# ProEZ Gel™ Aerosol Spray Pre-Treatment Gel

## Product Spray Coverage for Minimized Product Waste

# Table of Contents

# 1 Introduction

Instrument reprocessing is a crucial part of the daily functions of a hospital. The importance of keeping bodily soils loose and moist on the instruments is paramount in attaining a proper sanitation level post-cleaning. Extended periods of time in between surgeries can lead to hard-to-clean soils drying, highlighting the importance of pre-treatment products. Pre-treatment gels are used to treat instruments to begin the cleaning portion of reprocessing immediately following an operation.

Ensuring that the instruments are properly covered is crucial for effective pre-treatment. Instruments that are not properly covered can allow for hardening of organic soils which make reprocessing more time consuming and laborious. For an aerosol dispenser to be effective, a wide spray angle is a desirable property. A wider spray angle will ensure more effective instrument coverage which allows for more efficient delivery of the product. This minimizes the amount of waste produced for proper coverage.

# 2 Purpose

ProEZ Gel™ aerosol is a ready to use neutral pH pre-treatment gel applied at point-of-use to prevent soils from drying on instruments and devices used in healthcare. ProEZ Gel™ will be evaluated for its aerosol efficacy against a similar competitive product, PRE-Klenz® by Steris. The aerosols both feature bag-on-valve spray technology to dispense the product. A 7 oz. can from each product line will be used for this evaluation.

# 3 Method

### a. Spray Coverage

Spray angle will be measured for each aerosol by photographing the spray pattern from the front and estimating the initial angle by measuring from the valve using a digital protractor. This initial angle will be the theoretical spray angle. Upon determining the spray angle of each product, theoretical spray coverage values are calculated using eq. (1) derived from trigonometric measurements shown in Figure 1. Similarly, actual spray angles will be calculated using eq. (2) from the measured actual spray coverages.

$$Theoretical\ Spray\ Coverage = 2 * L * tan\left(\frac{Theoretical\ Spray\ Angle°}{2}\right) \quad (1)$$

$$Actual\ Spray\ Angle° = 2 * arctan\left(\frac{Actual\ Spray\ Coverage}{2 * L}\right) \quad (2)$$

Key:

ASA — Actual Spray Angle

TSA — Theoretical Spray Angle

ASC — Actual Spray Coverage

TSC — Theoretical Spray Coverage

L — Spray Height

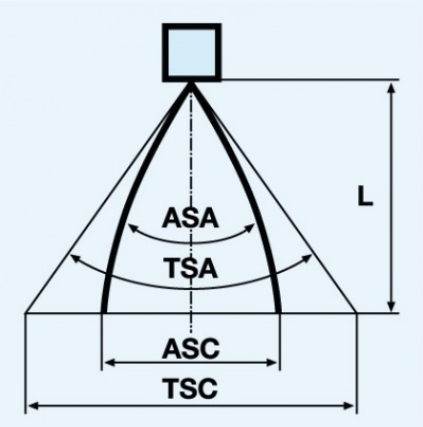


*Fig. 1. Diagram Depicting the Total Spray Coverage with Key*

Where L represents the spray height, or distance from the spray head to the table, in (1) and (2). Actual coverage will be determined by spraying the aerosols from heights of six and eight inches onto a tray and measuring the distance of the spread on the orthogonal plane to the spray using a tape measure. These measurements are repeated three times for each aerosol at each spray height and averaged. Six and eight inch heights were chosen to maximize the efficiency and safety of the user, as six inches ensures a wide spread and eight inches is close enough to the spray surface that the atomized particles are not inhaled by the user.

### b. Waste Minimization

To determine the efficiency of the aerosol spread, a tray with five stainless-steel straight Kelly forceps is sprayed with product from an approximate height of six inches and weighed until the instruments are visibly covered. The trays are lined with an absorbent blue towel to enhance the visibility of each product's spray pattern and highlight any dry spots left behind by the aerosols. The measurements are repeated three times for each aerosol and averaged.

## 4 Results

### a. Spray Coverage

The initial spray angles and the calculated theoretical spray coverages are shown in Table I. The results demonstrate that a wider spray angle allows for greater spread of the product. This information is corroborated by the actual spray angle results shown in Table II and Table III., which demonstrate that the ProEZ Gel™ aerosol has a wider spread.

## Table I

Measured Initial Spray Angles and Theoretical Spray Coverages

| | ProEZ Gel™ | PRE-Klenz® |
|---|---|---|
| **Initial Spray Angle (°)** | 69 | 21 |
| **Theoretical Spray Coverage at Six-Inch Height (Inches)** | 8.25 | 2.22 |
| **Theoretical Spray Coverage at Eight-Inch Height (Inches)** | 11.00 | 2.97 |

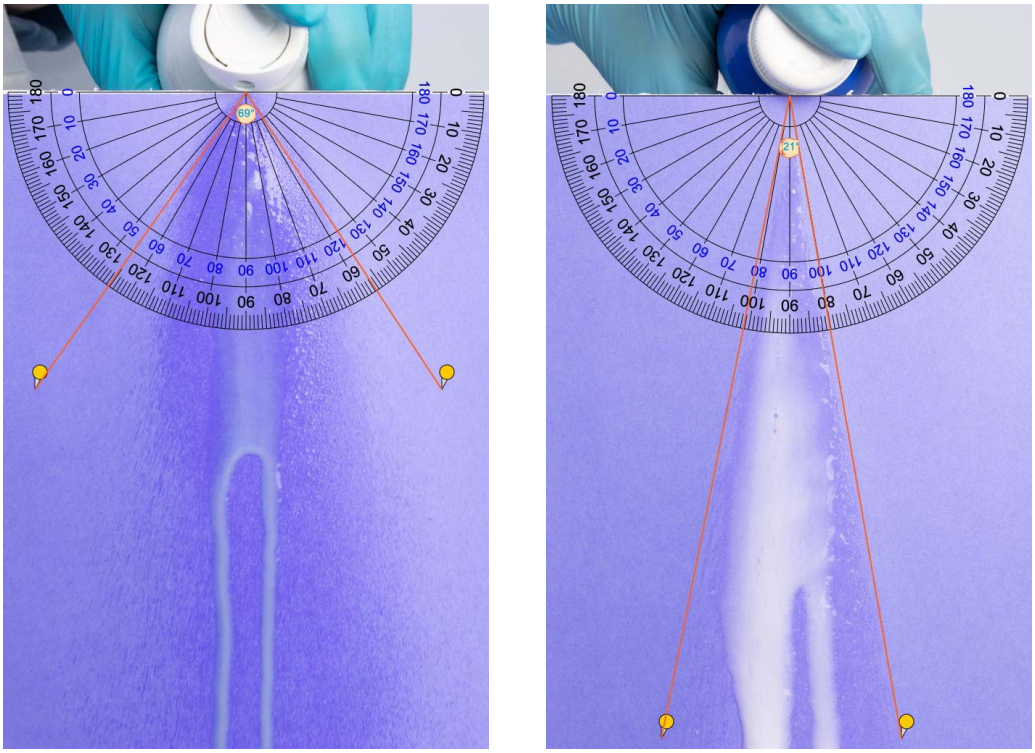

*Fig. 2. ProEZ Gel™ Spray Angle (Left) and PRE-Klenz® Spray Angle (Right)*

# Table II

## Six-Inch Spray Height Average Actual Spray Coverage Results

| | ProEZ Gel™ | Steris PRE-Klenz® |
|---|---|---|
| **First Trial (Inches)** | 5.781 | 1.875 |
| **Second Trial (Inches)** | 5.125 | 2.125 |
| **Third Trial (Inches)** | 5.594 | 1.75 |
| **Average (Inches)** | **5.500** | **1.917** |
| **Actual Spray Angle (°)** | **49.2** | **18.2** |

# Table III

## Eight-Inch Spray Height Average Actual Spray Coverage Results

| | ProEZ Gel™ | Steris PRE-Klenz® |
|---|---|---|
| **First Trial (Inches)** | 6.125 | 2.718 |
| **Second Trial (Inches)** | 6.500 | 2.500 |
| **Third Trial (Inches)** | 5.875 | 2.063 |
| **Average (Inches)** | **6.167** | **2.427** |
| **Actual Spray Angle (°)** | **42.2** | **17.3** |

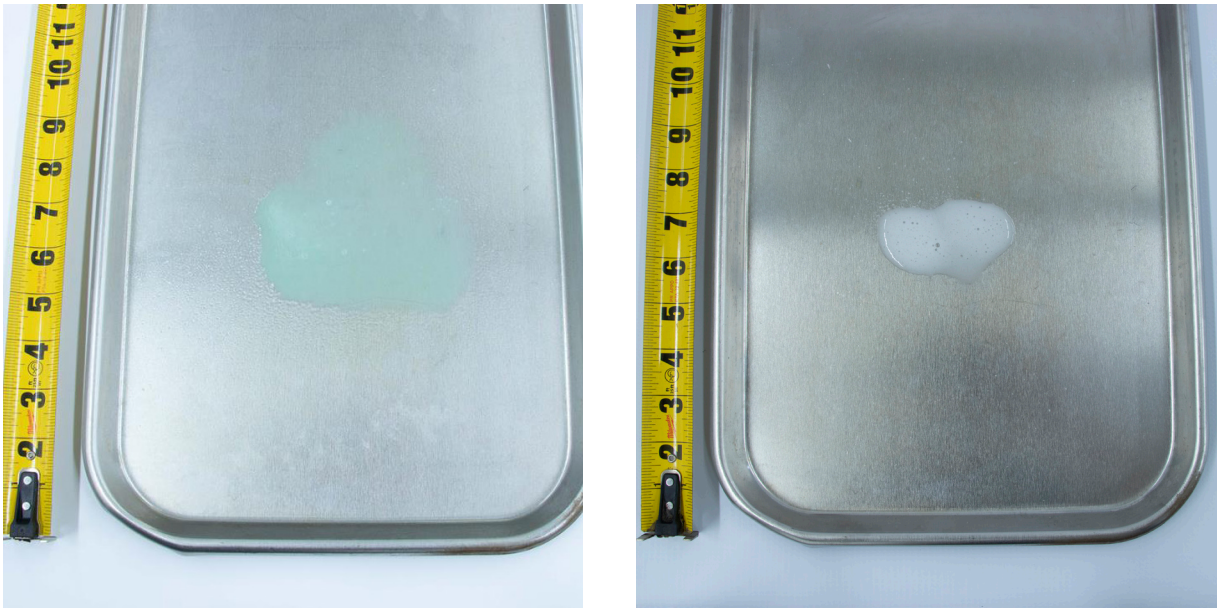

*Fig. 3. Actual Spray Coverages of ProEZ Gel™ (Left) and PRE-Klenz (Right), Six-Inch Spray Height*

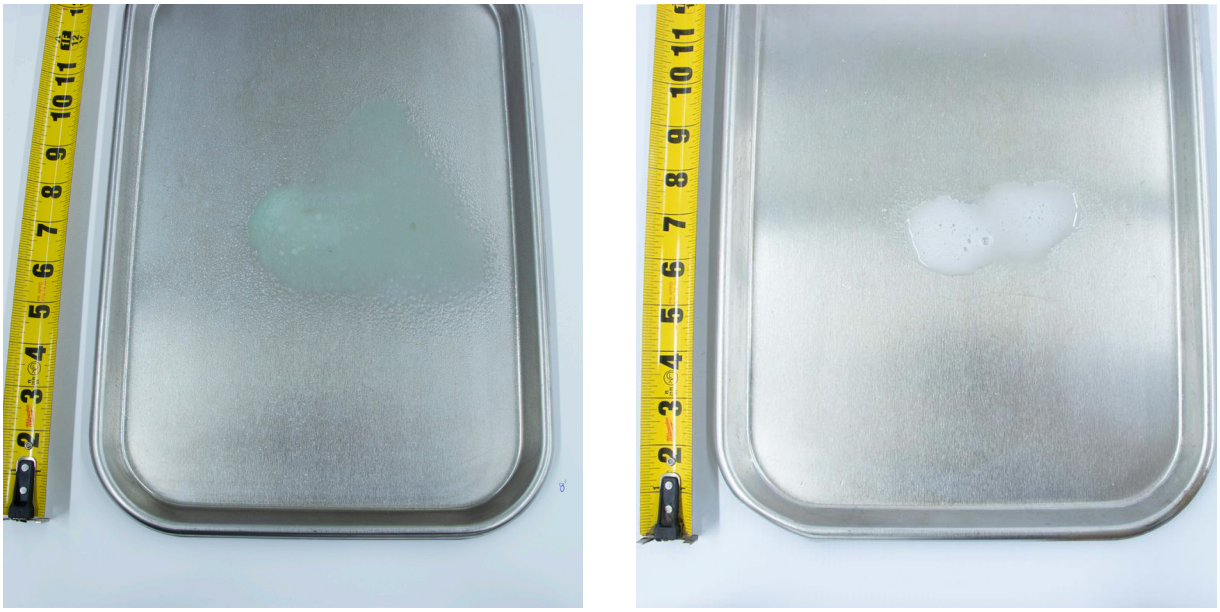

*Fig. 4. Actual Spray Coverages of ProEZ Gel™ (Left) and PRE-Klenz (Right), Eight-Inch Spray Height*

### b. Waste Minimization

The ProEZ Gel™ aerosol minimizes waste by requiring 2.1 times less product to cover the same number of instruments as its competitor product. The spray pattern is visible on the blue towel, highlighting the wet regions and the dry spots that were not covered by the aerosols. ProEZ Gel™ displays an even distribution on the towel, ensuring widespread coverage for instruments.

# Table IV
## Waste Minimization Test Results

| | ProEZ Gel™ | Steris PRE-Klenz® |
|---|---|---|
| **First Trial (g)** | 10.17 | 21.80 |
| **Second Trial (g)** | 10.89 | 20.59 |
| **Third Trial (g)** | 9.56 | 22.18 |
| **Average (g)** | **10.21** | **21.52** |


*Fig. 5. Waste Minimization Test First Trial, ProEZ Gel™ (Left) and PRE-Klenz® (Right)*

# 5 Conclusion

Adequate coverage of every instrument is key to a successful pre-treatment. A properly designed aerosol should ensure coverage by utilizing a wide spray angle to secure a large radius.

ProEZ Gel™ demonstrates excellent spray coverage by featuring a larger spray radius than its competitor product and is supported by spray data from heights of six and eight inches. The wide spray angle and coverage allows for ease-of-use when applying onto instruments by reducing the precision required to cover the entire tray of instruments. This also means that less product will be dispensed in the effort to fully cover the instruments as the product spreads wider, requiring fewer re-applications. This is demonstrated by the spray pattern on the blue towels along with the weight measured for each tray.

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