



**Thermal Product Solutions**

**Gruenberg · BlueM · Tenney · Lunaire · Lindberg · MPH · Kayex**

**SPX Corporation**



**Lunaire Environmental**



**Gruenberg**



**Tenney Environmental**



**Blue M**

# Dry Heat Sterilization of Rodent Cages.



# Why Go Dry?

## Benefits of Steri-Dry:

- Better for the environment (Green)
  - 50% Lower Energy Consumption per cycle
  - No Water used or discharged
  - 90+% reduction in rejected heat = lower HVAC usage
  - Greatly enhanced cage life – does not degrade cages at all.

# Why Go Dry? – (continued)

## Lower Installation Cost

- No Steam
- No Water
- No Drain
- No Steam Capture Hood
- No Pit
- No Reinforced Floor

Modular Design Easy to Install – Excellent for Existing Facilities

Less Maintenance & Repairs = Little/No Downtime

# Dry Heat Sterilization

- Dry Heat is an established & proven technology .
  - Pharmaceutical Vial Sterilization
- Myth of Sterilization, requires:
  - Pressure
  - Vacuum
  - Steam
- The Truth of Sterilization:    Temperature & Time

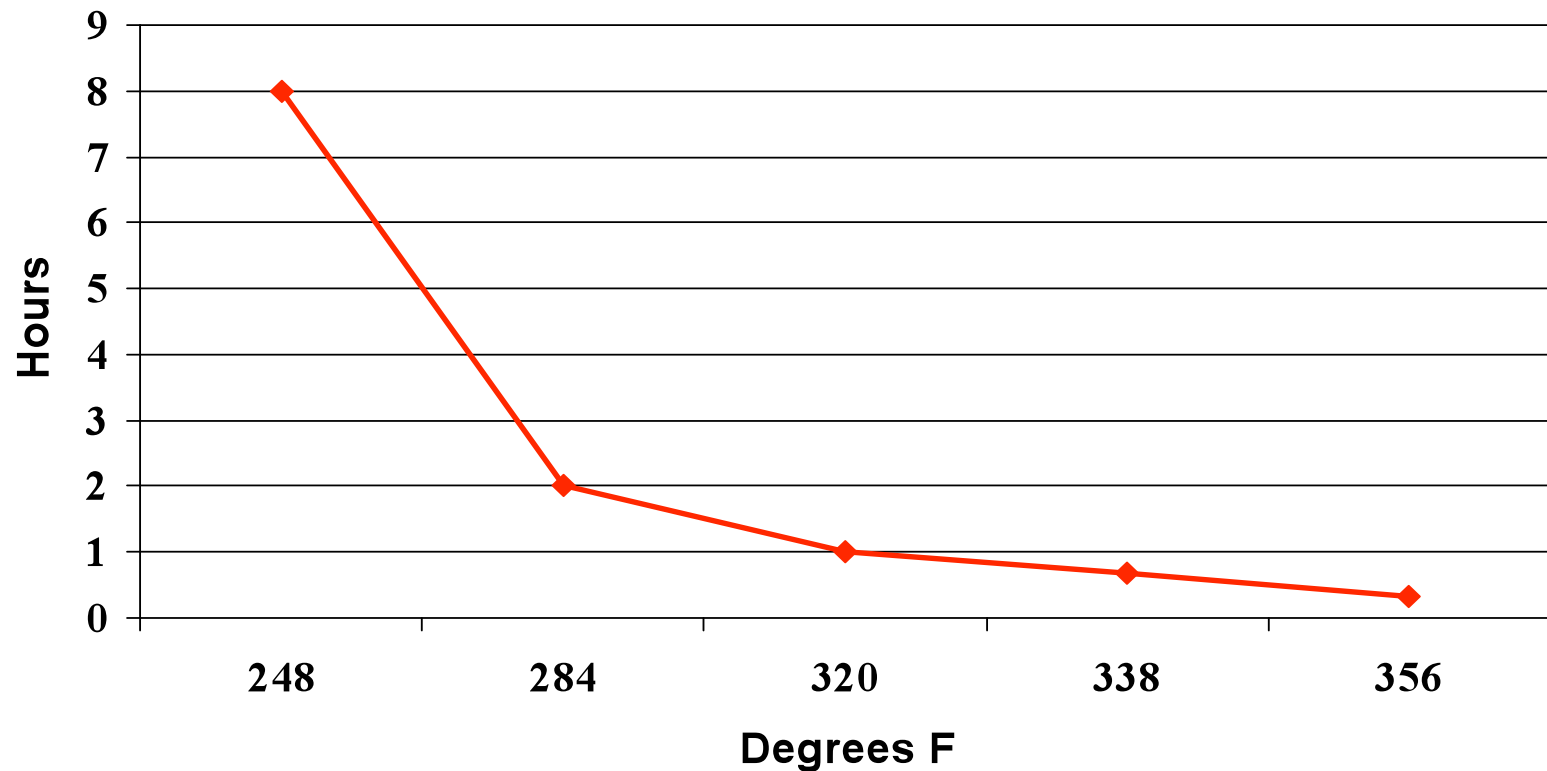
# Why Now?

---



---

## Dry Heat Temperature vs. Time to Sterilize



From R. Cruickshank, Medical Microbiology, 1974

## Dry Heat Temperature and Plastic Cage Durability

Polycarbonate	250° F
High Temperature Polycarbonate	260° F
Polysulfone	300° F
Polyphenylsulfone	350° F
Polyetherimide	>400° F

# TPS Steri-Dry System

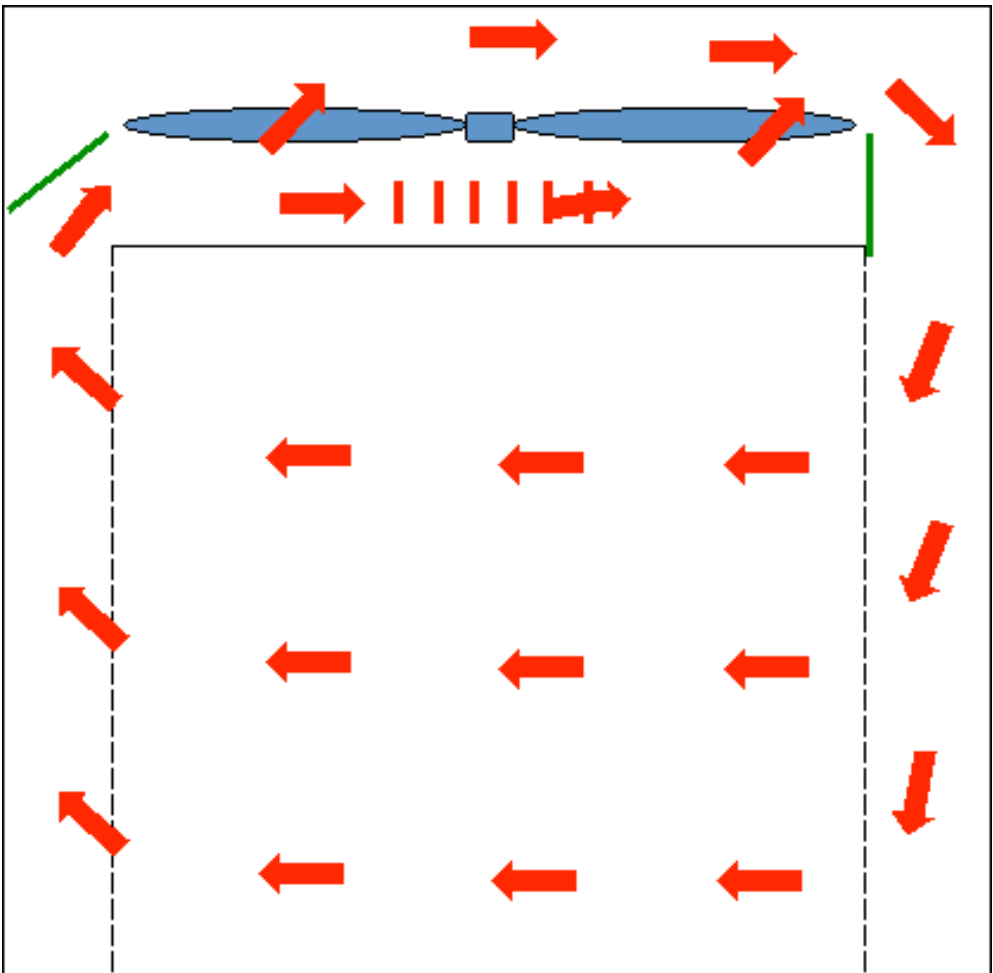
## How Does it Work?

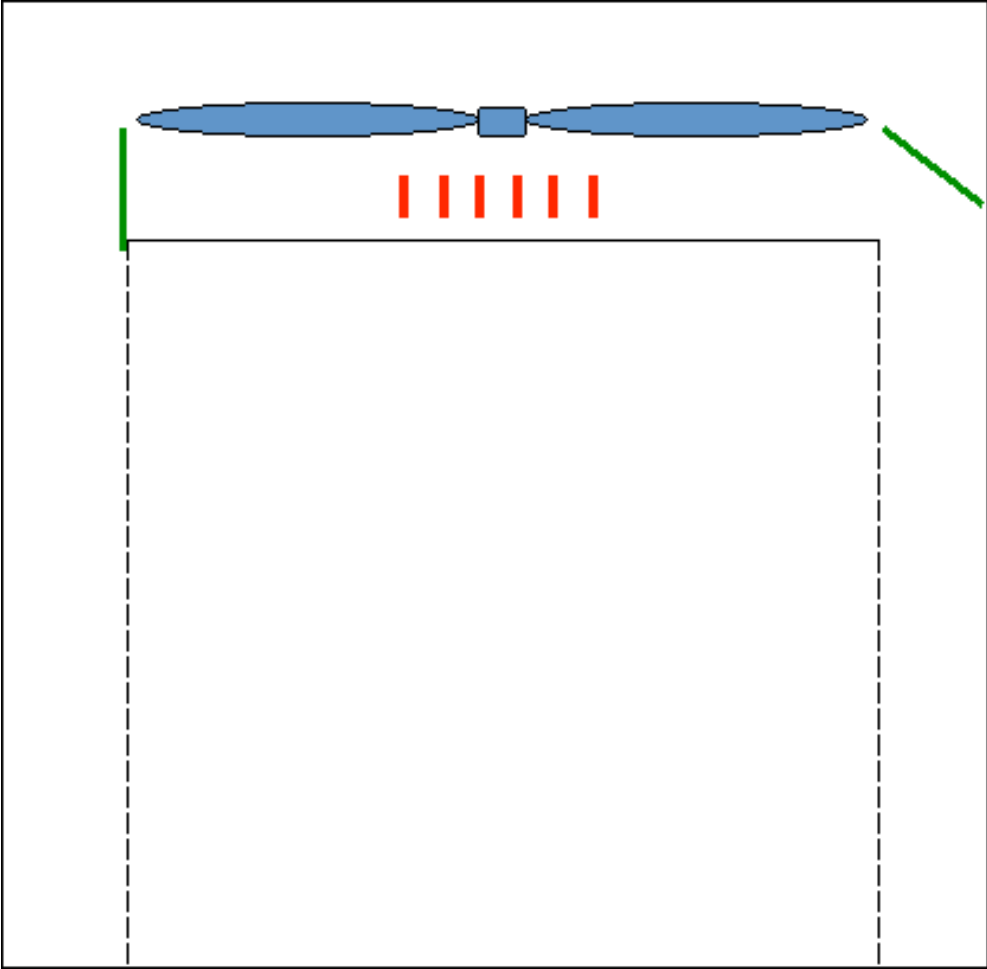


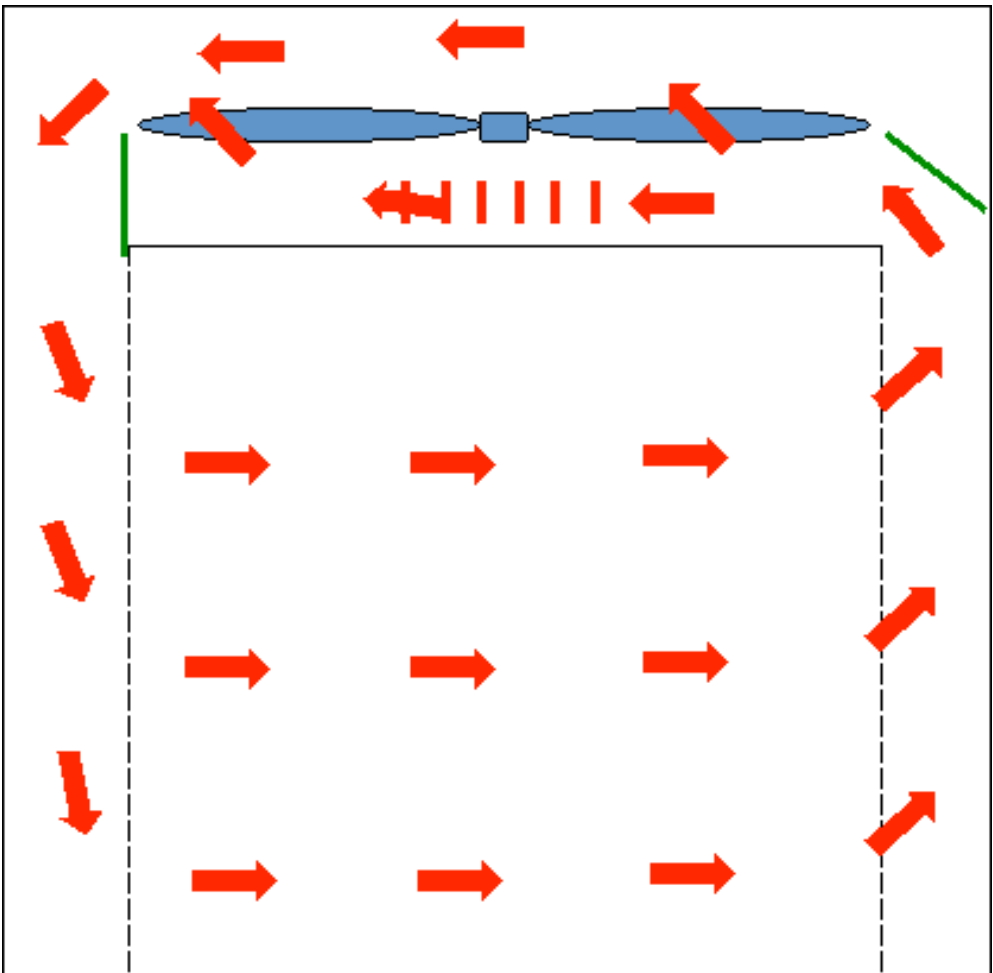
# Process Cycle

The cycle is broken up into three segments:

- **Heat up** - unit is ramped up to the sterilization setpoint temperature.
- **Soak** - the system is held at temperature to assure complete sterilization of all points within the unit.
- **Cool down** - the system interior and contents are cooled to a handleable temperature.







---

# Operating Costs Per Cycle

	<u>Autoclave</u>	<u>Dry Heat</u>
<u>Water usage/cycle</u>		
number of gallons	1,460	0
cost @ \$0.089/gallon	\$17.33	0
<u>Electricity usage/cycle</u>		
number of KWH	196	160*
cost @ \$0.135/KWH	<u>\$26.26</u>	<u>\$21.60</u>
Total cost/cycle	\$43.59	\$21.60
% savings/cycle		51%

\*calculated, not metered, for convection dry heat,  
based on 576 cage bottoms + bedding



# OPERATING COSTS PER YEAR

---

	<u>AUTOCLAVE</u>	<u>DRY HEAT</u>
ENERGY AND WATER*	45,333	22,464
CONTRACTED REPAIRS/YR	40,712	100
OVERTIME LABOR PREMIUM/YR**	<u>6,164</u>	<u>0</u>
TOTAL ANNUAL OPERATING COST	91,669	22,564
SAVINGS/YR		75

\* 4 CYCLES/DAY, 5 DAYS/WEEK

\*\* DUE TO BREAKDOWNS, 214 HOURS REQUIRED 50 OVER STRAIGHT TIME



# Validation Process – at Factory

1. Thermally map an empty chamber and tune pressure ducts
2. Load the chamber with animal cages.
3. Thermally map the cages to determine the slowest point to reach temperature. Re-tune duct walls if necessary
4. Test with Spore Strips or other BI

# Validation Process - Installation

1. Thermally map an empty chamber and tune pressure ducts.
2. Load the chamber with animal cages.
3. Thermally map the cages to determine the slowest point to reach temperature.
4. Place the BIs in selected cages and operate the sterilizer cycle.
5. Incubate the BIs for any signs of growth.

# Validation Process - Periodically

Temperature Mapping

Testing with Spore Strips or BI.

# Dry Heat Extends Cage Life

- Temp Cycling between 175F – 300F
- 52 Cycles = 1 year
- 6 years of test data simulated
- Only visual results measured
- No Change.



# TPS Steri-Dry System

---



# Steri-Dry Open Load Truck System



# Steri-Dry Open Truck System



# Steri-Dry Open Load Truck System

