Precision and Accuracy of Axygen® 300 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, and genomics. For HTS, reliable sample preparation and delivery methods have become critical to assay performance. Corning's 300 µL Axygen pipet tips 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 dispensing volume accuracy and precision of the Axygen 300 µL tips on the Hamilton Microlab STAR automation platform as compared to Hamilton 300 µL tips. These criteria were measured using the Artel Multichannel Verification System (MVS®), which calculates the volume of dispensed samples with an absorbance-based measurement system. The results demonstrate that Axygen 300 µL tips are comparable to Hamilton 300 µL tips using the Hamilton Microlab STAR liquid handling workstation to dispense volumes as low as 30 µL and as high as 300 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 300 µL tips (Corning Cat. No. HT-300-CBK-HTR) and Hamilton 300 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 30 µL test volume, each tip aspirated 30 µL of Range B solution (Artel Cat. No. MVS-204) and dispensed 30 µL into 170 µL of diluent solution (Artel Cat. No. MVS-202) in each well. For the 300 µL test volume, each tip aspirated 300 µL of Range HV solution (Artel Cat. No. MVS-214) and dispensed 300 µL into each well. To determine the volume of liquid dispensed into each well, absorbance readings for the solutions (diluted Range B solution for 30 µL dispense and Range HV solution for 300 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 % D from the set dispense volume and the % CV for the 48 tip dispenses.

Results and Discussion

The evaluation criteria for comparing Axygen 300 µL tips with Hamilton 300 µL tips are listed in Tables 1 and 2. The ability of the pipet tips to dispense 30 µL and 300 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 % CV of the replicates. Similarly, the accuracy is represented by the % 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 class selection chosen when using the liquid handling platform. However, for these studies the method and liquid used for testing was identical for Axygen 300 µL tips and Hamilton 300 µL tips.

Table 1. Evaluation Criteria for 30 µL Dispense Volume

30 µL	Axygen	Hamilton
n	48	48
Target Volume (µL)	30.00	30.00
% CV	0.39% ± 0.08%	0.49% ± 0.15%
% D	3.43% ± 0.08%	3.25% ± 0.21%
Total No. of Outliers	0	0

Table 2. Evaluation Criteria for 300 µL Dispense Volume

300 µL	Axygen	Hamilton
n	48	48
Target Volume (µL)	300.00	300.00
% CV	0.53% ± 0.10%	0.52% ± 0.12%
% D	2.04% ± 0.39%	2.14% ± 0.17%
Total No. of Outliers	0	0

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® 300 µL tips displayed comparable precision to Hamilton 300 µL tips using the Hamilton® Microlab® STAR™ automation system. There was no significant difference in the precision of each brand of tips when dispensing 30 µL (Figure 1A) or 300 µL (Figure 1B).

As demonstrated in Figure 2, Axygen 300 µL tips displayed comparable accuracy to Hamilton 300 µL tips using the Hamilton Microlab STAR automation system. There was no significant difference in the accuracy of each brand of tips when dispensing 30 µL (Figure 2A) or 300 µL (Figure 2B).

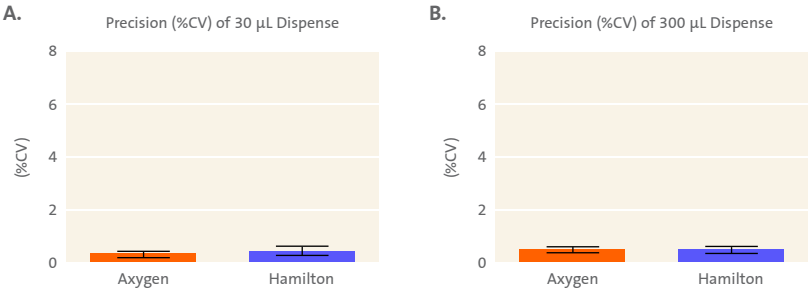

Figure 1. Precision (% CV) analysis of 300 µL tips. The % CV of Axygen and Hamilton 300 µL tips dispensing (A) 30 µL and (B) 300 µL volumes using the Hamilton Microlab STAR liquid handling workstation was determined using the Artel MVS® System. There was no significant difference in the % CV between each brand. Data shown with standard deviation (SD). n=48.

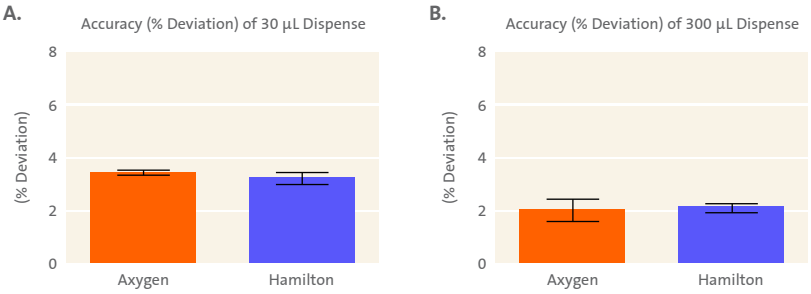

Figure 2. Accuracy (% D) analysis of 300 µL tips. The % D of Axygen and Hamilton 300 µL tips dispensing (A) 30 µL and (B) 300 µL volumes using the Hamilton Microlab STAR liquid handling workstation was determined using the Artel MVS System. There was no significant difference in the % D between each brand. Data shown with SD. n=48.

Conclusions

Axygen 300 µL tips demonstrate precision and accuracy comparable to Hamilton 300 µL tips using the Hamilton Microlab STAR liquid handling workstation to dispense volumes as low as 30 µL and as high as 300 µL.

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