

# GrainPro TranSafeliner™

(Patent applied for)

**For prevention of condensation, moisture ingress, and control of infestation without toxic fumigation in transit**

Agricultural commodities are transported from one climate zone to another. Most commodities suffer from condensation, infestation and moisture increase particularly when the voyage starts in tropical climates. GrainPro, Inc., a world leader in manufacturing gas tight storage enclosure offers a solution for safe storage of agricultural commodities in transit. Our GrainPro TranSafeliner™ (TSL) is made of transparent multi-layer film which has superior gas and moisture barrier properties. These container for bulk and bagged commodities. For more rapid fumigation, request a special version of TSL allowing flushing of carbon dioxide.

## In-Transit Insect Treatment Without Fumigation

Agricultural commodities such as grains, beans, pulses, cocoa beans, and oilseeds produce low oxygen and large amounts of carbon dioxide (CO<sub>2</sub>) atmosphere. The CO<sub>2</sub> produced is generated either by the large population of insects present in the commodity or by the respiration of the commodity itself. Commodities are generally fumigated before shipment but due to poor gas tightness and short exposure time to fumigants, there remains a survival of larvae, pupae, and eggs are still present. Due to high temperature and air humidity, the residual insect population increases rapidly causing damage to the commodity and making re-treatment on arrival to the destination necessary. GrainPro TranSafeliner™ consists of a specially designed gastight liner which oxygen depleted and CO<sub>2</sub> rich modified atmosphere is produced taking advantage of the respiration of insects and commodity. The low gas permeability property of TSL maintains this modified atmosphere which is lethal to insects and controls the insect population. This gives the TSL the advantage of 'green' and safe fumigation. High fat and oil content commodities like peanut and cocoa beans can also generate such modified atmospheres. The modified atmosphere created, can also prevent mold growth and oxidation of the commodities.

## Prevention of Condensation and Effects of Exterior Humidity

Moisture movement occurs when convection currents are encouraged by gradients of temperature generated particularly when a container is exposed to solar heat. High temperature causes moisture movement from the commodity to the free air space at the top of the container. As the temperature is reduced during the cooler times of the day, the moisture in the air condenses on the metal roof and drips



*View of the inner liner inside the shipping container*



*Laying out of TSL*



*Installation of TSL using axial fan*

from the top and walls of the container causing damage to the commodity. With the use of TSL, the moisture exchange between the commodity and the free air space is prevented. The liner enables the separation of the commodity's atmosphere from the container atmosphere. When there is no moisture to absorb, there is no condensation. Further even in a high humidity atmosphere the moisture content of the commodity does not change despite major temperature changes in transport, since moist air cannot enter the TSL.

### Advantages

- Prevents condensation by preventing entrance of moisture from outside
- Effectively controls insect infestation while in transit
- Excludes the use of toxic fumigation, 'green' fumigation
- Prevents oxidation and development of molds
- Easy to install and multi use for as long as not punctured

### Installation

A TSL can be installed in two ways:

- Use of axial fan to hold the liner to the container walls.
- Use of cable ties and tape or magnets to hang the liner.

While loading, the hung liner is pulled loose on top of the commodity. After loading, the loose end of the liner is pulled horizontally and taped using a special gas tight tape.



*Sealing of liner using gas tight tape*



*Closed TSL*



*Package of TSL kit comes with container liner, sealing tape, cable ties and installation manual*

### Specifications

Parameters	Test Method	Units	Values
Thickness		Micron, $\mu$	100
Weight		Gram/m <sup>2</sup>	97.5
Tensile Strength at break, MD	ASTM D-882	MPa	38.0
Tensile Strength at break, TD	ASTM D-882	MPa	38.0
Elongation at break, MD	ASTM D-882	%	500
Elongation at break, TD	ASTM D-882	%	540
Dart drop	ASTM D-709	gram	800
Haze	ASTM-1003	%	17
Clarity	ASTM-1003	%	86
C.O.F – in-in (static/dynamic)	inclined plane		0.45/0.40
Oxygen Permeability at 25°C, dry	ASTM D3985	cc/m <sup>2</sup> /day	52
WVTR (water vapor at 38°C, 90% RH)		cc/m <sup>2</sup> /day	5.5

### Available sizes:

Product Code	Size
GPP-TSL-20	10m perimeter, 9m length, 100 $\mu$ thickness
GPP-TSL-40	10m perimeter, 15m length, 100 $\mu$ thickness



### GrainPro, Inc.

200 Baker Ave., Suite 309, Concord MA 01742, USA  
 Tel. +1-978-371-7118 Fax +1-978-371-7411 sales@grainpro.com  
 GrainPro Phils, Inc. – Subic Gateway Park Phase 1,  
 Subic Bay Freeport Zone, Philippines  
 Tel. +63 47 252 7884 Fax +63 47 252 7885  
[www.grainpro.com](http://www.grainpro.com)