300 psi, or 92 kg/cm^2). Ensure that all connections are made properly, and gaskets are in place where they are required. The high-pressure hose should have a length of about 2-meters.



e) Open a section of the zipper (10-15 cm) to serve as an outlet when flushing the FIBC Hermetic Pouch-GHF with CO_2.

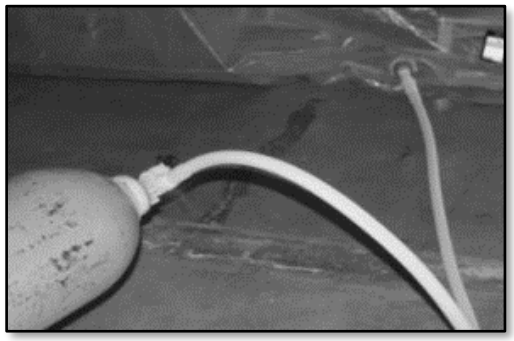


f) Open the cylinder valve. Adjust opening of the valve until sound of liquid passing through the hose is observed. The liquid CO_2 flushes into the FIBC Hermetic Pouch-GHF and will push the air upward starting from the bottom, following the piston effect, until the air is totally replaced. The opening through the zipper will serve as an outlet for the displaced air.

5.6.3. Ice formation along the pressurized hose and the pipe connector during CO_2 flushing:

a) During this procedure, some ice may form around the gas inlet and high-pressure hose.

Note: Do not use pressure reducer to reduce air/CO_2 mixing.

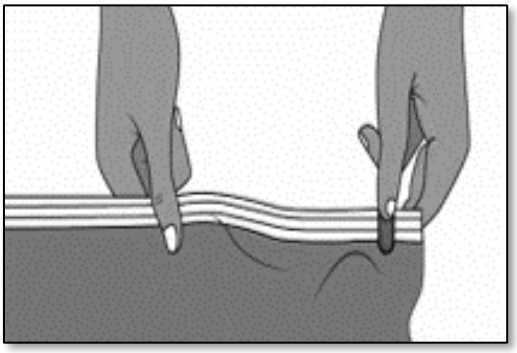


b) Flushing (emptying of the cylinder) depends on the amount of CO_2 to be applied. Emptying one 22kg cylinder should only take about 20 to 30 minutes. If the pressure hose or the inlet valve gets blocked with ice, this is an indication that the CO_2 is being released too quickly. If this happens the cylinder should be closed until the ice melts, and then the cylinder tap should be re-opened and adjusted to reduce the flow.
c) An additional indication that the gas is being released too quickly is when the FIBC Hermetic Pouch-GHF begins to balloon out because pressure begins to build-up inside. If this happens, the gas flow should be decreased at the cylinder tap until the rate of air being expelled through an open zipper section is about the same as the rate of CO_2 entering the liner.
d) If necessary, for small scale applications and the cylinder is not inverted, weighing scales may be used to control the weight of the gas delivered. In this case the gas is released slowly through a pressure gauge which can be adjusted to control the flowrate.

5.6.4. Since CO_2 is heavier than air, the air in the FIBC Hermetic Pouch-GHF will be displaced upwards and will be lifted out of the container through an open section of the zipper. Complete displacement is not possible as there is always some mixing at the interface between the air and the CO_2. However, if the final CO_2 concentration reaches 80% then the O_2 concentration in the remaining air amounts to 4% leaving 16% nitrogen. This mixing of the CO_2 with the remaining air, and absorption of CO_2 by the commodity, will take 12-24 hours depending on temperature.

5.6.5. After the required weight of CO_2 has been flushed, immediately:
a) Close the CO_2 cylinder valve.

b) Close the open zipper section thoroughly using the slider when air has been displaced.



5.6.6. For controlling stored-product insects, maintaining CO_2 above 50% for 10 days, or CO_2 above 35% for 15 days is sufficient to provide complete control, after which the liner may be opened. In addition, temperature accelerates treatment. Effective insect control may be achieved in as little as three days at 25° and less at higher temperatures.

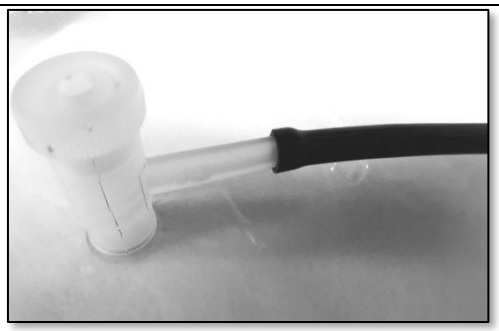
5.6.7. Although CO_2 is not toxic, it is an asphyxiant. It is advisable to unzip the FIBC Hermetic Pouch-GHF and wait until most of the CO_2 has dispersed.

5.7. INSTALLING THE FLEXIBLE INLET HOSE FOR CO_2 or O_2 Reading

The flexible inlet is included in the GrainPro Carbon Dioxide Analyzer or the user can find equivalent flexible hose from local hardware using the specifications as shown:

Inner Diameter	4 mm (0.16 in.)
Length	>5 cm (2 in.)

5.7.1. When taking the carbon dioxide or oxygen reading, install the flexible adapter hose into the plastic valve.



5.7.2. Twist the plastic valve cap to open.

5.7.3. Take the carbon dioxide or oxygen reading using an analyzer through the flexible inlet port.

5.7.4. After taking the oxygen or carbon dioxide reading, twist the plastic valve cap to close.

5.8. USING OXYGEN ANALYZER FOR MONITORING (WITH CO_2 FLUSHING)

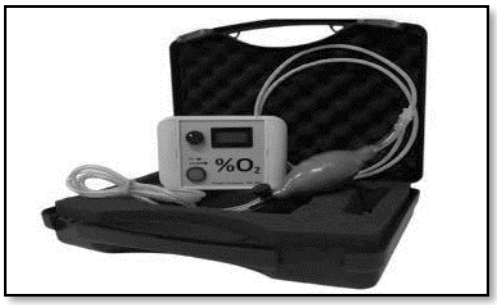
5.8.1. Recommended pest reduction timeline:

a. Leave the FIBC Hermetic Pouch-GHF closed for two weeks at a minimum of 35% CO_2 (13% O_2) concentration to eliminate all stages of insects and achieve best result.

b. Use of an oxygen analyzer:
Oxygen level should be checked using the oxygen analyzer after CO_2 flushing and upon arrival.

c. Using the analyzer, oxygen level can be checked through plastic valve with flexible adapter hose.

d. Close plastic valve after testing.



5.8.2. When flushing with CO_2, the approximate CO_2 concentrations can be determined by using the conversion table below when measuring the O_2 level:

$\%O_2$	$\%CO_2$	$\%O_2$	$\%CO_2$	$\%O_2$	$\%CO_2$	$\%O_2$	$\%CO_2$	$\%O_2$	$\%CO_2$	$\%O_2$	$\%CO_2$	$\%O_2$	$\%CO_2$
0.0	100	3.0	85.7	6.0	71.3	9.0	56.9	12.0	42.6	15.0	28.3	18.0	13.9
0.2	99.0	3.2	84.7	6.2	70.3	9.2	56.0	12.2	41.6	15.2	27.3	18.2	12.9
0.4	98.1	3.4	83.7	6.4	69.4	9.4	55.0	12.4	40.7	15.4	26.3	18.4	12.0
0.6	97.1	3.6	82.8	6.6	68.4	9.6	54.1	12.6	39.7	15.6	25.4	18.6	11.0
0.8	96.2	3.8	81.8	6.8	67.5	9.8	53.1	12.8	38.8	15.8	24.4	18.8	10.1
1.0	95.2	4.0	80.9	7.0	66.5	10.0	52.2	13.0	37.8	16.0	23.4	19.0	9.1
1.2	94.3	4.2	79.9	7.2	65.6	10.2	51.2	13.2	36.8	16.2	22.5	19.2	8.1
1.4	93.3	4.4	79.0	7.4	64.6	10.4	50.2	13.4	35.9	16.4	21.5	19.4	7.2
1.6	92.3	4.6	78.0	7.6	63.6	10.6	49.3	13.6	34.9	16.6	20.6	19.6	6.2
1.8	91.4	4.8	77.0	7.8	62.7	10.8	48.3	13.8	34.0	16.8	19.6	19.8	5.3
2.0	90.4	5.0	76.1	8.0	61.7	11.0	47.4	14.0	33.0	17.0	18.7	20.0	4.3
2.2	89.5	5.2	75.1	8.2	60.8	11.2	46.4	14.2	32.1	17.2	17.7	20.2	3.4
2.4	88.5	5.4	74.2	8.4	59.8	11.4	45.5	14.4	31.1	17.4	16.8	20.4	2.4
2.6	87.6	5.6	73.2	8.6	58.9	11.6	44.5	14.6	30.1	17.6	15.8	20.6	1.4
2.8	86.6	5.8	72.3	8.8	57.9	11.8	43.5	14.8	29.2	17.8	14.8	20.8	0.5

5.9. USING CARBON DIOXIDE ANALYZER FOR MONITORING (WITH CO_2 FLUSHING)

5.9.1. Recommended pest reduction timeline:

a. Leave the FIBC Hermetic Pouch-GHF closed for 15 days at 35% CO_2 concentration (minimum) or 50% CO_2 for 10 days to eliminate all stages of insects and achieve best results.

5.9.2. Using the carbon dioxide analyzer:

a. Carbon dioxide level should be checked using the carbon dioxide analyzer after CO_2 flushing and upon arrival.

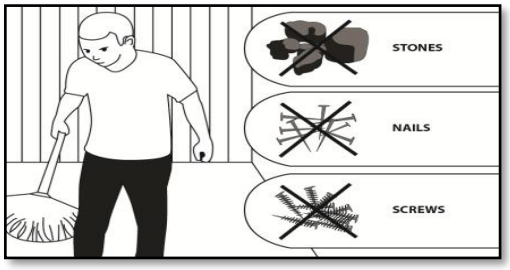
b. Carbon dioxide level may go down by several percent but must not approach 0%. Check for any source of leak or damage. Sealing is probably compromised, and the commodity may not be adequately protected.

c. Close plastic valve after testing

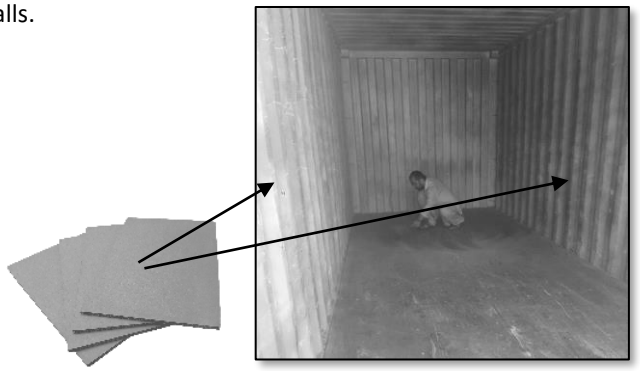
5.9.3. Monitoring of carbon dioxide level is recommended to ensure control of insect infestation. Details of using CO_2 analyzer are discussed in the analyzer's instruction manual.

5.10. LOADING

5.10.1. Ensure that container floor is free of any sharp objects that may damage the liner.



5.10.2. Place cardboards along the container walls.



5.10.3. Start to load using a forklift.

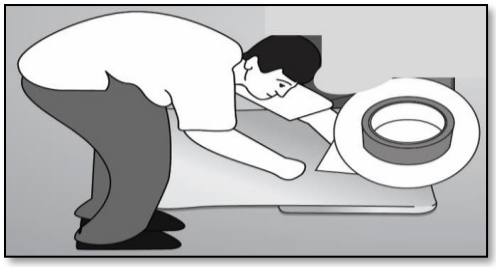
5.10.4. Recommended: Place cardboards in between FIBC Hermetic Pouch during loading to prevent damage during transit.

5.10.5. Close the container van carefully. Make sure not to pinch/squeeze the excess liner material between the container doors.

6. MAINTENANCE AND CARE

6.1. REPAIRING PUNCTURES AND OTHER DAMAGES

6.1.1. Use an ordinary 2" wide plastic tape to patch the damaged section of the liner.
   a. Clean the surface of the damaged area with damp cloth and allow the surface to dry before applying the plastic tape.
   b. Cut out a piece of tape enough to cover the damaged area (outside surface) of the liner.



6.1.2. Protective maintenance:
   a. Check the plastic tape occasionally and replace or re-patch if necessary.

6.2. SAFEKEEPING

6.2.1. The empty liner should be stored away from heat or direct sunlight and on a table or platform to protect from rodents.

6.2.2. Do not place heavy objects on top of the liner to prevent damage.

6.3. RECYCLING

GrainPro® FIBC Hermetic Pouch-GHF is made of polyethylene with barrier layer.

6.3.1. The products can be delivered to the nearest recycling facilities in the area.

6.3.2. Plastic #4 – LDPE (Low Density Polyethylene) can be recycled into compost bins, paneling, trash can liners and cans, floor tiles, and shipping envelopes.

7. FREQUENTLY ASKED QUESTIONS

7.1. WHAT IS GRAINPRO® FIBC Hermetic Pouch-GHF?

- The GrainPro® FIBC Hermetic Pouch-GHF is a cost-effective Ultra Hermetic™ storage solution. With care it can be used multiple times.

7.2. WHAT COMMODITIES CAN I STORE IN IT?

- The GrainPro® FIBC Hermetic Pouch-GHF, when loaded with FIBC or other non-hermetic container, is used to store a wide variety of dried commodities such as maize, soybean, wheat, cassava and rice paddy in boxes or in bags. It also preserves tobacco, spices, coffee, and different seeds.

7.3. HOW LONG CAN IT PRESERVE COMMODITIES?

- Typically for more than six months.

7.4. DOES IT HELP IMPROVE SEED GERMINATION?

- The GrainPro® FIBC Hermetic Pouch-GHF does not improve seed germination but maintains it with very little change.

7.5. CAN I STORE LOOSE COMMODITIES?

- No. The GrainPro® FIBC Hermetic Pouch-GHF is designed to hold commodities loaded in FIBC/big bags.

7.6. HOW DOES THE GRAINPRO® FIBC Hermetic Pouch-GHF KILL PESTS EMBEDDED IN THE COMMODITIES?

- The hermetic FIBC Hermetic Pouch-GHF as a gastight container relies on the respiration of insects, commodity and microflora which increases the level of carbon dioxide and decreases available oxygen inside the storage. This in turn eliminates insects including eggs, larvae, pupae and adults.

7.7. DOES IT ONLY KILL ADULT INSECTS?

- The GrainPro® FIBC Hermetic Pouch-GHF is designed to eliminate insects in all life stages.

7.8. CAN I SPEED UP THE PROCESS OF DEPLETING OXYGEN?

- Yes. The GrainPro® FIBC Hermetic Pouch-GHF can be flushed with CO_2 and rapidly create a "controlled atmosphere" which is low in O_2 and high in CO_2.

7.9. CAN I USE PHOSPHINE INSTEAD OF CO_2?

- Yes. While we do not encourage its use due to phosphine's adverse health effects to operators and growing insect resistance, we understand that many continue to use it and look for improved gas tightness.

7.10. IS IT REUSABLE?

- Yes, as long as the plastic material of the GrainPro® FIBC Hermetic Pouch-GHF is undamaged.

8. WARRANTY CLAUSE

GrainPro® hereby warrants that products sold to Buyers shall be free of defects in workmanship and materials, for a period as follows, starting from the date of shipment (B/L): One year for the GrainPro® FIBC Hermetic Pouch-GHF.

The warranty liability is limited to replacement of defective products within the warranty period at GrainPro's plant in accordance with the provisions specifically and expressly set forth herein.

The Buyer will pay for the products which need to be replaced under warranty, a percentage of the full list price according to the ratio between the period, which has passed until replacement, and the full warranty period.

The Buyer shall bear the shipping costs for shipment of defective Products to GrainPro®, and GrainPro® shall bear the shipping costs of returning good Products to Buyer.

The Warranty does not cover the cost of any service, work, or material required for the replacement of defective Products at the site of installation.

GrainPro® shall have no obligation under the warranty to replace defective Products or parts thereof if the defect is a result of any of the following: normal wear and tear; damages occurring after delivery, accidents, acts of God, or catastrophes, buyer's fault or negligence, improper storage or installation and improper maintenance.

Replacement costs and shipping charges for Products found not to be under warranty as specified above shall be paid in full by the Buyer before new/refurbished Products are shipped.

Notwithstanding the above, if the Products include main parts or sub-assemblies purchased by GrainPro® from other vendors ("Additional Equipment"), then the period and terms of warranty for Additional Equipment are limited to the period and terms offered by the vendors of such equipment.

The Buyer agrees that the warranty liabilities of GrainPro® shall be and are limited to the express foregoing terms: THE EXPRESS WARRANTIES AND OBLIGATIONS SET FORTH ABOVE, ARE AND SHALL BE IN LIEU OF ALL OTHER WARRANTIES AND OBLIGATIONS OF GRAINPRO®, and EXPRESSED OR IMPLIED. EXCEPT TO THE EXTENT HEREIN PROVIDED, GRAINPRO® DOES NOT MAKE AND SHALL NOT BE DEEMED TO MAKE ANY WARRANTY WHATSOEVER, TO ANY END USER OR TO ANY OTHER PERSON OR PARTY, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR USE OR PURPOSE. GRAINPRO® SHALL NOT BE LIABLE FOR ANY LOSS OF USE, SALES OR PROFIT OR FOR ANY INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES CAUSED BY OR SUFFERED AS A RESULT OF THE SALE OR USE OF THE PRODUCTS.

For further information and clarifications, visit our website at www.grainpro.com; email our Technical Support team: customercare@grainpro.com or call: (+6347) 252-7884.