



HAEMO-SOL INTERNATIONAL, LLC  
7301 YORK ROAD  
BALTIMORE, MD 21204  
TEL: 800-821-5676  
FAX: 410-828-8461  
[WWW.HAEMO-SOL.COM](http://WWW.HAEMO-SOL.COM)

---

### **Fighting Back Against Bacteria Found in Food and Beverage Processing Facilities**

Cleaning food and beverage processing equipment can be an arduous and daunting task. Sanitation teams must work tirelessly to ensure that all components including mixers, grinders, conveyor belts, bottling machines, and other tools are inspected and free from any remaining food particles and proteins before beginning a manufacturing run. Surfaces that are not properly cleaned can promote the growth and colonization of bacteria, and lead to the spread of food-borne illnesses.

Some of the most common bacteria found in the food and beverage industry include *Campylobacter jejuni*, *Salmonella choleraesuis*, *E. coli*, and *Pseudomonas aeruginosa*. These microscopic organisms thrive in the warm and moist environments of food and beverage plants, hiding in equipment crevices and gaps not easily accessible to cleaning. If not removed, these bacteria will multiply and create a protective layer called biofilm.

Biofilm is a slimy, sticky material made up of sugars and proteins that feed, support, and safeguard bacteria. It allows bacteria to grow and multiply by protecting these microorganisms from antimicrobial agents and other destructive forces, such as heat. Since biofilm is not easily removed, it can be one of the greatest barriers to eliminating bacteria and properly disinfecting and sterilizing utensils and equipment.

In order to guarantee that all surfaces that come into contact with meat, fish, vegetables, soda, beer, and other food products are properly cleaned, experts and technicians must: 1) first, remove residual food particles; 2) then, disrupt biofilm membranes; and 3) finally, kill bacteria. Traditionally, this has been done by following a cleaning regiment that includes:

- Using a proper cleaner, such as a high alkaline cleaner
- Allowing the cleaner to have sufficient contact time on the surface(s)
- Agitating the cleaning solution by using mechanical or pressurized force
- Rinsing thoroughly using the proper rinse water and temperature
- Selecting a sanitization method that works with cleaning processes (e.g., heat, quaternary ammonium sanitizer, etc.)



HAEMO-SOL INTERNATIONAL, LLC  
7301 YORK ROAD  
BALTIMORE, MD 21204  
TEL: 800-821-5676  
FAX: 410-828-8461  
[WWW.HAEMO-SOL.COM](http://WWW.HAEMO-SOL.COM)

---

It should be noted that, in some instances, high alkaline detergents can do double duty and not only remove protein wastes (e.g., blood, fats, oils, greases, etc.), but also disturb biofilm and kill specific bacteria. Two such detergents are Haemo-Sol Regular (026-050) and Haemo-Sol Enzyme Active (026-055). In fact, in a recent study conducted by Nelson Laboratories, Haemo-Sol Regular and Haemo-Sol Enzyme Active were both shown to kill more than 99.99% of *Pseudomonas aeruginosa*, *Salmonella choleraesuis*, and *Campylobacter jejuni*. See laboratory data at the end of this report for further details.

Irrespective of the cleaning agent that is used, equipment, utensils, and surfaces that come into direct contact with animal and vegetative products, should undergo a final thermal or chemical sanitization treatment. Under the thermal method of sanitization, technicians use hot water or steam on processing equipment for a specified amount of time. Chemical sanitization involves the use of an approved chemical sterilant. Both methods will ensure that all remaining living organisms are killed.

With the increased number of illnesses related to food poisoning and contamination, food and beverage processing centers are under tremendous pressure to significantly reduce the number of cases of food-borne illnesses reported each year. By simply following proper cleaning protocols and procedures, companies can protect the public and keep food safe for consumers.



HAEMO-SOL INTERNATIONAL, LLC  
 7301 YORK ROAD  
 BALTIMORE, MD 21204  
 TEL: 800-821-5676  
 FAX: 410-828-8461  
 WWW.HAEMO-SOL.COM



Sponsor:  
 Sierra Silkman  
 Haemo-Sol International LLC  
 7301 York Rd.  
 Baltimore MD 21204

Time Kill Study Final Report

Test Article: Haemo-Sol Regular (026-050) - Yellow Label  
 Purchase Order: 082012  
 Laboratory Number: 651414  
 Study Received Date: 29 Aug 2012  
 Test Procedure(s): Standard Test Protocol (STP) Number: STP0158 Rev 02  
 Protocol Detail Sheet (PDS) Number: 201203616 Rev 01

**Summary:** This report describes the procedure for the evaluation of products for anti-microbial activity against selected organisms at representative contact times. Products are evaluated in a liquid matrix. The test organisms and contact times are chosen by the sponsor. This is a quantitative test that allows the determination of the amount of organism reduction at pre-determined intervals. All test method acceptance criteria were met.

**Results:** Values are considered approximate (~) when plate counts were outside of the statistically accurate range of 25-250 colony forming units (CFU)/plate for bacteria and yeast and 8-80 CFU/plate for mold. Less than symbols (<) are applied to recovery values where no CFU were observed on the plates. This denotes the limit of detection for the test.

Test Article:

*Salmonella choleraesuis*, ATCC #6539:

Identification	Exposure Intervals	Average Control Titer (CFU/mL)	Average Test Article Titer (CFU/mL)	Percent Reduction (%)	LOG <sub>10</sub> Reduction
Control	1 hour	9.3 x 10 <sup>6</sup>	7.7 x 10 <sup>6</sup>	17	0.08
Test Article	10 minutes	9.3 x 10 <sup>6</sup>	<2.0 x 10 <sup>1</sup>	>99.99979	>5.67
	30 minutes		<2.0 x 10 <sup>1</sup>	>99.99979	>5.67
	60 minutes		<2.0 x 10 <sup>1</sup>	>99.99979	>5.67

*Pseudomonas aeruginosa*, ATCC #9027:

Identification	Exposure Intervals	Average Control Titer (CFU/mL)	Average Test Article Titer (CFU/mL)	Percent Reduction (%)	LOG <sub>10</sub> Reduction
Control	1 hour	5.1 x 10 <sup>7</sup>	2.2 x 10 <sup>7</sup>	58	0.37
Test Article	10 minutes	5.1 x 10 <sup>7</sup>	<2.0 x 10 <sup>1</sup>	>99.999961	>6.40
	30 minutes		<2.0 x 10 <sup>1</sup>	>99.999961	>6.40
	60 minutes		<2.0 x 10 <sup>1</sup>	>99.999961	>6.40

  
 Study Director Thomas Pace, B.S.

02 NOV 2012  
 Study Completion Date



HAEMO-SOL INTERNATIONAL, LLC  
 7301 YORK ROAD  
 BALTIMORE, MD 21204  
 TEL: 800-821-5676  
 FAX: 410-828-8461  
 WWW.HAEMO-SOL.COM



Sponsor:  
 Sierra Silkman  
 Haemo-Sol International LLC  
 7301 York Rd.  
 Baltimore MD 21204

### Time Kill Study Final Report

Test Article: Haemo-Sol Enzyme Active (026-055) - Royal Blue Label  
 Purchase Order: 082012  
 Laboratory Number: 651415  
 Study Received Date: 29 Aug 2012  
 Test Procedure(s): Standard Test Protocol (STP) Number: STP0158 Rev 02  
 Protocol Detail Sheet (PDS) Number: 201203616 Rev 01

**Summary:** This report describes the procedure for the evaluation of products for anti-microbial activity against selected organisms at representative contact times. Products are evaluated in a liquid matrix. The test organisms and contact times are chosen by the sponsor. This is a quantitative test that allows the determination of the amount of organism reduction at pre-determined intervals. All test method acceptance criteria were met.

**Results:** Values are considered approximate (~) when plate counts were outside of the statistically accurate range of 25-250 colony forming units (CFU)/plate for bacteria and yeast and 8-80 CFU/plate for mold. Less than symbols (<) are applied to recovery values where no CFU were observed on the plates. This denotes the limit of detection for the test.

Test Article:

*Salmonella choleraesuis*, ATCC #6539:

Identification	Exposure Intervals	Average Control Titer (CFU/mL)	Average Test Article Titer (CFU/mL)	Percent Reduction (%)	LOG <sub>10</sub> Reduction
Control	1 hour	9.3 x 10 <sup>6</sup>	7.7 x 10 <sup>6</sup>	17	0.08
Test Article	10 minutes	9.3 x 10 <sup>6</sup>	7.6 x 10 <sup>2</sup>	99.9919	4.09
	30 minutes		<2.0 x 10 <sup>1</sup>	>99.99979	>5.67
	60 minutes		<2.0 x 10 <sup>1</sup>	>99.99979	>5.67

*Pseudomonas aeruginosa*, ATCC #9027:

Identification	Exposure Intervals	Average Control Titer (CFU/mL)	Average Test Article Titer (CFU/mL)	Percent Reduction (%)	LOG <sub>10</sub> Reduction
Control	1 hour	5.1 x 10 <sup>7</sup>	2.2 x 10 <sup>7</sup>	58	0.37
Test Article	10 minutes	5.1 x 10 <sup>7</sup>	~7.3 x 10 <sup>1</sup>	~99.99986	~5.84
	30 minutes		<2.0 x 10 <sup>1</sup>	>99.999961	>6.40
	60 minutes		<2.0 x 10 <sup>1</sup>	>99.999961	>6.40

Study Director Thomas Pace, B.S.

02 NOV 2012

Study Completion Date



HAEMO-SOL INTERNATIONAL, LLC  
 7301 YORK ROAD  
 BALTIMORE, MD 21204  
 TEL: 800-821-5676  
 FAX: 410-828-8461  
 WWW.HAEMO-SOL.COM



Sponsor:  
 Sierra Silkman  
 Haemo-Sol International LLC  
 7301 York Rd.  
 Baltimore MD 21204

### Time Kill Study Final Report

Test Article: Haemo-Sol Regular (026-050) - Yellow Label  
 Purchase Order: 120712  
 Laboratory Number: 669448  
 Study Received Date: 24 Dec 2012  
 Test Procedure(s): Standard Test Protocol (STP) Number: STP0158 Rev 02  
 Protocol Detail Sheet (PDS) Number: 201300068 Rev 01

**Summary:** This report describes the procedure for the evaluation of products for anti-microbial activity against selected organisms at representative contact times. Products are evaluated in a liquid matrix. The test organisms and contact times are chosen by the sponsor. This is a quantitative test that allows the determination of the amount of organism reduction at pre-determined intervals. All test method acceptance criteria were met.

**Results:** Values are considered approximate (~) when plate counts were outside of the statistically accurate range of 25-250 colony forming units (CFU)/plate for bacteria and yeast and 8-80 CFU/plate for mold. Less than symbols (<) are applied to recovery values where no CFU were observed on the plates. This denotes the limit of detection for the test.

Test Article:  
*Campylobacter jejuni*, ATCC #29428

Identification	Exposure Intervals	Average Control Titer (CFU/mL)	Average Test Article Titer (CFU/mL)	Percent Reduction (%)	LOG <sub>10</sub> Reduction
Control	10 minutes	2.7 x 10 <sup>7</sup>	2.2 x 10 <sup>7</sup>	20	0.10
Test Article	5 minutes	2.7 x 10 <sup>7</sup>	<2.0 x 10 <sup>1</sup>	>99.999926	>6.13
	10 minutes		<2.0 x 10 <sup>1</sup>	>99.999926	>6.13

  
 Study Director Thomas Pace, B.S.

10 MAY 2013  
 Study Completion Date

These results relate only to the test article listed in this report. Reports may not be reproduced except in their entirety. Subject to NLI terms and conditions at www.nelsonlabs.com



HAEMO-SOL INTERNATIONAL, LLC  
 7301 YORK ROAD  
 BALTIMORE, MD 21204  
 TEL: 800-821-5676  
 FAX: 410-828-8461  
 WWW.HAEMO-SOL.COM



Sponsor:  
 Sierra Silkman  
 Haemo-Sol International LLC  
 7301 York Rd.  
 Baltimore MD 21204

Time Kill Study Final Report

Test Article: Haemo-Sol Enzyme Active (026-055) - Royal Blue Label  
 Purchase Order: 120712  
 Laboratory Number: 669449  
 Study Received Date: 24 Dec 2012  
 Test Procedure(s): Standard Test Protocol (STP) Number: STP0158 Rev 02  
 Protocol Detail Sheet (PDS) Number: 201300068 Rev 01

**Summary:** This report describes the procedure for the evaluation of products for anti-microbial activity against selected organisms at representative contact times. Products are evaluated in a liquid matrix. The test organisms and contact times are chosen by the sponsor. This is a quantitative test that allows the determination of the amount of organism reduction at pre-determined intervals. All test method acceptance criteria were met.

**Results:** Values are considered approximate (~) when plate counts were outside of the statistically accurate range of 25-250 colony forming units (CFU)/plate for bacteria and yeast and 8-80 CFU/plate for mold. Less than symbols (<) are applied to recovery values where no CFU were observed on the plates. This denotes the limit of detection for the test.

Test Article:  
*Campylobacter jejuni*, ATCC #29428

Identification	Exposure Intervals	Average Control Titer (CFU/mL)	Average Test Article Titer (CFU/mL)	Percent Reduction (%)	LOG <sub>10</sub> Reduction
Control	10 minutes	2.7 x 10 <sup>7</sup>	2.2 x 10 <sup>7</sup>	20	0.10
Test Article	5 minutes	2.7 x 10 <sup>7</sup>	<2.0 x 10 <sup>1</sup>	>99.999926	>6.13
	10 minutes		<2.0 x 10 <sup>1</sup>	>99.999926	>6.13

Study Director  Thomas Pace, B.S.  
 PO Box 571830 | Murray, UT 84157-1830 U.S.A. • 628C South Redwood Road | Salt Lake City, UT 84125-6600 U.S.A.  
 www.nelsonlabs.com • Telephone 801 290 7500 • Fax 801 290 7998 • sales@nelsonlabs.com

*10 MAY 2013*  
 Study Completion Date  
 cm FRT0158-0001 Rev 4  
 Page 1 of 2