

Axygen® 30 µL Automation Tips in 384-well Format for Agilent® Bravo™/Velocity 11 – Precision and Accuracy



SnAPPShots

A brief technical report
from the Corning
Applications Group

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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 has a line of 30 µL pipet tips in a 384-well format, which have been specifically designed for applications using the Agilent Bravo/Velocity 11 automated liquid handling platform.

The focus of this study was to evaluate the dispensing volume accuracy and precision of the Axxygen 384-well, 30 µL tips on the Agilent Bravo/Velocity 11 automation platform, as compared to Competitor 384-well, 30 µL tips. These criteria were measured using the Artel Multichannel Verification System (MVS®), which calculates the volume of dispensed samples using an absorbance-based measurement system. The results demonstrate that Axxygen 384-well, 30 µL tips are comparable to Competitor 384-well, 30 µL tips using the Agilent Bravo/Velocity 11 liquid handling workstation to dispense volumes as low as 5 µL and as high as 30 µL.

Materials/Methods

Tips Evaluated

Axygen 384-well, 30 µL tips (Corning Cat. No. VT-384-31UL-R) and Competitor 384-well, 30 µL tips.

Methods

The Agilent Bravo/Velocity 11 automation platform was used to assess accuracy, as percent deviation (% D), and precision, as coefficient of variation (% CV), for Axxygen 384-well, 30 µL tips and Competitor 384-well, 30 µL tips.

To test the ability of each brand of tips to dispense accurately and precisely, 384-well, 30 µL tips were used to aspirate from an Axxygen Low Profile reservoir (Corning Cat. No. RES-SW384-LP) and dispense into a Corning 384-well black with clear bottom microplate (Corning Cat. No. 3711). For the 5 µL test volume, each tip aspirated 5 µL of Range B solution (Artel Cat. No. MVS-204) and dispensed 5 µL into 50 µL of diluent solution (Artel Cat. No. MVS-202) in a single well. For the 30 µL test volume, each tip aspirated 30 µL of Range A solution (Artel Cat. No. MVS-203) and dispensed 30 µL into 25 µL of diluent solution. To determine the volume of liquid dispensed into each well, absorbance readings for the solutions – diluted Range B solution for 5 µL dispense and diluted Range A solution for 30 µL dispense – were measured using an

Artel ELx800NB® Plate Reader (Artel Cat. No. 1311197). Each study was performed 3 independent times for each brand of tips for a total of 1,152 tip dispenses. Evaluation criteria include percent deviation from the set dispense volume (% D), and the variability in dispense volume (% CV) for the 1,152 tip dispenses.

Results/Discussion

The evaluation criteria for comparing Axxygen 384-well, 30 µL tips with Competitor 384-well, 30 µL tips are listed in Tables 1 and 2. The ability of the pipette tips to dispense 5 µL and 30 µL volumes accurately and precisely was determined through the analysis of the mean volume dispensed across 3 replicates of 384 tips each. 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 class selection chosen when using the liquid handling platform, however for these studies the method and liquid used for testing was identical for Axxygen 384-well, 30 µL tips and Competitor 384-well, 30 µL tips.

As demonstrated in Figure 1, Axxygen 384-well, 30 µL tips displayed comparable precision to Competitor 384-well, 30 µL tips using the Agilent Bravo/Velocity 11 automation system. There

Table 1. Evaluation Criteria for 5 µL Dispense Volume

	Axygen	Competitor
No. of Wells	1,152	1,152
Outliers	0	4
Target Volume (µL)	5.00	5.00
% CV (n = 3 replicates)	2.00 ± 0.02%	1.92 ± 0.13%
% D (n = 3 replicates)	3.81 ± 0.04%	5.52 ± 0.38%

Table 2. Evaluation Criteria for 30 µL Dispense Volume

	Axygen	Competitor
No. of Wells	1,152	1,152
Outliers	3	7
Target Volume (µL)	30.00	30.00
% CV (n = 3 replicates)	1.89 ± 0.01%	1.95 ± 0.11%
% D (n = 3 replicates)	1.18 ± 0.08%	1.19 ± 0.02%

Data in tables show ± standard deviation (SD).

was no significant difference in the precision of each brand of tips when dispensing 5 μ L (Figure 1A) or 30 μ L (Figure 1B).

As demonstrated in Figure 2, Axygen® 384-well, 30 μ L tips displayed lower % D, and thus higher accuracy, than Competitor 384-well, 30 μ L tips using the Agilent® Bravo™/Velocity 11 automation system to dispense 5 μ L (Figure 2A). The Axygen 384-well, 30 μ L tips displayed comparable accuracy to Competitor 384-well, 30 μ L tips when dispensing 30 μ L, with no significant difference in the accuracy of each brand of tips (Figure 2B).

Conclusions

- ▶ Axygen 384-well, 30 μ L tips demonstrate comparable precision to Competitor 384-well, 30 μ L tips using the Agilent Bravo/Velocity 11 Liquid Handling Workstation to dispense volumes as low as 5 μ L and as high as 30 μ L.
- ▶ Axygen 384-well, 30 μ L tips demonstrate comparable accuracy to Competitor 384-well, 30 μ L tips using the Agilent Bravo/Velocity 11 Liquid Handling Workstation to dispense 30 μ L and improved accuracy to dispense 5 μ L.

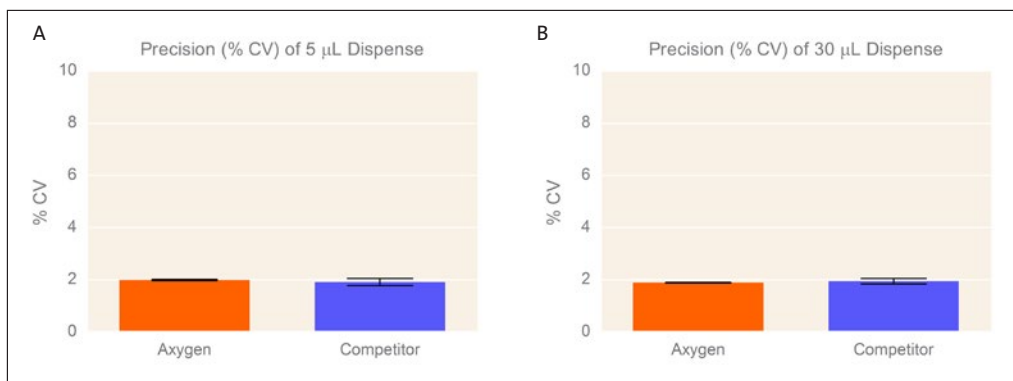


Figure 1. Precision (% CV) Analysis of 384-well, 30 μ L tips. The % CV of Axygen and Competitor 30 μ L tips dispensing (A) 5 μ L and (B) 30 μ L volume using the Agilent Bravo/Velocity 11 liquid handler was determined using the Artel MVS® System. There was no significant difference in % CV between each brand. Data shown with standard deviation (SD) for 3 independent experiments of 384 wells each.

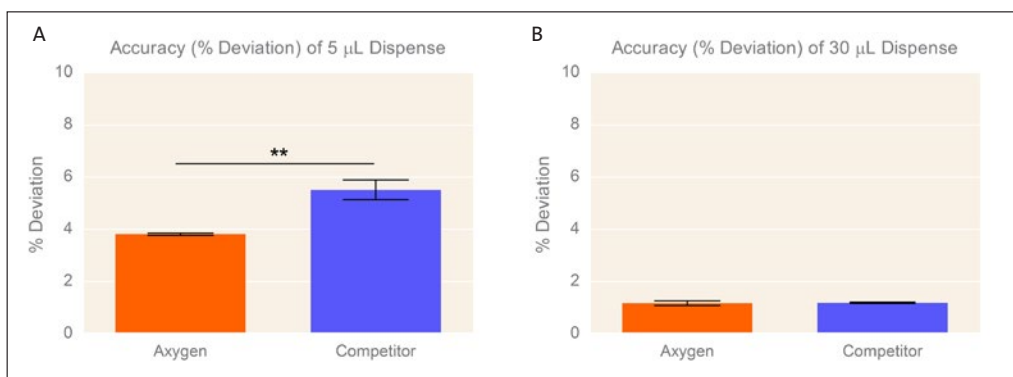


Figure 2. Accuracy (% D) Analysis of 384-well, 30 μ L tips. The % D of Axygen and Competitor 30 μ L tips dispensing (A) 5 μ L and (B) 30 μ L volume using the Agilent Bravo/Velocity 11 liquid handler was determined using the Artel MVS System. (A) Axygen tips displayed significantly lower % D, and, thus, higher accuracy, than Competitor tips dispensing 3 μ L. **P<0.01 (B) There was no significant difference in % D between each brand dispensing 30 μ L. Data shown with SD for 3 independent experiments of 384 wells each.

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