Green World Tek

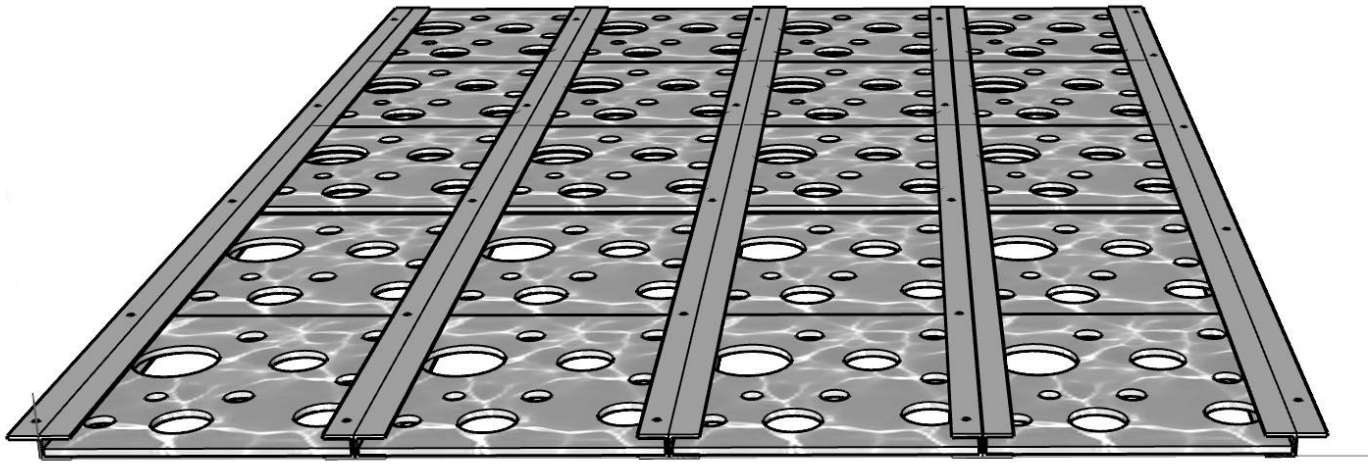
Phase Change Material

Introducing the ATTS System

ISSUE DATE: 01/27/2023
VALID TILL: ————————

CONFIDENTIAL

Reduce Fuel Consumption
by up to 50%, <u>Conservatively</u>



Active Thermal Transport System (ATTS)

- Reduces Compressor Fuel Consumption from the Refrigeration System
- Reduces Equipment Runtime Substantially
- Reduces Wear and Tear on Equipment Saving Repair Costs
- Keeps Temperature Steady in the Trailer thus Reducing Spoilage
- Transferable From One Trailer to Another Without Losing Effectiveness
- Built to Last Without Degredation of Performance Over Time
- FDA Approved and Nonflammable

MAINTAIN PRODUCT QUALITY WHILE GREATLY REDUCING FUEL COSTS

Who is Green World Tek

Green World Tek, LLC is a smart materials company whose family of BioPCM products impact our daily lives. The mission - to develop and manufacture smart and sustainable materials to decarbonize our footprint and enable human health - is focused on creating a sustainable shared value for all, through the use of smart materials. Since its founding in 2011, our manufacturer has completed over 20,000+ projects in trucks, buildings as well as telecom and data shelters.

The Opportunity

One of the largest applications of phase change material (PCM) today is in the storage and transportation of food, pharmaceuticals, vaccines, and other perishables—also known as cold chain. Our proprietary BioPCM platform helps solve complex and expensive supply chain challenges like product spoilage, regulatory non-compliance, and cost containment, throughout the distribution and storage life cycle of a wide variety of temperature-controlled goods, all while greatly reducing fuel costs.

The Product and Service

BioPCM enables temperature control across multiple temperature ranges, including cryogenically frozen, frozen, sub-zero, refrigerated, cool, and room temperature options with single-use and reusable products. Our range of solutions allows precise load temperatures to be maintained for 24-120 hours, ensuring safe shipments of high-value goods around the world. Subsequently, the truck's refrigeration system doesn't turn on or cycle as frequently thus greatly reducing the need to add additional fuel or leave trucks running overnight or indefinitely.

ENRG Panel is a 24" x 20" rugged polymeric shell filled with BioPCM phase change material that uses a lock-in-place track system for installation on walls and ceilings, even in refrigerated transport trailers. Once mounted, the panel absorbs and releases thermal energy to reduce the need for refrigeration or HVAC cooling and heating.

If desired, Green World Tek offers full-service domestic installation services through its network of national, certified installers.

The Value

Performance is determined by two key metrics: the melt/freeze transition temperature and the heat absorption capacity. The BioPCM in the ENRG Panel is engineered to have a melt/freeze transition temperature, referred to as the "Q Value," that is close to the control temperature of the space where the ENRG Panel is installed.

The ENRG Panel is only one inch thick and comes delivered fully assembled. Installation in reefer trucks takes only a few hours. The recommended number of ENRG Panel is 136-148 depending on surface area and monthly energy usage. Depending on outside temperatures, savings can payback the fully installed cost within 2 years.

REEFER TESTING DATA

					COMPRESSOR	
Date	PCM Status	Set Point	On Temp	O ff Temp	On Time %	Off Time %
3/18/22	Without	34º	60º	55º	**57**	43
5/7/22	Wi th	34º	61º	61º	8.6	91.4
3/9/22	Without	30º	46.5º	48.5º	68	32
5/10/22	With	30º	53.5º	69.7º	14	86
4/4/22	Without	-2º	58.8º	51.2º	49	51
4/7/22	With	-2º	54.7º	51º	33	**67**
7/18/22	Without	36º	75º	——º	100	0
4/13/22	With	35.1º	71º	61º	30	70
7/21/22	Without	27º	86º	——º	100	0
4/20/22	With	26.1º	88.4º	81.7º	34	66
3/21/22	Without	-9.9º	73.8º	——º	100	0
4/8/22	Wi th	-9.9º	51º	49.8º	5	95

Test #1	**Trailer 400730 w/o ATTS**	**16.7 Gallons**	**Trailer Year 2015**
	Trailer R2383 w/o ATTS	**4.5 Gallons**	**Trailer Year 2019**
Test #2	**Trailer 400730 with ATTS**	**2.7 Gallons**	**Trailer Year 2015**
	Trailer R2369 w/o ATTS	**5.4 Gallons**	**Trailer Year 2019**

Trailers R2383 and R2369 are 2019 reefers and burned 4.5 gals and 5.4 gals respectively w/o ATTS for this test which was run based on the same parameters as reefer 400703 which is 4 years older. Reefer 400703 burned 2.7 gals with ATTS. This is a 40% reduction when compared to 2383 and a 50% reduction when compared to 2369 despite 400703 being 4 years older. Older reefers with ATTS outperform newer reefers without ATTS.

NOTE: The 2015 Trailer, 400730, w/o ATTS burned 16.7gals of fuel. With ATTS it burned only 2.7 gals!!! This is a reduction of 84% in fuel usage (a very good result). New trailers without ATTS perform worse than an old trailer with ATTS.

Trailer #400730

Trailer Manufacturing Date:	June 2015
Refrigeration Unit:	Carrier 7300 x4
Trailer Load:	Frozen Pizzas (23,600lbs)
Set Temperature Within Trailer:	0º F

Trailer #R2383 & R2369

Trailer Manufacturing Date:	October 2019
Refrigeration Unit:	Carrier 7300 x4
Trailer Load:	Frozen Pizzas (23,600lbs)
Set Temperature Within Trailer:	0º F

The Gallery