

TORRESAK™

PATENT PENDING

Modified Atmosphere Packaging

For Biochar

Torresak, LLC

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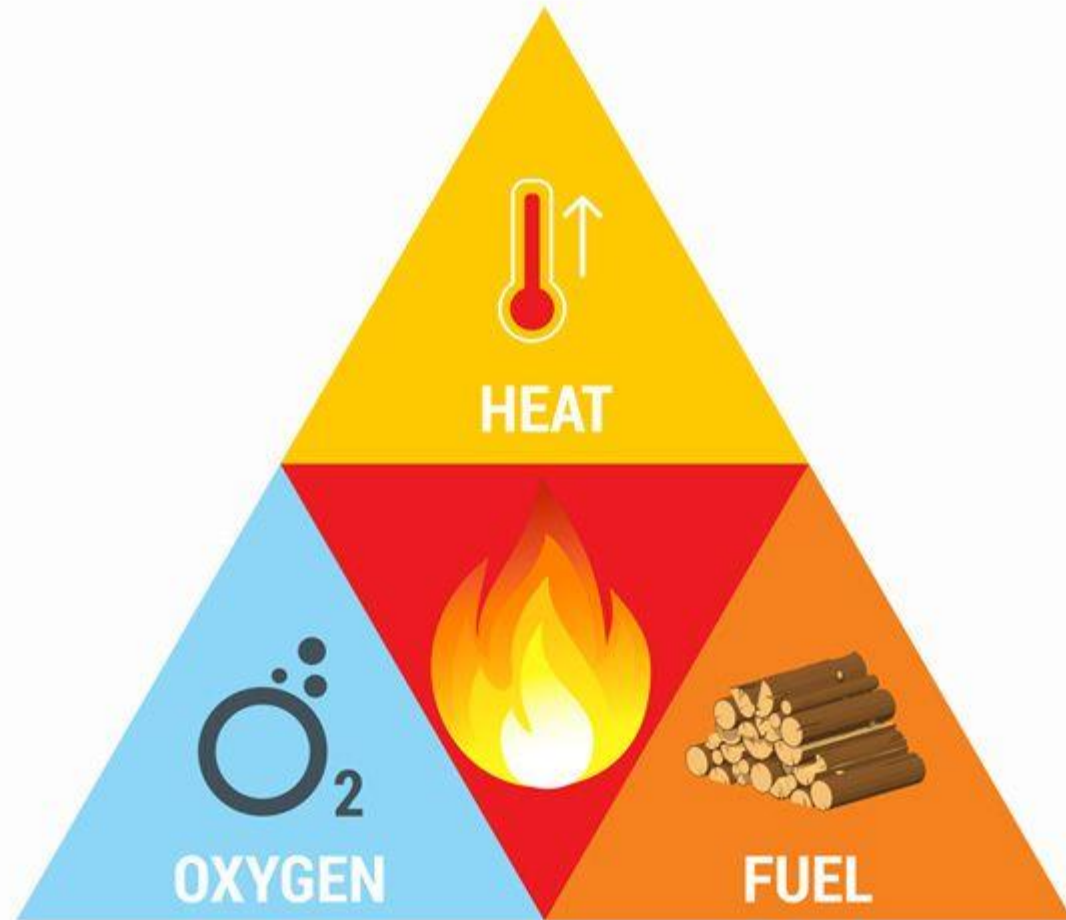
The Problem

- Char can self ignite under certain conditions- the more reactive material is left in the higher the fire risk. Also, Oxygen sorbtion is an exothermal process.
- Pictures on this page are of actual biochar fires that self ignited
- Stabilizing with water is only a temporary, expensive solution- why ship water?
- How can I safely ship and store dry biochar?
- Is there a more permanent, less expensive solution?



The Fire Triangle

- Fire needs 3 conditions present to occur: fuel, oxygen and heat. These are called the “Fire Triangle.”
- If any of the 3 conditions are missing, fire cannot occur.
- Using clever package design, we can reduce or eliminate one or more legs of the Fire Triangle.
- This is called “Modified Atmosphere Packaging” or MAP.
- How can this work with Biochar?



Modified Atmosphere Packaging (MAP)

- Used since 1821 in the food industry
- Typically displaces oxygen inside the package with an inert gas, like N_2 , but CO_2 could be used with biochar.
- Barrier films prevent the transfer of gases and liquids in or out of the package, like water or O_2 , keeping food fresh longer.
- A typical MAP process can involve filling, evacuation, purge, evacuation and heat seal.
- Torresak MAP technology was lifted from the food packaging industry and scaled up. Inert atmosphere internally helps to reduce fire risk.
- Vacuum packed, N_2 purged coffee bricks are good examples of Modified Atmosphere Packaging.

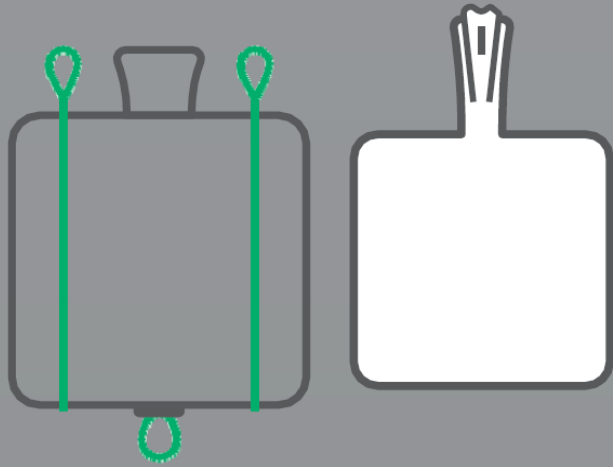


The Solution: TORRESAK™

- Torresak uses vacuum sealing and N₂ purge to remove and displace oxygen inside the bulk FBIC bag. Fire cannot occur with less than 5% oxygen content- Torresak MAP brings O₂ content inside the bag down to around 1%.
- All bag materials are food grade, anti static films and woven PP which prevent static sparking.
- Compaction of the biochar removes air space from between the particles, and also permits 20% more char to be packed in the bag.
- Negative pressure and compression immobilizes the char particles to prevent friction and hot spots.
- Hermetic liner structure prevents the transfer of O₂, N₂ or H₂O through the bag.
- The inert Modified Atmosphere inside the bag helps keep the biochar safe.
- The oxygen indicator instantly verifies bag integrity.

1

PROVIDES MODIFIED ATMOSPHERE PACKAGING (MAP)



Cubic shape optimizes space

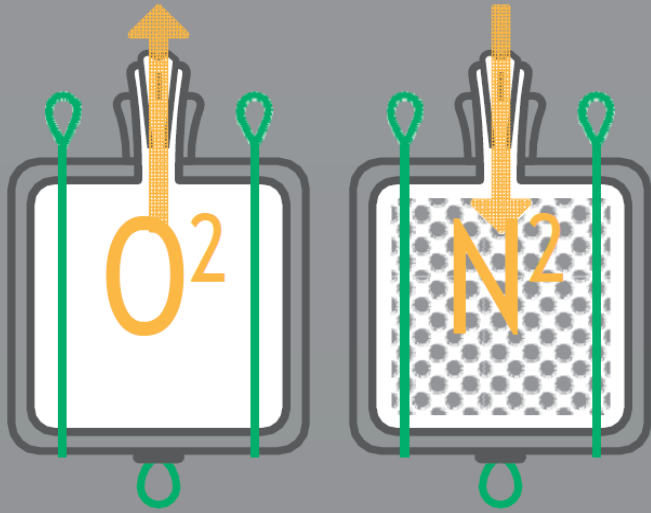
Retains cube shape for easy stacking

Reduced risk of punctures and snags

Very strong – constructed with 5x safety factor

2

REPLACE O² WITH N² AND SEAL THE BAG



Package specifically designed for biochar

Trilaminare hermetic liner-Nitrogen flush

The vacuum sealing process immobilizes biochar particles to minimize friction and hot spots

Made from static dissipative materials to minimize sparking

Oxygen content reduced to just 1%

3

EMPTY, CUT AND REUSE THE BAG



Cut the seal off the top and bottom spouts to reuse

Up to 3 uses per bag

CHOOSE SAFETY, CHOOSE TORRESAK!

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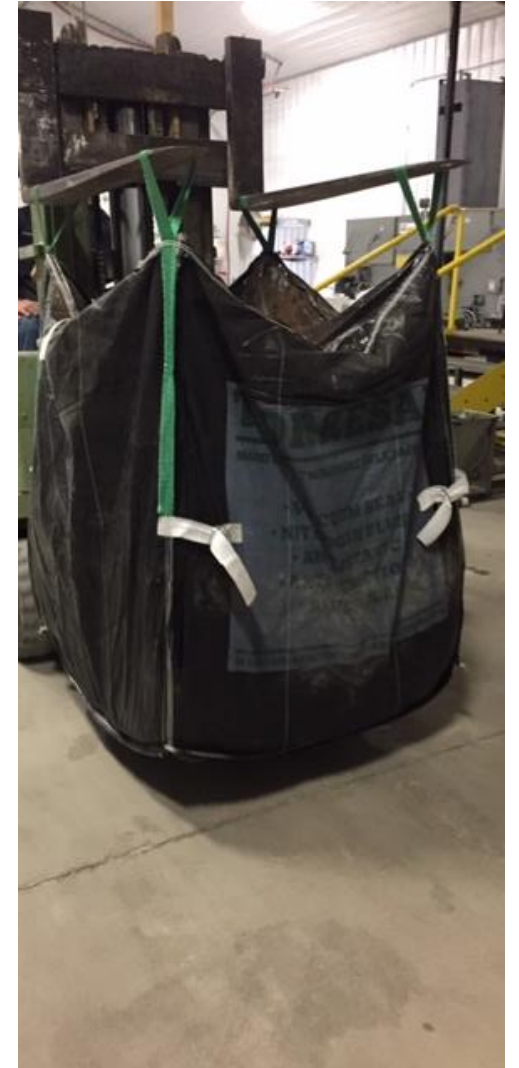
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Torresak
Step 1- Fill,
N2 Flush and
Compact



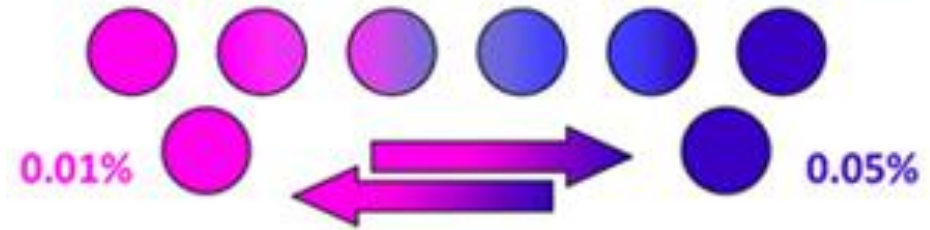
Torresak Step 2- N₂ Purge, Vacuum Seal

- High volume, low velocity vacuum nozzle does not remove char fines from the bag. Air velocity is less than the settling velocity of char dust.
- Filled and compressed Torresak retains the cube shape of the form.
- Torresak footprint remains inside of a standard shipping pallet. This helps to reduce damage from forklift tines and snagging.



Oxygen Indicator

- Torresak has optional indicator tablets available to affix on the inside of the liner, behind one of the corner apertures. The user loosens the corner strap to view the indicator.
- Pink color indicates oxygen content is in the “safe” range.
- Blue/purple color indicates oxygen content is in the “fire risk” range.
- The oxygen indicator enables the user to identify suspect bags, and to take appropriate action, such as immediate inspection and isolation outdoors, in a safe area.



Smaller is Better for Freight Cost- Stacking

- Torresak is sized so that it can be stacked 2 high in extra tall shipping containers. This increases the weight of biochar in each container load by approximately 20-25% over shipping 72" single layer bags, by taking up container head space.



Brand Your
Biochar with
TORRESAK!

Print 2 bag
side panels 2
ink colors with
your Brand!

BRANDING IS EVERYTHING



\$1.25



\$3.25

**THANKS
FOR LISTENING.**



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