Precision and Accuracy of Axygen® 50 µL Automation Pipet Tips for Hamilton® Microlab® Prep™, STAR™ Line, NIMBUS®, and VANTAGE® Liquid Handling Workstations

Application Note

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Introduction

Automated liquid handling and high throughput screening (HTS) are widely used for drug discovery, molecular biology applications, and genomics. For HTS, reliable sample preparation and delivery methods have become critical to assay performance. Corning introduced a line of 50 µL Axygen pipet tips, which have been specifically designed for applications using the Hamilton Microlab Prep, STAR Line, NIMBUS, and VANTAGE liquid handling workstations. The precision and accuracy testing was performed using the Microlab STAR; however, the other lines of liquid handlers also use the same pipetting system, and, therefore, the tips are compatible with all lines.

The focus of this study was to evaluate the quality, dispensing volume accuracy, and precision of the Axygen 50 µL tips on the Hamilton Microlab STAR automation platform as compared to Hamilton 50 µL tips. These criteria were measured using the Artel Multichannel Verification System (MVS®). The results demonstrate that Axygen 50 µL tips are comparable to Hamilton 50 µL tips using the Hamilton Microlab STAR liquid handling workstation to dispense volumes as low as 5 µL and as high as 50 µL.

Materials and Methods

The Hamilton Microlab STAR liquid handling workstation (Hamilton Cat. No. 1532) was used to assess accuracy as percent deviation (% D) and precision as coefficient of variation (% CV), for Axygen 50 µL tips (Corning Cat. No. HT-50-CBK-HTR) and Hamilton 50 µL tips.

To test the ability of each brand of tips to dispense accurately and precisely, a column of 8 tips was arranged so that each tip aspirated from an Axygen Low Profile reservoir (Corning Cat. No. RES-SW96-LP) and dispensed into 1 column of a Corning® 96-well black/clear-bottom microplate (Corning Cat. No. 3631). For the 5 µL test volume, each tip aspirated 5 µL of Range C solution (Artel Cat. No. MVS-205) and dispensed 5 µL into 195 µL of diluent solution (Artel Cat. No. MVS-202) in each well. For the 50 µL test volume, each tip aspirated 50 µL of Range A solution (Artel Cat. No. MVS-203) and dispensed 50 µL into 150 µL of diluent solution into each well. To determine the volume of liquid dispensed into each well, absorbance readings for the solutions – diluted Range C solution for the 5 µL dispense and Range A solution for 50 µL dispense – were measured using an Artel ELx800NB® plate reader (Artel Cat. No. 1311197).

Each study was performed 6 independent times for each brand of tips for a total of 48 tip dispenses. Evaluation criteria include percent deviation from the set dispense volume (% D) and the variability in dispense volume (% CV) for the 48 tip dispenses.

Results and Discussion

The evaluation criteria for comparing Axygen 50 µL tips with Hamilton 50 µL tips are listed in Tables 1 and 2. The ability of the pipet tips to dispense 5 µL and 50 µL volumes accurately and precisely was determined through the analysis of the mean volume dispensed across 48 wells. The precision of each brand of tip is represented by the coefficient of variation (% CV) of the replicates. Similarly, the accuracy is represented by the percent deviation (% D) from the target volume of the replicates. It is important to note that the accuracy of liquid dispense may vary depending on the method and liquid chosen when using the automation platform. However, the method and liquid used for these studies was identical for Axygen 50 µL tips and Hamilton 50 µL tips.

Table 1. Evaluation Criteria for 5 µL Dispense Volume

50 µL	Axygen	Hamilton
n	48	48
Target Volume (µL)	5.00	5.00
% CV	1.32 ± 0.54%	1.50 ± 0.35%
% D	1.63 ± 0.24%	1.51 ± 0.31%
Total No. of Outliers	0	1

Table 2. Evaluation Criteria for 50 µL Dispense Volume

1000 µL	Axygen	Hamilton
n	48	48
Target Volume (µL)	50.00	50.00
% CV	0.48 ± 0.15%	0.86 ± 0.44%
% D	1.22 ± 0.20%	1.22 ± 0.17%
Total No. of Outliers	0	3

Data in tables shows ± standard deviation. Hamilton®, Microlab®, NIMBUS®, and VANTAGE® are registered trademarks of Hamilton Company. CO-RE™, Prep™, STAR™, STARlet™, and STARplus™ are trademarks of Hamilton Company. The compatibility of Axygen tip products with Hamilton Company products has been independently determined by Corning; however, there should be no implication of sponsorship or endorsement by Hamilton Company of Axygen tip products.

As demonstrated in Figure 1, Axygen® 50 µL tips displayed comparable precision to Hamilton 50 µL tips using the Microlab® STAR™ automation system. There was no significant difference in the precision of each brand of tips when dispensing 5 µL (Figure 1A) or 50 µL (Figure 1B).

As demonstrated in Figure 2, Axygen 50 µL tips displayed comparable accuracy to Hamilton 50 µL tips using the Microlab STAR automation system. There was no significant difference in the accuracy of each brand of tips when dispensing 5 µL (Figure 2A) or 50 µL (Figure 2B).

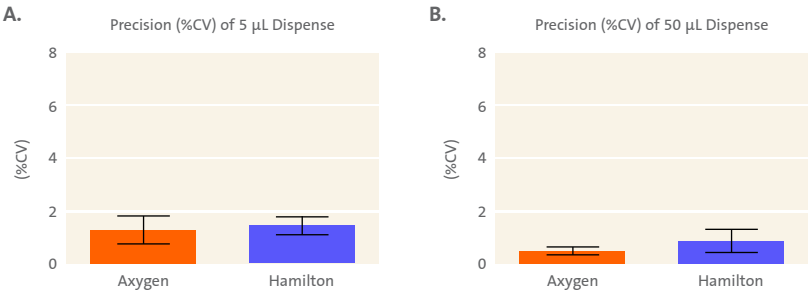

Figure 1. Precision (% CV) analysis of 50 µL tips. The % CV of Axygen and Hamilton 50 µL tips dispensing (A) 5 µL and (B) 50 µL using the Microlab STAR liquid handler was determined using the Artel MVS® System. There was no significant difference in % CV between each brand. Data shown with standard deviation (SD). n = 48.

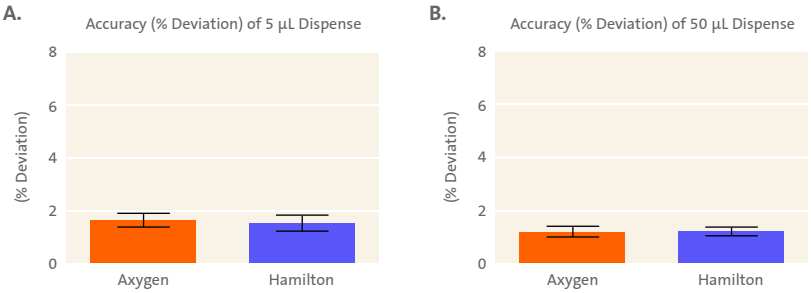

Figure 2. Accuracy (% D) analysis of 50 µL tips. The % D of Axygen and Hamilton 50 µL tips dispensing (A) 5 µL and (B) 50 µL using the Microlab STAR liquid handler was determined using the Artel MVS System. There was no significant difference in % D between each brand. Data shown with SD. n = 48.

Conclusions

Axygen 50 µL tips demonstrate comparable precision and accuracy to Hamilton 50 µL tips using the Hamilton Microlab STAR liquid handling workstation to dispense volumes as low as 5 µL and as high as 50 µL.

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