

**DELIVER WITH PRODUCT  
TO END USER**

# **Smart-Read<sup>™</sup>** **EZTest<sup>®</sup> Steam**

*Geobacillus stearothermophilus*

## TECHNICAL REPORT

Complies with:  
USP  
ISO 11138  
and all appropriate subsections.

Technical Data and Use of Smart-Read EZTest Steam

SGM Part #7716  
Rev. 3  
05AUG09

## INTRODUCTION

Smart-Read EZTest Steam is a self-contained biological indicator for use in monitoring the efficacy of 121°C, 132°C, 134°C and 135°C steam sterilization cycles. Smart-Read EZTest is easy to use; no sophisticated laboratory testing or analysis is required. Smart-Read units consist of bacterial spores *Geobacillus stearothermophilus* (7953<sup>1</sup>) inoculated onto a paper carrier, which is placed into a thermoplastic vial that serves as a culture tube. A small glass ampoule containing sterile culture medium and color indicator is also contained in the vial.

## STORAGE

Smart-Read EZTest indicators should be stored at room temperature. The indicators should not be stored near sterilants or other chemicals. Smart-Read biological indicators have a 24 month shelf-life. Do not desiccate.

## MEDIUM

The culture medium, consisting of a proprietary formulated soybean casein digest base, is filled into glass ampoules and flame sealed. Following manufacture, the ampoules are exposed to a steam processing cycle to render them sterile. The sealed ampoules are of a convenient size to be placed into the plastic body with the spore paper. The ampoule is an "onion skin" glass that allows it to be easily crushed when the plastic body is compressed. This provides the spores with a nutrient medium for growth.

The culture medium has a pH indicator (bromocresol purple) which appears purple. After activation (when the plastic body is compressed) if the medium changes to yellow it indicates viable spores were present, grew and produced acid. If the medium remains purple, the spores did not grow, indicating they were killed in the sterilization process. Therefore, if the sterilization process was not effective, the spores will grow and turn the medium yellow. If any ampoules show signs of a visual color change or turbidity prior to use, they should be autoclaved and discarded.

## USE

### EXPOSURE

1. Remove an appropriate number of Smart-Read EZTest units from the box.
2. Identify the indicators by labeling pertinent process information.
3. Place the Smart-Read indicator in a suitable test pack which is representative of the load (e.g., a linen pack for load of linen, a tray of instruments for metal goods).
4. Place this test pack in the most challenging areas of the sterilizer, generally on the bottom shelf near the door over the drain.

NOTE: If a test pack is not being used, the Smart-Read EZTest unit should be oriented in a horizontal position during load processing.

5. Process the load as usual.
6. Remove from the sterilizer and allow the pack and biological indicator to cool for a sufficient time, at least 10 minutes.

<sup>(1)</sup> Culture is traceable to a recognized culture collection identified in USP and ISO 11138.

7. Retrieve the Smart-Read biological indicator from the test load.
8. The chemical indicator on the label changes from blue to black when exposed to steam. This distinguishes exposed from unexposed units.

NOTE: A black color does not indicate acceptable sterilization.

9. To activate the media, place the indicator in the crusher on the Smart-Well<sup>®</sup> incubator and pull forward. This will fracture the glass ampoule and allow the growth media to come in contact with the spore strip.

### INCUBATION IN SMART-WELL INCUBATOR

Smart-Read EZTest biological indicators are designed to be used with the Smart-Well incubator which is calibrated to maintain a temperature of 60°±2°C. The units must be activated prior to incubation. Activate the Smart-Read biological indicator using the crushing chamber located on the Smart-Well incubator. Place the indicator in an upright position in the crushing chamber and slowly pull forward to break the glass ampoule and release the media. This will fracture the ampoule and allow the growth medium to come in contact with the spore strip. Ensure that the spore strip is completely saturated with the culture medium. Do not allow the culture medium to come in contact with the filter in the cap at any time. Immediately place the exposed activated Smart-Read BI in the Smart-Well incubator, cells 1-10.

The Smart-Well incubator continuously monitors the BI and alerts the user to a positive BI test (color change to yellow) or a negative BI test (color remains purple) at the completion of the incubation period.

### INTERPRETATION OF SMART-READ RESULTS

LEDs located in front of each cell of the Smart-Well incubator display the status of the test cell: **amber** = testing; **red** = detection of yellow change in color; **green** = BI purple at end of incubation cycle. The appearance of a yellow color indicates bacterial growth. No color change indicates the spores were killed in the sterilization process.

The Smart-Read EZTest steam will indicate a failed sterilization cycle in as little as three to five hours. The Smart-Well incubator will announce the detection of a positive Smart-Read EZTest BI. The announcement consists of an audible alarm, a change of the incubation cell status LED from amber to red and a printed record of the exact time the positive test was detected. The confirmation of a positive test can be performed immediately by the user and is 100% visually verifiable.

Act on a positive test (a color change to yellow) as soon as the color change is noted. Color change is to be interpreted as "inadequate sterilization". Follow your institution's guidelines when a failed sterilizer process occurs. Always investigate sterilizer failures. Check the sterilizer for leaks or malfunctioning steam traps, check valves, etc. and retest the sterilizer with several Smart-Read biological indicators throughout the test load after any repairs to critical components. Smart-Read indicators can be subcultured if identification of positive growth is desired.

The response of the Smart-Read EZTest BI is 100% biological based on the growth of spores that have survived the sterilization process. Both positive and negative tests are 100% visually verifiable by the user. A purple color is a negative test indicating all spores were killed in the sterilization cycle. The recommended incubation time of 10 hours meets the CDRH FDA RIT protocol.

A positive control should be run at least once per day. As soon as a control turns yellow, appropriately verify and then autoclave and discard. The control is intended to ensure that viable spores are present on

the BI lot prior to testing the sterilizer. Positive controls are not intended to be a "color standard" for comparing test results. It is recommended to incubate the positive controls a maximum of five hours. If the control has not turned yellow in five hours the test is considered negative. A true negative or no growth in a positive control is a serious problem. Fortunately the causes are few: a grossly malfunctioning incubator; inadvertent sterilization of the control vial; or inadvertent sterilization of the box of indicators - due to improper storage.

### RESISTANCE PERFORMANCE TESTING

D-value determination was performed by fraction negative analysis. Smart-Read EZTest Steam biological indicators were exposed in a steam BIER vessel that meets the ANSI/AAMI/ISO 18472 Resistometer standard and cycle exposure conditions in accordance with ISO 11138-3. Exposure conditions were at 121°C ± 0.5°C, 132°C ± 0.5°C, 134°C ± 0.5°C and 135°C ± 0.5°C in saturated steam using a pre-vacuum cycle. Following exposure, samples were activated and incubated at 60±2°C for 10 hours. Performance data is presented in Table 2.

**Table 2**  
**Smart-Read Performance Data**

#### 121°C

Crop Number	Number Positive Out of 25										Population/ Unit	D-value <sup>(1)</sup> (Minutes)
	Exposure Times (in minutes)											
	7	8	9	10	11	12	13	14	15	16		
Bst-011899	25	25	22	16	6	1	0	0	NA	NA	1.5 x 10 <sup>5</sup>	1.9
Gst 031005	25	24	23	22	9	3	0	0	NA	NA	2.1 x 10 <sup>5</sup>	1.9
Gst 031804	25	24	23	12	4	1	0	1	0	0	1.8 x 10 <sup>5</sup>	1.8

<sup>(1)</sup>Calculated according to USP methods.

#### 132°C

Crop Number	Number Positive Out of 20								Population/ Unit	D-value <sup>(1)</sup> (Minutes)
	Exposure Times (in minutes)									
	1	1.5	2	2.5	3	3.5	4	4.5		
Bst-011899	20	20	10	3	4	0	0	NA	1.5 x 10 <sup>5</sup>	0.4
Gst 031005	20	20	15	17	0	4	0	0	2.1 x 10 <sup>5</sup>	0.5
Gst 031804	NA	NA	20	17	0	0	0	NA	1.8 x 10 <sup>5</sup>	0.3

<sup>(1)</sup>Calculated according to USP methods.

### 134°C

Crop Number	Number Positive Out of 20								Population/ Unit	D-value <sup>(1)</sup> (Minutes)
	Exposure Times (in minutes)									
	0.5	1	1.5	2	2.5	3	3.5	4		
Bst-011899	20	19	17	2	0	0	NA	NA	$1.5 \times 10^5$	0.3
Gst 031005	NA	20	13	11	3	1	0	0	$2.1 \times 10^5$	0.4
Gst 031804	20	1	0	0	NA	NA	NA	NA	$1.8 \times 10^5$	0.3

<sup>(1)</sup>Calculated according to USP methods.

### 135°C

Crop Number	Number Positive Out of 20								Population/ Unit	D-value <sup>(1)</sup> (Minutes)
	Exposure Times (in minutes)									
	0.5	1	1.5	2	2.5	3	3.5	4		
Bst-011899	20	19	17	2	0	0	NA	NA	$1.5 \times 10^5$	0.3
Gst 031005	20	20	18	7	0	1	0	0	$2.1 \times 10^5$	0.3
Gst 031804	20	0	0	0	NA	NA	NA	NA	$1.8 \times 10^5$	0.3

<sup>(1)</sup>Calculated according to USP methods.

## POPULATION DETERMINATION

Detailed population assay instructions are available in pdf format on the SGM Biotech website. From the [www.sgmbiotech.com](http://www.sgmbiotech.com) home page, select 'Population Assay Kit' under the 'Related Products' tab. Then click on 'Product Manuals' on the right.

# CERTIFICATE

Units are manufactured in compliance with SGM Biotech's quality standards, USP, and ISO 11138 guidelines and all appropriate subsections.

# Smart-Read™



BIOLOGICAL INDICATOR

CERTIFICATE OF ANALYSIS



Reorder No. SEZS/

*Geobacillus stearothermophilus* 7953<sup>(1)</sup>

For: Steam Sterilization

Culture: EZTest Media, 60 ± 2°C. The supplied bacteriological medium will meet requirements for growth promoting ability.

Purity: No evidence of contaminants using standard plate count techniques.

Lot No.: SR-

Manufacture Date: YEAR MONTH DAY

Expiration: 24 months from Manufacture Date.

Heat Shocked Population: 0.0 x 10<sup>0</sup> Spores/Unit

Assayed Resistance:

Temperature	D-value <sup>(2)</sup>	Survival	Kill
121°C		(3)	(3) minutes
132°C		(4)	(4) minutes
134°C		(4)	(4) minutes
135°C		(4)	(4) minutes

Z-value °C

D-value reproducible only when exposed in an AAMI BIER vessel and cultured under the exact conditions used to obtain results reported here. MPN method used.

Units are manufactured in compliance with SGM Biotech's quality standards, USP, and ISO 11138 guidelines and all appropriate subsections.

(1) Culture is traceable to a recognized culture collection identified in USP and ISO 11138.

(2) D-value calculated using the Limited-Holcomb-Spearman-Karber method.

(3) Survival/Kill values are calculated according to USP and ISO 11138. SGM uses a D-value rounded to four decimal places in this calculation.

(4) Empirically derived data.

Certified By: \_\_\_\_\_

Complete Quality Control testing results available upon request.