

BI Label Claim Verification Testing by Third Party, Part II

By Kurt McCauley

Introduction

This spore news is the second in a two-part series on the topic of third-party testing of BIs.

The topic of the first paper covered third-party requirements as stated in the standards and provided some statistics on past studies performed at Mesa Labs. This paper will expand on the discussion and provide some suggestions on how to proceed with future testing.

History

Revisiting the historical data discussed in the first paper we see that the majority of third-party tests were for population verification (45%) followed by D-value verification (36%). Over 90% of the population tests were successfully verified. The methods and materials for these tests are easily controlled thus contributing to the high success rate.

Approximately 70% of the third-party tests on the D-value successfully verified the label claims. The equipment, materials and methods for these tests are more complex and thus can lead to increased variability in the test results. At times these process variables can be enough to push the results outside of the stated acceptance criteria.

In many of these cases we believe that the BI is functioning as certified, however when the test results are outside the stated acceptance criteria, the third party will report the D-value claim could not be verified.

There are several well written publications^{1,2,3,4,5} discussing sources of variability in equipment, media, methods etc. that contribute to differences in results amongst test labs. To gain a better understanding of the variables, the reader is encouraged to spend some time reviewing these publications.

The Acceptance Criteria

A third-party lab will generally follow the BI manufacturer's methods and materials as closely as possible, but it is the BI user who typically specifies the acceptance criteria.

Regarding the acceptance criteria for the population verification: BI users most often state that the population must be within 50% and 300% of the certified value. These criteria are stated in the USP⁶, and ISO⁷. The in-house historical data indicate that most population verifications (~78%) actually fall within +/-50% of the certified population. Of the 22% that were not within this range, all were less than 50% of the certified value. Confirmation of population is typically not an issue for well trained and equipped third party labs unless the BI truly has a population that is out of specification.

Regarding the acceptance criteria for the D-value verification: BI users most often state that the D-value must be within +/-20% of the certified value. Historically, this criterion was stated in various standards, however the published data^{1,2} did not support this as a realistic range. USP has revised its position to state "When a BI is used in accordance with the BI manufacturer's directions, the resistance of the BI need not be reconfirmed."⁷ The ISO position regarding the +/-20% claim⁸ states:

"The D-value shall be within +/-20% of the manufacturers stated value when determined by the manufacturer during the stated shelf life using the method specified by the manufacturer."

The authors of these revised standards understood the limitations of the +/-20% claim.

If the +/-20% claim is only valid when performed by the manufacturer, then is there a more suitable number that could be used for a third-party test? When reviewing the in-house historical data from the third-party testing, we found that approximately half of the failed studies were within +/-27% of the label claim. In these cases, it is very possible that these BI were performing as designed but due to the variation discussed above, the D-value was reported as out of specification.

Regarding the more complex sterilization processes (non-traditional), the +/-20% claim will be even more difficult to meet. In-house data collected on the Apex BI line, engineered for use in hydrogen peroxide decontamination systems, suggests a +/- 50% acceptance criteria. We do not recommend third-party D-value testing on BIs for these processes.

Discussion

It is completely understandable why the +/-20% continues to be used as an acceptance criterion for D-value reassessment. The publications referenced in this paper, including the revised standards, give little guidance as to what would be an appropriate third-party verification criterion. The in-house historical data (moist heat, dry heat and EtO) suggest that a value in the +/-27% range may be more realistic however additional data are required prior to making any solid claims.

¹GS Oxborrow, CW Twohy, and CA Demetrius, “Determining the Variability of BIER Vessels for EtO and Steam” Medical Device & Diagnostic Industry 12 No 5 (1990): 78-83

²GA Mosely “Estimating the Effects of EtO BIER-Vessel Operating Precision and D-value Calculation” Medical Device & Diagnostic Industry” April 2002

³NAMSA Guidance document “Biological Indicator Characterization” (2007)
http://www.namsa.com/documents/authored-papers/Biological_Indicator_Characterization_Info_sheet.pdf

⁴R Nyberg “Guidance for Verification of Biological Indicators: Understanding the Acceptance Criteria of D-value and Population Verification” PharmTech.com (2006) <http://pharmtech.findpharma.com/pharmtech/article/articleDetail.jsp?id=316164>

⁵R Nyberg “To assess or Determine? Unraveling the D-value” Medical Device & Diagnostic Industry (March 2010) Volume 23 No.3

⁶USP <55> Biological Indicators—Resistance Performance Tests

⁷USP <1229.5> Biological Indicators for Sterilization

⁸ISO 11138-1:2006 “Sterilization of health care product—biological indicators—Part 1: General requirements” Section 6.3.2

About the Author

Kurt McCauley has a B.S. in Microbiology and is a Product Development Engineer in the Sterilization and Disinfection Control Division of Mesa Laboratories. He began work at Mesa in 1995 and has been involved with all aspects of biological indicator production and development. Mr. McCauley currently serves as Co-chair for AAMI Working Group 91 (Resistometers) and is an active member of both AAMI/ ISO Working Groups 4 (biological indicators) and 6 (chemical indicators).