GRAINPRO® COCOON™ CARGO

INSTRUCTION MANUAL

MA4042TSD1014-3

GRAINPRO
STORING THE FUTURE

"A GREEN, NOT ONLY FOR PROFIT COMPANY"

scan me

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1. INTRODUCTION

The **GrainPro® Cocoon™ Cargo** is designed to address the growing market demand of transporting agricultural commodities in Big Bags (officially known as Flexible Intermediate Bulk Container or FIBC; also called "tote bags" in the USA). Very often, commodities are infested before loading into the container or are found to be infested upon arrival at destination ports even if they were fumigated with phosphine prior to loading into containers.

Twenty (20) bags of 700-1000 kg or 10 bags of 1000-1500 kg fit in a standard 20-foot shipping container. GrainPro developed a Cocoon with the same capacity as a 20-foot container that can accommodate 20 small or 10 large Big Bags. The Cocoon Cargo zipper is located near the ground to facilitate handling bulk with forklifts. A sturdier and more durable 1250 g/m^2 PVC allows for outdoor storage which can handle extreme pressure. The Cocoon Cargo is equipped with a CO_2 or phosphine treatment port and an air outlet port, which makes it ideal for fumigation.

1.1. FEATURES:

1.1.1. Easy to use and ensure the safety of all dry agricultural commodities
1.1.2. An ideal fumigation chamber for infested crops before shipment or on arrival
1.1.3. Preserves the quality (aroma, freshness, color, etc.) of the stored products
1.1.4. Ideal for organic fumigation using CO_2
1.1.5. Facilitates temporary storage of goods at departure or destination ports
1.1.6. Applicable for commodities in Big Bags, but also for smaller bags with or without pallets
1.1.7. Minimizes condensation, inhibits/controls mold growth, and infestation
1.1.8. A "green" technology for organic product storage (certified safe for organic grain storage as secondary packaging)

1.2. PRODUCT GUARANTEE:

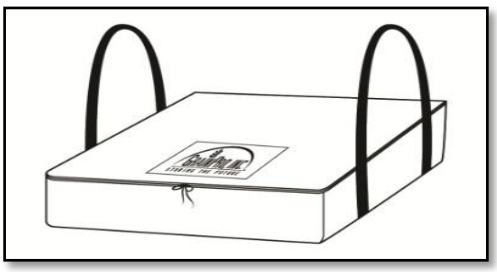
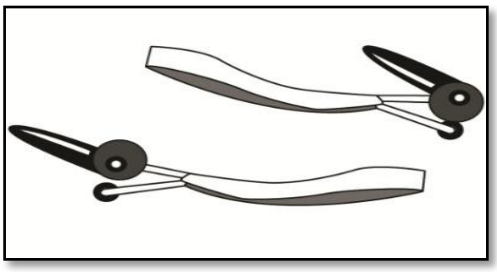
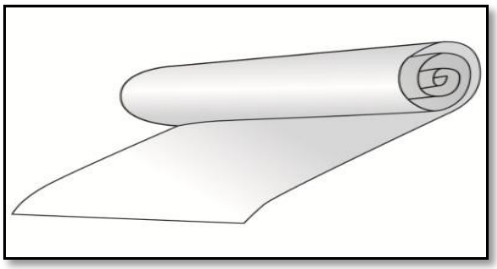
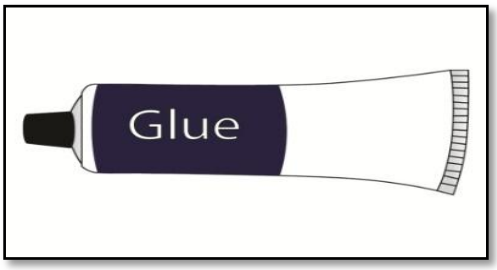
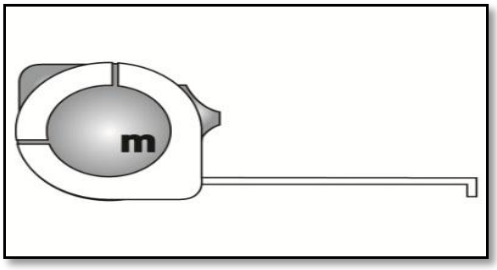
1.2.1. In accordance with the terms and conditions herewith, GrainPro, Inc., guarantees the quality of this product per its written warranty provided it is used according to the instructions in this manual.
1.2.2. Please read and understand the manual thoroughly before using the Cocoon Cargo.

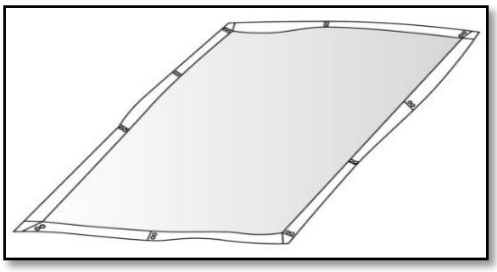
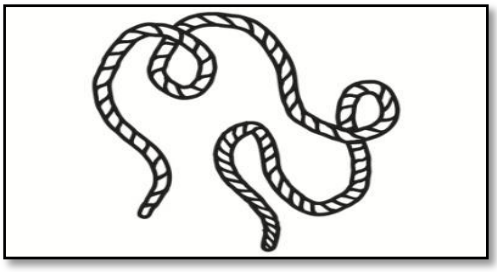
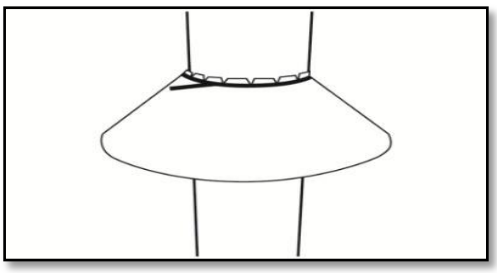
1.3. COMMENTS, COMPLAINTS, AND/OR CLARIFICATIONS:

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

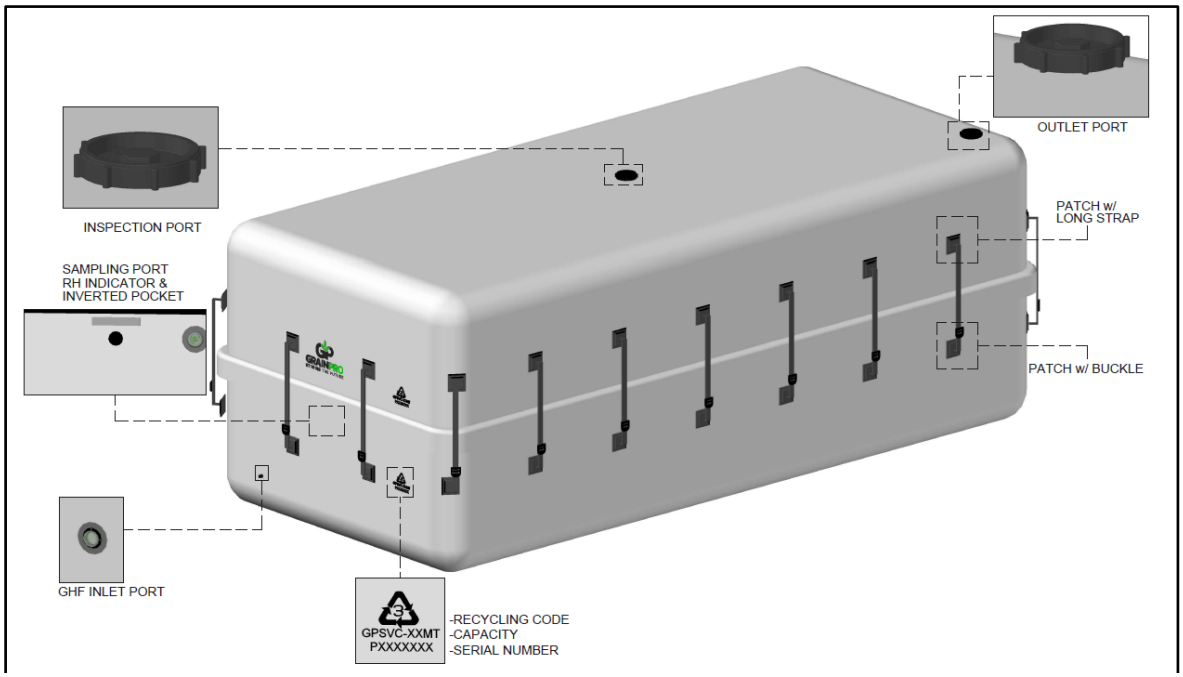
2. CHECKLIST

Please inspect your GrainPro Cocoon Cargo to ensure that the package includes the following items:

PART NAME	DESCRIPTION	IMAGE
2.1. CARRY BAG	2.1.1. Contents: a. Cocoon Cargo (Top and Bottom) b. GrainShade™ c. Small parts d. Repair kit e. Instruction manual	
2.2. ZIPPER PULL	2.2.1. For zipper sealing One (1) set (left and right)	
2.3. PATCHING MATERIAL	2.3.1. White-colored PVC roll for patching holes and other damages (30cm x 1.5m) One (1) piece	
2.4. PVC GLUE	2.4.1. For patching PVC materials (One) 1 tube	
2.5. SILICON SPRAY	2.5.1. For zipper lubrication One (1) can	
2.6. TAPE MEASURE	2.6.1. For checking the height of the stack One (1) piece	

2.7. GRAINSHADE™	2.7.1. Reflective cover material for outdoor installation One (1) piece	
2.8. EXTRA ROPE	2.8.1. For tying the GrainShade™ Forty (40) meters long (minimum)	
2.9. RODENT GUARD	2.9.1. To prevent rodents from climbing up the platform when storing an empty and folded Cocoon Cargo Four (4) pieces per pack	
2.10. INSTRUCTION MANUAL	2.10.1. Installation instructions 2.10.2. Maintenance instructions 2.10.3. Frequently asked questions 2.10.4. Warranty clause	

3. COMPONENTS



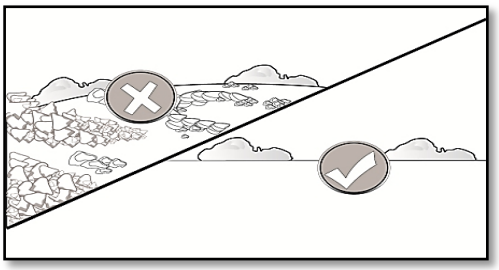
4. SPECIFICATIONS

4.1. MATERIALS	
PARAMETERS	DETAILS
Material	Reinforced Polyvinyl Chloride (Re-PVC)
Thickness, mm (inch)	0.97 (0.04) ±5%
Color	White
Material weight	1,250 g/m2
Oxygen Transmission Rate (OTR)	<500 cm^3/m^2/day @ 0.1 MPa
Water Vapor Transmission Rate (WVTR)	<9 g/m^2/day
Product life	15 years
Warranty	5 years
Sealing method	PVC Hermetic Zipper
Capacity, Big Bags @ 700-1000 kg for small/ 1000-1500 for large	20 small or 10 large Big Bags
Dimensions (L x W x H)	640cm x 285cm x 235cm (252 in. x 112 in. x 93 in.)
Packed weight	125 kg (276 lbs)±5%
Packed dimensions	110 cm x 100 cm x 30 cm (43 in. x 39 in. x 12 in.)
Packed volume	0.3 m^3 (11 ft^3)

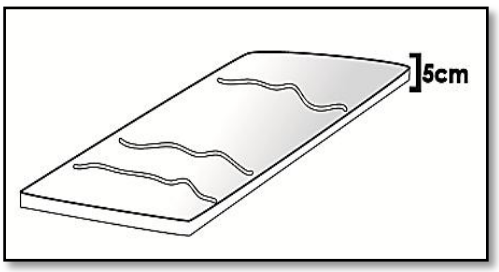
5. INSTALLATION

5.1. SITE SELECTION

5.1.1. The Cocoon Cargo can be installed indoor or outdoor. For indoor installation, look for:
   a. A flat area away from standing or running water.
   b. Cleared of any sharp objects (stones, broken glass, nails, etc.) that may puncture the Cocoon.
   c. Sufficient space to accommodate the Cocoon Cargo, the GrainShade and an inspection path around (at least 50 cm each side).



5.1.2. If the Cocoon Cargo is going to be installed on soil or turf, put a layer (5cm) of fine sand (or any equivalent) on top as ground foundation.



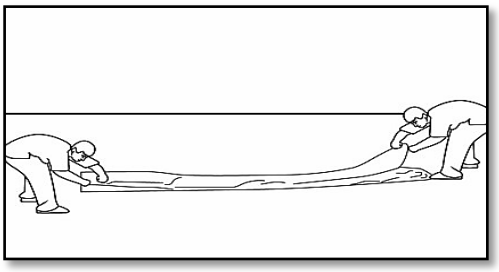
5.1.3. During loading, make sure that workers do not wear shoes with spikes that may damage the Cocoon Cargo. Preferably, choose a site that offers ease in loading/unloading, away from crowded areas and rubbish. For indoor installation, clean the area to remove sharp objects.

5.2. LOADING

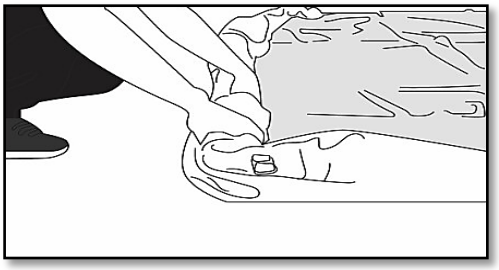
5.2.1. Check the moisture content of the commodity to ensure the MC is at a safe level. (Excessive moisture levels can lead to condensation, mold and aflatoxin growth among others). Safe moisture level for long term storage is different for every commodity.

5.2.2. Loading the bottom section:

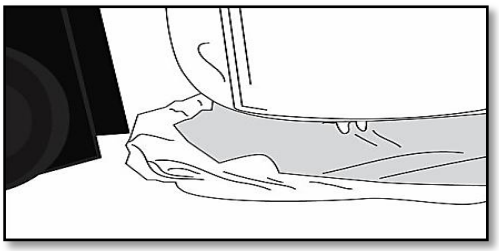
a. Unfold the bottom section of the Cocoon Cargo and lay it out on the prepared site.



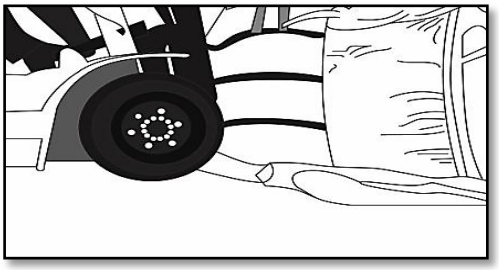
b. Roll down the wall. Stretch the floor of the bottom section by pulling the corners before loading the bags.



5.2.3. Start the loading of Big Bags using a mechanical loader or a forklift.



5.2.4. Continue loading by placing the Big Bags as close as possible to each other. Load the second layer of Big Bags the same way as the first layer.

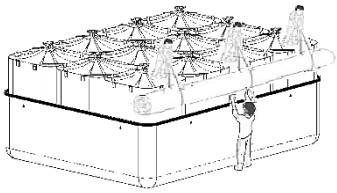


5.2.5. Place desiccants (calcium chloride) bags on strips on top.

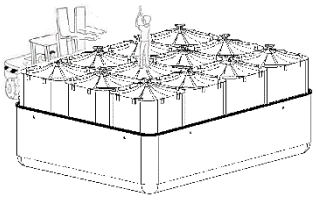
5.3. POSITIONING THE TOP SECTION

5.3.1. Place the top section over the stack. There are several ways to place the top section:

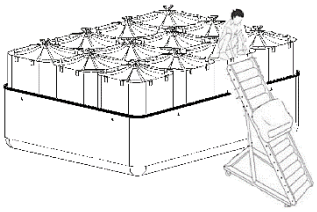
a. By rolling.
b. By using a forklift or conveyor.



Rolling method



Use of forklift



Use of conveyor

5.3.2. Unfold the top section over the stack. Make sure that top and bottom section arrows are aligned and the tension straps are outside.

5.3.3. One pair of arrows is painted green. Match these arrows for correct front and back orientation of the Cocoon.

5.3.4. Pull the sides covering the entire pile.
NOTE: Do not use tensions straps to pull or carry the top section.

5.3.5. Use silicon spray in closing the Cocoon with zipper pull.

5.4. USE OF DESICCANT (CALCIUM CHLORIDE, $CaCl_2$) – (Recommended)

5.4.1. Required dosage of Calcium Chloride, $CalCl_2$:

COCOON CARGO	Desiccant Require ($CaCl_2$) for 1 month of Storage	Desiccant Required ($CaCl_2$) for 6 months of Storage
	grams	grams
GP Cocoon Cargo	300	1800

5.4.2. Place the desiccants (Calcium Chloride, $CaCl_2$) at the middle-top portion of the bags inside the Cocoon Cargo before zipping.

5.4.3. For six (6) months of storage, spread-out the desiccant packs on top portion of the bags inside the Cocoon Cargo before Zipping.

5.5. ZIPPING

5.5.1. Preparing to zip:

a. Insert one hand inside the inverted pocket and engage the zipper track of the top and bottom liners by pressing the zipper.

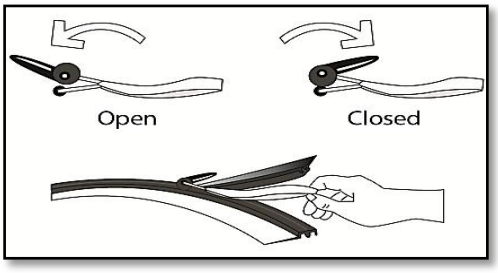
b. Manually close the zipper track to a length of 10 cm before using the zipper pulls.

NOTE:

- There are zipper pulls that zip to the right for right-handed users [marked with “RIGHT”] and zipper pulls that zip to the left for left-handed users [marked with “LEFT”].

5.5.2. Engaging the zipper pull:

a. Open the zipper pull by moving the black plastic handle, projecting the large wheel away from the flexible pulling loop.



b. Starting from the inverted pocket, place the smaller black running wheel inside the liner facing upward to engage the zipper track of the bottom liner.

c. Place the larger wheel outside the liner facing upward, to engage the zipper track of the top liner.

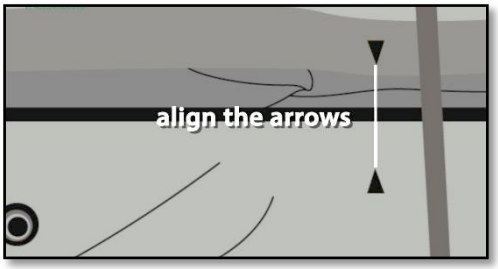
5.5.3. Using the zipper pull:

a. Rotate the zipper pull's plastic handle 180° toward its pulling loop, forcing the tongues and grooves of the two zipper tracks together. Slide the zipper pull around your Cocoon Cargo.

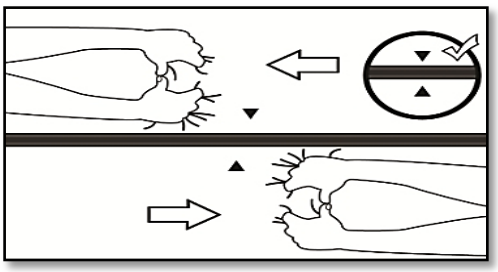
b. To make zipping easier, a second person should pull the top and bottom liners' zipper tracks close to each other as the zipper pull is advancing.
c. Apply the silicon spray to the zipper track to ensure ease of pulling the zipper pull.

5.5.4. Completing the zipping process:

a. Take note of the marks ("arrows") printed on both top and bottom sections in pairs.



b. The markings at the top section are located on the protective flap. If you reach a pair that does not match, you can slide the already zipped tracks by pulling the top and bottom liners in opposite directions until the marks meet.



NOTES:

- If marks do not align, the two zippers may have been exposed to different temperatures which might result in elongation of the zipper.
- Expose the Cocoon sections under the sun for 30 minutes to remove zipper length difference.

5.5.5. Removing the zipper pull:

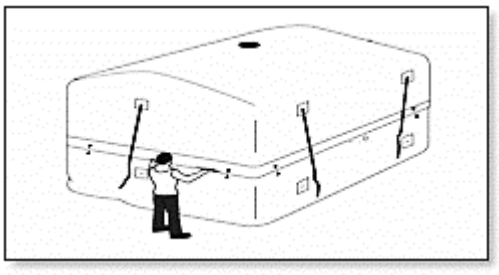
a. From the inverted pocket, take the zipper pull off the track by rotating the plastic handle 180° from the zipper pull loop.

b. Close the last few centimeters of the zipper track by sliding your fingers into the inverted pocket behind the zipper track, located at the front section of the Cocoon Cargo.

5.5.6. Ensuring a complete hermetic closure:

a. Check to ensure that the entire length of the zipper track is fully closed.

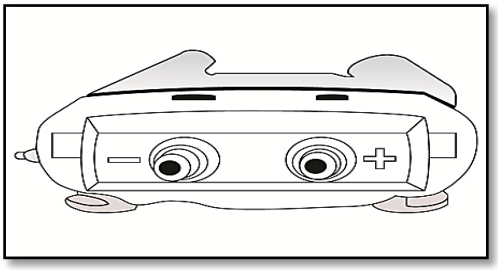
b. If not, press the zipper by hand.
NOTE:
- Dirt or other objects on the zipper track can prevent it from closing.



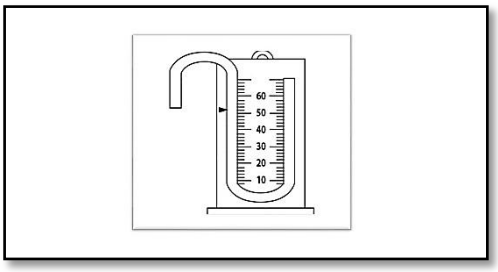
5.6. PRESSURE DECAY TEST (PDT)

5.6.1. After completely zipping and closing all the ports of the Cocoon Cargo, perform a Pressure {Vacuum} Decay Test (PDT) to ensure gas-tightness:

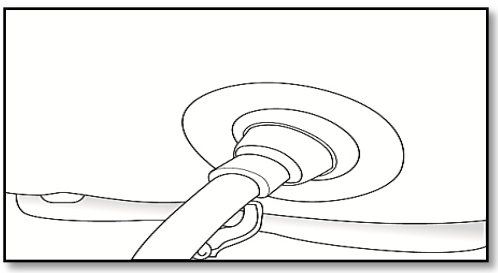
a. Use digital manometer



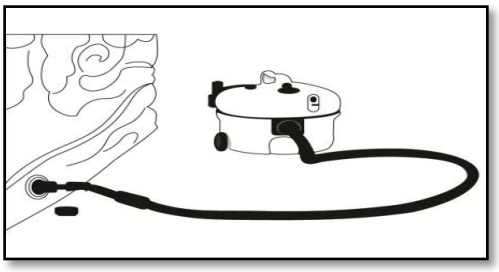
b. Or use commercially available or improvised U-tube manometer to monitor the pressure



5.6.2. Connect the manometer hose into the flexible inlet of the Cocoon Cargo.



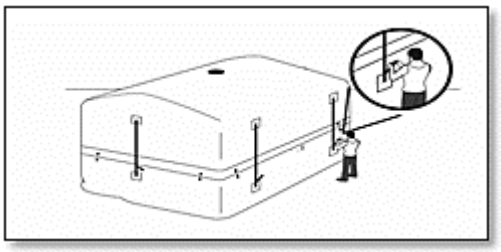
5.6.3. Use a vacuum pump [at least 2.3 cubic meters per minute with 600 Watts (0.80 horsepower) centrifugal pump]:



a. Connect the vacuum pump hose to the inlet port of the Cocoon Cargo.
b. Create at least -250 Pascals (Pa) or -25 millimeters' water (mm H_2O) negative pressure. Doing this can also help engage the zipper tracks properly.
c. To be sufficiently airtight, the final pressure should not be greater than one-half (½) of the initial pressure (created by the vacuum pump) within five (5) minutes. For -250 Pascal, the pressure should not be greater than -125 Pa.
d. If PDT test fails, check for holes/tears and improperly sealed zippers then repeat the PDT procedure.

5.7. TENSIONING OF STRAPS (PROTECTING ZIPPER)

5.7.1. Pull the protective flap down over the zipper track. Tighten the straps to pull any slack away from the ground. Check the protective flap over the zipper track. The protective flap should not be displaced.



5.7.2. The tension straps are long enough to raise and apply tension to the sides of the Cocoon Cargo, even if it is only three-quarters full. The required tension can be achieved by attaching the cords to the buckles of the Cocoon Cargo. (Tensioning straps prevents folds on sides to prevent rodent getting a tooth hold).

5.8. CARBON DIOXIDE (CO_2) SAFETY

5.8.1. 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.

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

5.8.3. Protect cylinders from physical damage. Do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. 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.

5.8.4. 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.

5.8.5. Close the container valve after each use; keep closed even when empty.

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

5.9. PROCEDURE FOR PURGING CARBON DIOXIDE (CO_2)

5.9.1. Calculation:

a) Total Volume – Volume Occupied by the Commodity.
b) Every 2.0 kg of CO_2 replaces 1 cubic meter of air.
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
Barley	0.62	32.7
Cashew nuts	0.50	43.0
Chia seeds	0.68	27.5
Chickpeas	0.74	22.4
Cocoa beans	0.56	37.8
Coffee beans	0.59	35.3
Cotton seed	0.40	51.6
Cowpea	0.75	21.5
Maize	0.72	24.1
Millet	0.63	31.8
Mung bean	0.75	21.5
Oats	0.43	49.0
Paddy	0.60	34.4
Paddy, rice bran	0.55	38.7
Peanuts, shelled	0.64	31.0
Rice, milled	0.80	17.2
Rye	0.72	24.1
Sesame	0.59	35.3
Sorghum	0.72	24.1
Soybean	0.75	21.5
Sunflower	0.41	50.7
Wheat	0.77	19.8

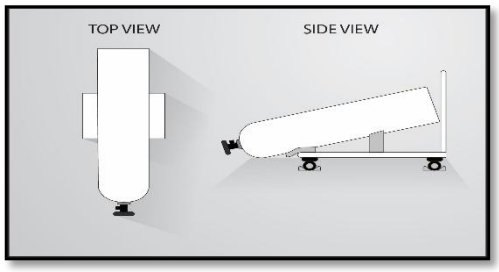
5.9.2. CO_2 application:

a. Make sure that enough CO_2 is available on site. The weight of the CO_2 in the cylinder is indicated by the industrial companies (i.e. 22kg standard capacities which can be used to calculate the number of cylinders required). CO_2 cylinders are available with or without syphon (dip tube).

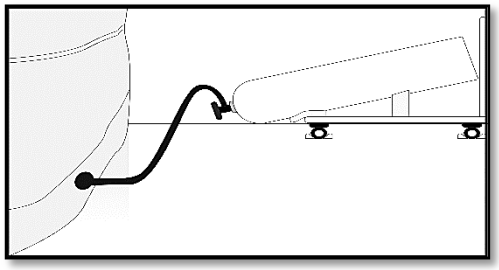
NOTES:

- For rapid flushing, the cylinder should be inverted using mechanical inverter.
- Cylinder with syphon should be in upright position during flushing.

b. If a mechanical inverter is not available, a makeshift inverter can be made using sand bags or any available tools. The cylinder should be inverted with its top resting on one sand bag and the bottom end resting on pile of two or three sandbags.

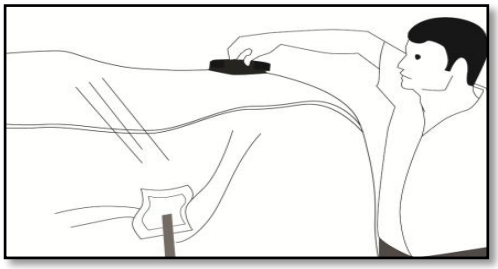


c. A Snap-on standard high-pressure hose (optional; available from GrainPro) should be connected between the cylinder and the gas inlet valve.
NOTES:
- The hose should withstand a pressure of 88 atmospheres (1,300 psi or 92 kg/cm^2).



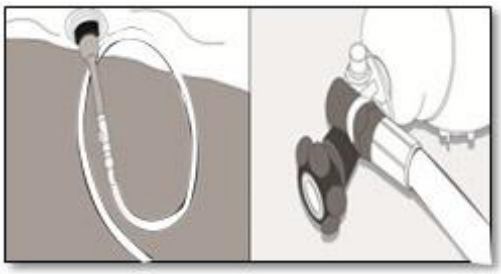
- Ensure that all connections are done properly and gaskets are installed as required.
- The high-pressure hose should have a length of about 2 meters to facilitate easy connection to the inlet valve.

d. Open the outlet port located at the back (top) of the Cocoon Cargo to displace air during purging.

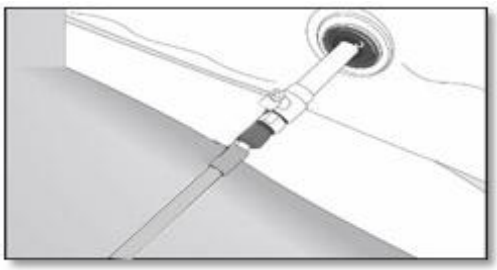


e. Open the gas inlet valve connected to the inlet port and then open the cylinder tap.

NOTES:
- During purging, the liquid CO_2 enters the liner and evaporates. This pushes the air upward starting from the bottom. Following a piston effect, the air is displaced through the outlet port.



5.9.3. Safety warning
Caution: CO_2, although not poisonous, is an asphyxiant and displaces oxygen. Use either large vented room or duct attached to outlet port venting to outdoor.

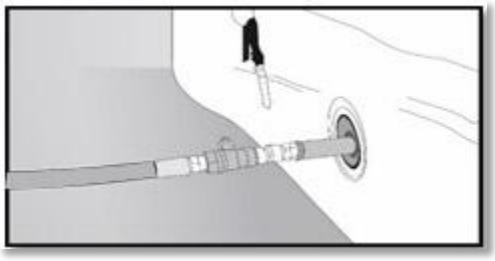


5.9.4. Ice formation along the pressurized hose during CO_2 flushing
a. During this procedure, some ice may form around the gas inlet and high pressure hose.
b. If this happens do not touch the PVC liner because it becomes brittle, loses its flexibility and may crack!

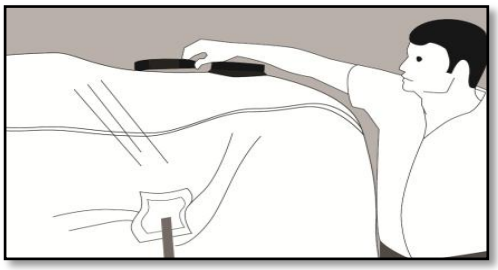
c. Flushing (emptying of the cylinder) depends on the amount of CO_2 to be applied. Emptying one 22kg cylinder should only take about 20 to 30 minutes. If the pressure hose or the inlet valve gets blocked with ice, this indicates that the CO_2 is being released too quickly. If this happens, the cylinder should be closed until the ice melts. Then, the cylinder valve should be adjusted to reduce the flow.
d. An additional indication that the gas is being released too quickly is when the liner begins to balloon because pressure begins to build-up. If this happens, the gas flow should be adjusted through the cylinder valve. The rate in which the air is expelled through the outlet port should be almost equal to the rate of CO_2 entering the liner.
e. If necessary, weighing scales can be used to control the weight of the gas delivered.

5.9.5. Since CO_2 is heavier than air, the air inside the liner is pushed upwards and is expelled through the outlet port. Complete displacement is not possible as there is always some mixing of air and CO_2. The final CO_2 concentration should reach 80% after flushing. This mixing of the CO_2 with the remaining air, and absorption of CO_2 by the commodity, take 12-24 hours approximately. Take the carbon dioxide or oxygen reading after 24 hours.

5.9.6. After the required weight of CO_2 has been applied, immediately:
a. Close the CO_2 cylinder valve and the inlet port of the liner.



b. Close the outlet port after flushing.

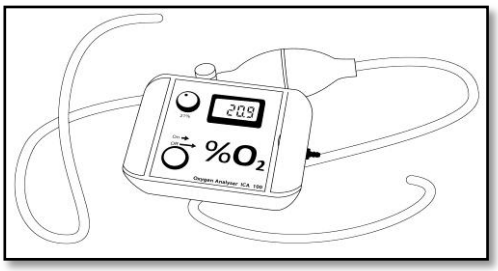


5.9.7. To control insects:
a. Maintain CO_2 above 50% for 10 days, or CO_2 above 35% for 15 days to sufficiently provide complete control. After which the liner may be opened.
b. Higher temperatures accelerate insect control.

5.10. USING OXYGEN ANALYZER FOR MONITORING

5.10.1. Recommended pest reduction timeline:
a. Leave the Cocoon Cargo closed for two weeks at a minimum of 35% CO_2 (13% O_2) concentration to eliminate insects in all life stages and achieve best results.
b. When storing commodities for longer periods, keep the Cocoon Cargo sealed until it is unloaded completely to prevent re-infestation.

5.10.2. Use of an oxygen analyzer:
a. During the first 15 days of installation, oxygen levels should be checked daily using the oxygen analyzer.



b. Succeeding monitoring should be done twice a week. Normally, oxygen levels should drop 1-2% per day to a level less than 3% (though lower levels have been observed as well). Oxygen levels go up by a few percent but must not exceed 7%. Otherwise, sealing is probably compromised and the commodity may not be adequately protected.

5.10.3. When purging with CO_2, the approximate CO_2 concentrations can be determined by measuring O_2 concentrations using below conversion table:

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

5.11. USING CARBON DIOXIDE ANALYZER FOR MONITORING

The GrainPro CO_2 analyzer uses a non-dispersive infrared radiation (NDIR) sensor for the detection of carbon dioxide. When a sensor encounters a target gas, voltage signal is generated in proportion to the gas concentration. This voltage signal is amplified, digitized and displayed on the instrument's OLED display.

5.11.1. Recommended pest reduction timeline:

a. Leave the Cocoon closed for 15 days at 35% CO_2 concentration (minimum) or 50% CO_2 for 10 days to eliminate insects in all life stages and achieve best results.
b. When storing commodities, leave the Cocoon sealed until it is unloaded completely.

5.11.2. Using the carbon dioxide analyzer:

a. During the first 15 days of installation, carbon dioxide level should be checked daily using the carbon dioxide analyzer.

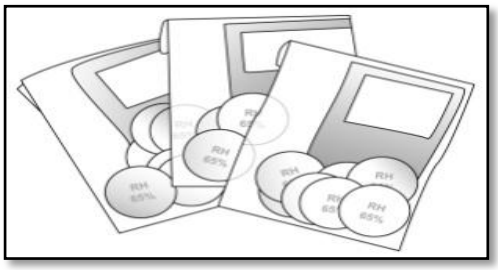
b. Succeeding monitoring should be done twice a week. Carbon dioxide level may go down by several percent but must not approach 0%. Otherwise, check for any source of leak or damage. Sealing is probably compromised, and the commodity may not be adequately protected.

5.11.3. When carrying-out a CO_2 treatment, the approximate CO_2 concentrations can be determined by measuring CO_2 concentrations using the carbon dioxide analyzer. Details of using CO_2 analyzer are discussed in the analyzer's instruction manual.

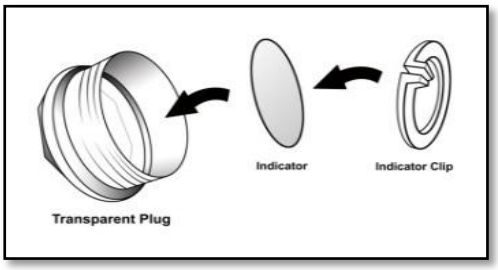
5.12. MONITORING RELATIVE HUMIDITY (%RH)

5.12.1. Use of humidity indicator:

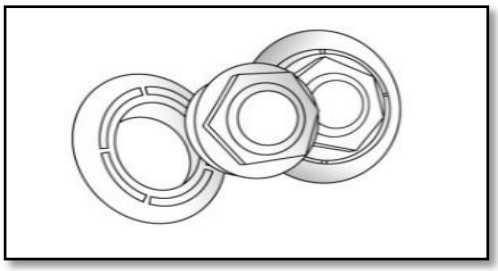
a. The humidity indicator is a special circular paper with moisture-sensitive chemical. Its color changes from brown to green when relative humidity exceeds 65%, and vice versa.
b. The humidity indicator provides an affordable and quick reference to relative humidity inside the Cocoon Cargo.
c. It is easy to use and does not require meticulous preparation for installation.
d. The material is non-toxic and disposal does not need any special treatment.
e. Procedures on how to use the humidity indicator:



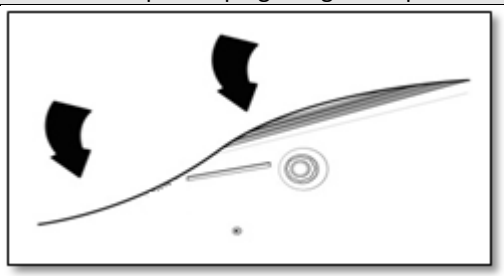
Get a humidity indicator from the pack



Put the humidity indicator inside the transparent plug using the clip



Attach the transparent plug to the threaded flange tightly



Hide the humidity indicator with the zipper cover

5.13. USING GRAINPRO ECOWISE FOR WIRELESS MONITORING

The GrainPro® EcoWiSe™ is a wireless sensing system designed to remotely monitor the environment within a hermetic storage unit in real time. The sensor collects and sends out data such as relative humidity (%RH), temperature (°C) and CO_2 levels (%) to a receiver that is connected to a computer. The software transmits the information via the Internet to designated users who can monitor the data on their computers or smartphones.

5.13.1. EcoWise Standard remits data on RH and temperature

5.13.2. EcoWiSe Plus provides data on RH, temperature and CO_2 levels.

5.13.3. Details of using wireless monitoring are discussed in the EcoWiSe instruction manual.

5.14. DISMANTLING

5.14.1. Although CO_2 is not toxic, it is an asphyxiant and it is advisable to unzip the Cocoon Cargo and wait until most of the CO_2 has dispersed.

5.14.2. Cocoon Cargo may be progressively filled for several days during harvest, provided that commodity has uniform moisture content. However, it is not recommended to load the partially filled Cocoon Cargo with another batch of commodity from a new harvest. When the new commodity is placed on top, the old commodity from the previous harvest is left at the bottom.

5.14.3. Commodity should be unloaded at the end of storage.

a. Unfasten the tension straps.
b. Use a coin to twist the zipper (sharp objects should not be used for opening the zipper).
c. Gently pull the two sections apart, taking off the top section completely.
d. Unload the commodities (a stairway of sacks might make the job easier).

6. PREVENTING CONDENSATION

6.1. WHY CONDENSATION OCCURS?

6.1.1. Condensation is caused by temperature differences i.e. hot temperature by day and cool temperature at night or sudden rain in a hot sunny day. When air collides with a cool surface at dew point, the vapor in the air condenses on the surface. Air movement inside the Cocoon Cargo follows the natural convection current in which hot air rises and cool air sinks (except for the phenomenon called inversion). Hence, when warm air inside the Cocoon Cargo rises and hits the cool surface of Cocoon Cargo top cover at dew point, condensation occurs.

6.1.2. Therefore, avoid trapping warm air inside the Cocoon Cargo to prevent condensation at the top layer. The GrainShade prevents the heating up of air inside the Cocoon Cargo by reflecting solar radiation. Condensation can be checked manually through opening the sampling port on the top section of Cocoon. Close the sampling port properly after checking.

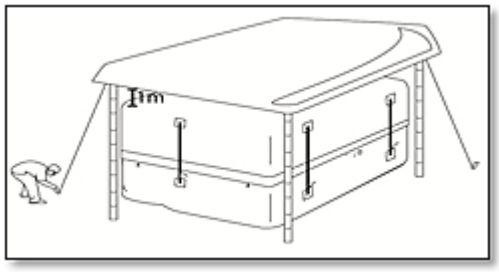
6.2. MOISTURE CONTENT (MC) REQUIREMENT FOR SAFE STORAGE

6.2.1. Commodities should be dried before storage to at least 12% MC for sorghum, 9-10% millet, 12-14% for paddy and maize, and 13% for wheat. When the commodity is properly dried, microbial growth is inhibited due to absence of available water.

6.2.2. Maintain safe moisture of stored commodity by protecting dried product from ambient air (with high %RH) using hermetic technology. Use desiccant per section, 5.4.

6.3. SETTING-UP THE GRAINSHADE (OUTDOOR INSTALLATION)

6.3.1. Ensure that the poles are rigid and stable:



a. Use poles (pipe, lumber, or bamboo) at least 1.5 meters from each corner and 1.0 meter higher than the Cocoon Cargo.
b. Connect the corners of the GrainShade to the apex of the poles, maintaining at least 1-meter clearance between the top surface of the Cocoon Cargo and the GrainShade.
c. Additional guy wires might be used to reinforce the pole by tying the top. The other end is pegged to the ground away from the pole.

6.3.2. If poles are not available, tie the GrainShade to nearby posts, walls, tree branches, or pegs for support.

6.3.3. To prevent the GrainShade from sagging and flapping during rain and strong wind, install wire or rope beneath and above the GrainShade.

7. MAINTENANCE AND CARE

7.1. REGULAR EXAMINATION

7.1.1. Measure oxygen or carbon dioxide concentration using the analyzer.

a. First-two weeks – Daily
b. Succeeding days – Twice a week

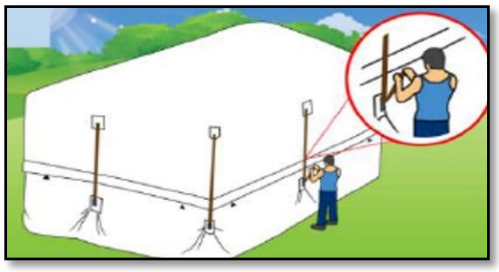
7.1.2. Check for possible condensation by opening the sampling port at least once a week. Make sure that the port is properly closed after checking.

7.2. PHYSICAL INSPECTION

7.2.1. Check the zipper track for any small openings and press any open track section found by hand.

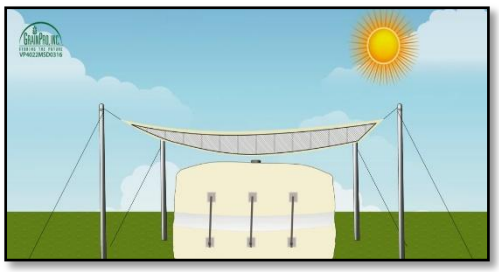
7.2.2. No slack material should develop near the ground.

7.2.3. If slacks are observed, re-adjust the tension straps to pull slacks away from the ground.



7.2.4. During rainy season, the upper surface of the Cocoon Cargo should be regularly inspected for accumulated water and holes that would permit water to seep into the Cocoon Cargo. The stored commodity is not adequately protected if the Cocoon Cargo is not completely sealed.

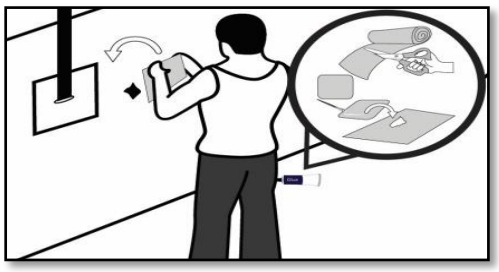
7.2.5. Re-secure the tension of the guy wires to prevent the GrainShade from sagging and flapping during rain and strong wind.



7.3. REPAIRING PUNCTURES AND OTHER DAMAGES

7.3.1. Use the patching material and glue from the repair kit.

a. Clean the area to be patched with a damp cloth or organic solvent.
b. Apply glue (150-200g) on both surface with a brush or spatula.
c. Let it dry for 5-10 minutes. Stick the patch and apply sufficient pressure.



7.3.2. Protective maintenance:

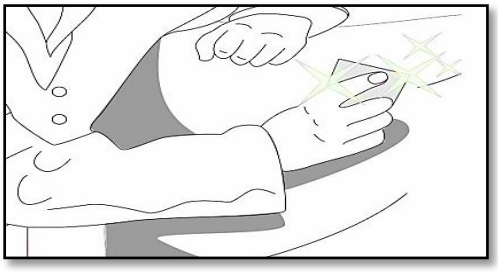
a. Check the patched PVC occasionally. Replace or re-patch if necessary.

7.4. PROHIBITED ITEMS FOR AIR SHIPMENT

7.4.1. The Silicone spray (for zipper lubrication) and Glue (for patching PVC materials) are not allowed to be shipped through air cargo.
7.4.2. These items will be removed from the package.
7.4.3. The client is advised to purchase locally available PVC glue.

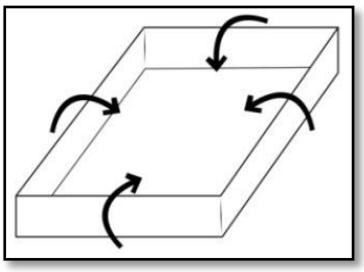
7.5. CLEANING TOP AND BOTTOM SECTIONS

7.5.1. If necessary, use with soap and water.
7.5.2. Air dry or dry under the sun.



7.6. FOLDING

7.6.1. Measure 180cm from the end and fold inside.
7.6.2. Fold any extra material and finally fold in half.
7.6.3. Fold the material lengthwise until it fits in the carrying bag.
7.6.4. Folding procedures and repacking of the Cocoon Cargo: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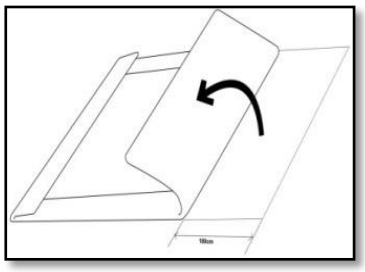
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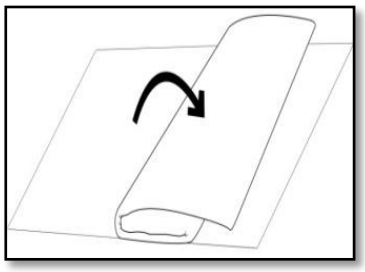
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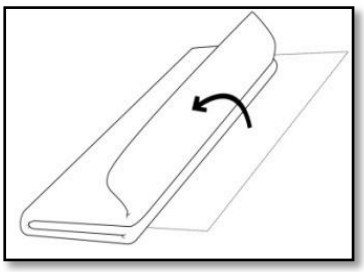
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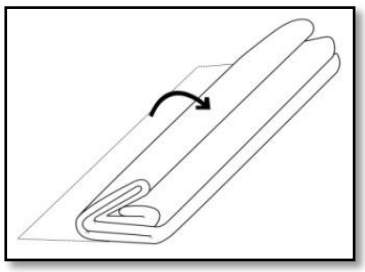
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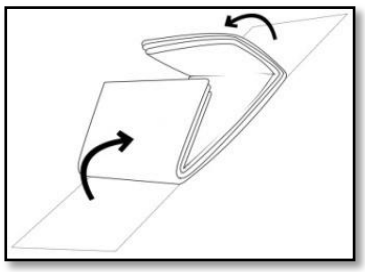
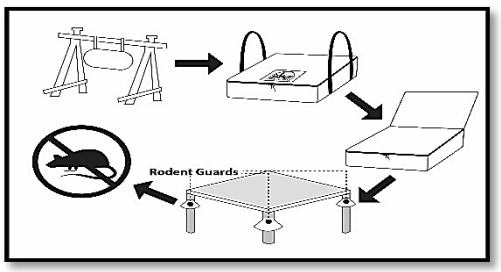

F

Caution: Do NOT fold along the sampling/inspection port, GHF inlet and outlet ports, transparent plug and flexible inlet ports.

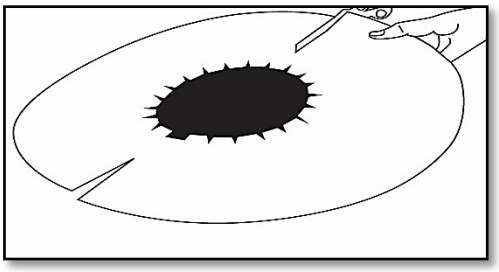
7.7. SAFEKEEPING

7.7.1. The empty Cocoon Cargo should be stored and protected from heat or direct sunlight and rodents.
7.7.2. Do not place heavy objects on top of the Cocoon as it may deform or damage the liner.

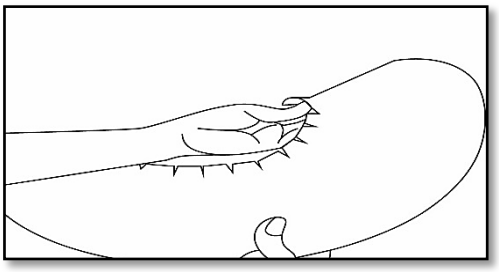


7.8. PLATFORM INSTALLATION OF RODENT GUARD (RG)

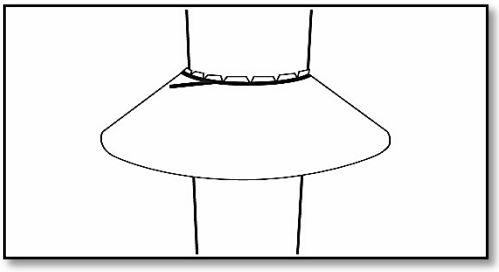
7.8.1. Install rodent guards to protect Cocoon against rodent attacks (one set contains 4 pieces):
   a. One set can be installed on any platform legs with perimeter (round or square) of 22 cm (9'') to 44 cm (17'').
   b. If the leg area is smaller, guards can be cut in half to fit.



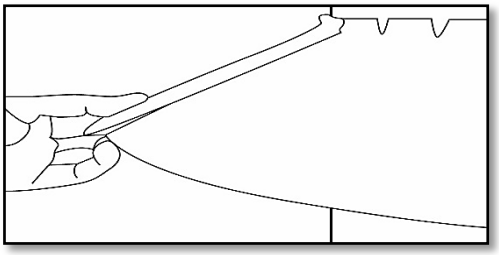
7.8.2. Fold the rodent guard's teeth upwards against the sides of the leg to keep it from slipping.



7.8.3. Make sure to overlap the sides at least one inch (2.5 cm).



7.8.4. Lock the overlap using staple wire, cable wire, or any fastener.



7.9. TERMITE CONTROL

7.9.1. Overview of Termite

a. The two most common types of termites are "dry wood" and "ground," or subterranean termites.
b. Termites need moisture to survive and will die if exposed to sunlight or open air for more than a few minutes. Their tunnels protect them from the elements.

c. High moisture areas like basements and crawl spaces are very attractive to termites and can serve as starting points for an infestation.

7.9.2. Description (Subterranean Termite)

a. Food and moisture:
   - Need a great deal of moisture such as from soil, and damp wood, Cellulose (from wood) is their diet.
b. Habitat:
   - Usually they live in the soil, but can be above ground if enough moisture is present. They have large colonies.
c. Evidence of activity:
   - Protective mud tubes ascending from the ground to the structure or protruding from walls, etc.
d. Prevention:
   - Pre-treat the soil with a termiticide before construction.
   - For more information go to Chemical soil treatment.
   - Use a termite bait station monitoring system to monitor termite activity and bait placements after detection.
   - Conduct regular inspections.
e. Control Measures:
   - With current activity use a baiting program or a termite barrier treatment.

7.9.3. Termite Treatments.

a. The traditional method of controlling subterranean termites is to apply a liquid pesticide, known as a termiticide, to the soil. This chemical treatment relied on the application of a chemical barrier around and beneath the structure designed to block all possible routes of termite entry. Any termites attempting to penetrate through the treated soil are either killed or repelled.
b. There are several different insecticides currently used by pest control operators for termite soil treatments. All of them are safe and effective when used per label directions. The insecticides remain effective in the soil for approximately 5 to 10 years.
c. Effective termite treatments require a great volume of termiticide.

7.10. RECYCLING

The GrainPro Cocoon Cargo is made of Reinforced PVC.

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

7.10.2. Plastic #3 – PVC (Vinyl) can be recycled into paneling, flooring, speed bumps, decks or roadway gutters.

8. FREQUENTLY ASKED QUESTIONS

8.1. WHAT IS COCOON CARGO?

- The Cocoon Cargo™ is developed for the fumigation of commodities before they leave the port or upon arrival in the port. Made of strong, heavy-duty materials, the Cocoon Cargo has the same dimensions as a 20' shipping container and can be filled with 20 small or 10 large big bags or "Tote bags".

8.2. WHAT FEATURES DIFFERENTIATE IT FROM OTHER COCOONS?

- Since the zipper of the Cocoon Cargo is located near the bottom, big bags can be loaded easily using a forklift. It can also be used as a fumigation chamber.

8.3. WHAT IS ITS SIZE?

- The Cocoon Cargo has the same dimension as a 20' shipping container.

8.4. WHAT COMMODITIES CAN I STORE IN IT?

- The Cocoon Cargo can store a wide variety of dried grains (rice paddy, maize, wheat, nuts, beans coffee, cacao, soybean and seeds). The commodities stored in it can be stored in bulk or in smaller bags loaded inside big bags (or tote bags).

8.5. HOW MANY BIG BAGS CAN FIT IN A COCOON CARGO?

- 20 small or 10 large big bags (tote bags) can fill a Cocoon Cargo to full capacity.

8.6. WHEN SHOULD I USE IT?

- The Cocoon Cargo is designed for fumigation of commodities before leaving the port or upon arrival.

8.7. CAN I USE OTHER FUMIGANTS ASIDE FROM CO_2?

- Yes. Phosphine can be used to fumigate the commodities instead of CO_2.

8.8. HOW LONG CAN I KEEP COMMODITIES INSIDE THE COCOON CARGO?

- Commodities can be preserved in the Cocoon Cargo for up to 6 months.

8.9. HOW MANY PEOPLE ARE NEEDED TO SET UP THE COCOON CARGO?

- At least 2 people are needed to install and load the Cocoon Cargo using forklift.

8.10. IS IT REUSABLE?

- Yes, the Cocoon Cargo is made from reinforced polyvinyl chloride (PVC) which has a useful life of 15 years.

9. WARRANTY CLAUSE

GrainPro® hereby warrants that Products sold by it to Buyer shall be free of defects in workmanship, including maintaining gas tightness for a period as follows - starting from the date of shipment (B/L): Five years for the Cocoon™ Cargo liner and zipper.

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

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

The Warranty does not cover the cost of any services, work, or materials required for the replacement of defective Products with good 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, fault or negligence, or improper storage installation, maintenance of the Products.

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

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, EXPRESSED OR IMPLIED. EXCEPT TO THE EXTENT HEREIN PROVIDED, GRAINPRO DOES NOT MAKE AND SHALL NOT BE DEEMED TO MAKE ANY WARRANTY WHATSOEVER TO THE, 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.

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