READING THERMAL

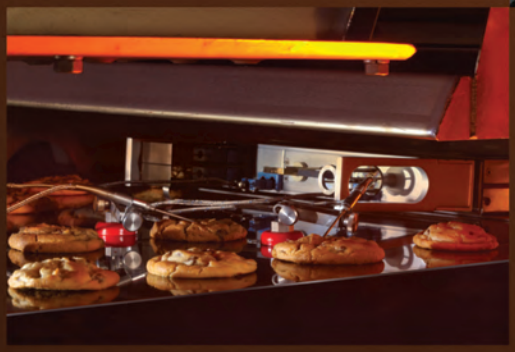
Food Safety

THE SCIENCE BEHIND FOOD SAFETY

Scientific research on foodborne pathogens (e.g. salmonella) provides the basis for the amount of time at temperature required to kill or render a specific pathogen harmless. Health officials utilize this research along with studies on specific outbreaks of food borne illness and decide how much a pathogen count should be reduced to render it harmless. This reduction is commonly referred to as the Kill Step. Killing 90% of the pathogens in a specific food sample is called a 1D reduction (where D stands for "log" or a factor of 10). Killing 99% of the pathogens is called a 2D reduction (a factor of 100). Killing 99.9% of the pathogens is called a 3D reduction (a factor of 1000), and so forth. Pathogen reduction level is highly controversial but many food safety experts recommend a 5D (99.999% Kill) to 6D (99.9999 % Kill) reduction.

VALIDATE YOUR KILL STEP

The SCORPION® 2 Data Logger, coupled with a Temperature Interface containing Product Probes, provides a simple solution for measuring environment temperature and product core temperature and understanding their relationship under specific process conditions. Once data is recorded the SCORPION® Software (SV8) Food Safety Module is used to calculate process lethality and generate a comprehensive report displaying cumulative log reduction.



Pathogen reduction levels can be achieved by baking a product at a specific temperature for a specific length of time (time at temp). If a 1D reduction requires 3 minutes at 200°F (93°C), then a 5D reduction, at the same temperature, would take five times as long or 15 minutes. Achieving a high D level typically requires a longer baking time at a specific temperature or a shorter baking time at a higher temperature. Both scenarios are detrimental to production efficiencies. Longer baking time translates to reduced throughput and higher temperature translates to increased energy consumption.

SCORPION® 2

Data Logging Measurement System with SMART SENSOR TECHNOLOGY™

DATA COLLECTION AND ANALYSIS

Controlling the internal temperature of food products is critical for attaining the degree of safety demanded by today's marketplace. Using the proprietary SCORPION® Software (SV8) Food Safety Module to analyze product core temperature data, collected with SCORPION® 2, the user is able to validate the baking process kill step.

PROCESS OPTIMIZATION

Understanding the relationship between Environment Temperature, Product Core Temperature, Process Time and Cumulative Log Reduction enables process optimization:

- Process temperature can be adjusted to meet Product Core Temperature requirements and minimize energy consumption
- Process time can be adjusted to meet required pathogen reduction specifications and maximize throughput

KILL STEP VALIDATION IN 3 EASY STEPS:

1) COLLECT DATA

Measure the product core temperature through a specific process. Reading Thermal supplies several types of Product Insertion Probes and Bare Wire Thermocouples for this purpose.

Hypodermic Product Insertion Probe with Probe Fixture

Standard Product Insertion Probe with Probe Fixture

2) CALCULATE LETHALITY

Enter microbial heat tolerance coefficients (T_{ref}, z, D) specific to your product and choose the measured core temperature to be used in the lethality calculation.

Microorganism	Product	T_{ref} (°F)	D (min)	z (°F)
Salmonella spp.	Hamburger Bun	141.8	3.14	11.25
Salmonella spp.	100% Whole Wheat Multigrain Bread	131.0	9.70	11.73

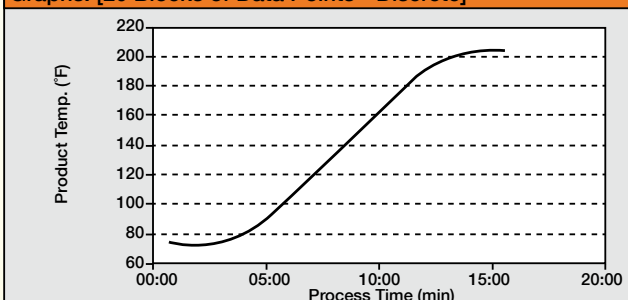
3) PROVE KILL STEP

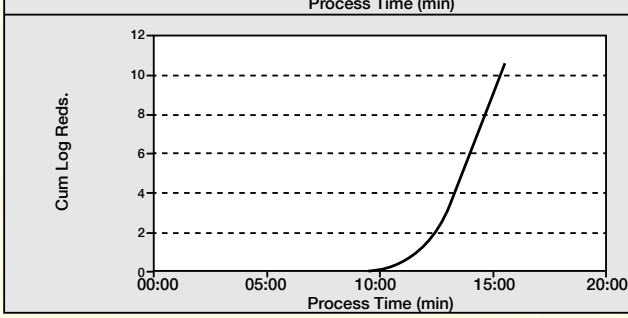
A comprehensive report is generated displaying Cumulative Log Reductions and a choice of several graphs.

Microorganism:				
Zone Name	**Microorganism**	**T_{ref} (°F)**	**D (min)**	**z (°F)**
All Data	Salmonella spp.	141.8	54.12	28.38
	Soft Cookies - Channaiah et al. 2015			

Process Lethality:
Cum. Log Reductions: 10.4 [All 956 Data Points]
Cum. Log Reductions: 10.6 [20 Discrete Data Points - from 940 sample points]

Graphs: [20 Blocks of Data Points - Discrete]





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