

# Comparative Evaluation of Suction and Tool Passage Performance in Commercially Available Bronchoscopes



This report summarizes findings from a study comparing the performance of the Verathon® BFlex™ 2 Large 5.8 mm (BFlex 2), Ambu® aScope™ 4 Broncho Large 5.8 mm (aScope 4), Ambu aScope 5 Broncho 5.6 mm (aScope 5), and the Olympus BF-1TH190 6.0 mm (BF-1TH190) through a series of benchtop tests. These tests were conducted to evaluate key performance attributes like suction strength and tool insertion force.

## Key Findings<sup>1</sup>

### **BFlex 2:**

- Had superior suction support compared to the other scopes tested
- Achieved 125% higher suction than aScope 5
- Encountered the lowest resistance force when advancing tools compared to all other single-use scopes tested
- Required 68% lower insertion force when passing a standard 2.0 mm biopsy forceps than aScope 5
- Was the only single-use scope able to pass the Chartis Catheter through the distal tip

## Introduction

Ambu® launched its original aScope™ single-use bronchoscope in 2009, providing clinicians with an alternative to the reusable video bronchoscopes that had been commonly used since the 1990s. Over the years, Ambu introduced subsequent generations of the aScope Broncho with various enhancements, and other companies began entering the single-use bronchoscope market. Verathon® launched the original BFlex™ in 2019, followed by the BFlex 2 in 2023. In the first quarter of 2026, Verathon implemented an enhancement to further advance the performance and clinical utility of BFlex 2. This paper provides a head-to-head comparison with BFlex 2, aScope 4, aScope 5, and BF-1TH190 in a series of key benchtop performance tests. These tests are centered around suction performance and insertion force for various tool types. All testing was performed on the enhanced BFlex 2 configuration implemented in 2026.

## Methods & Results

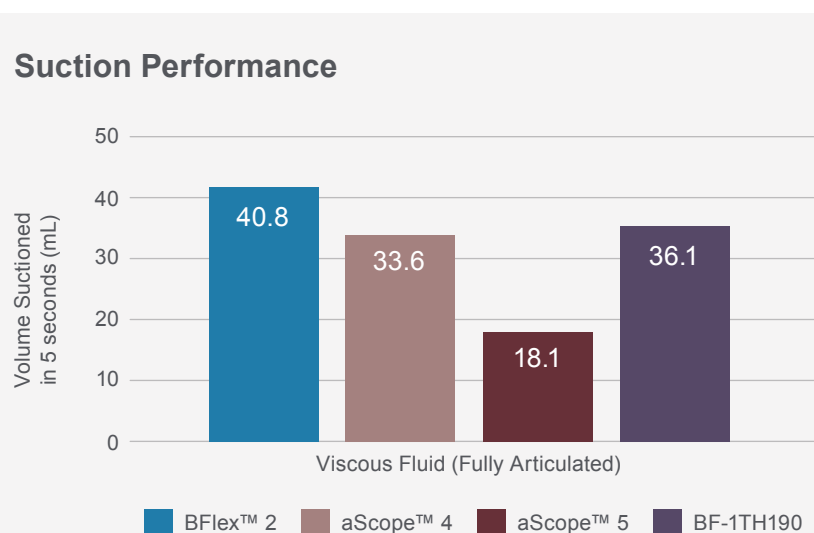
**Setting and design:** Testing was performed in a controlled lab environment on five (5) samples of each of the following single-use bronchoscopes: Verathon BFlex 2 Large 5.8 mm, Ambu aScope 4 Broncho Large 5.8 mm, Ambu aScope 5 Broncho 5.6 mm and one (1) sample of the reusable Olympus BF-1TH190 6.0 mm. These scopes were run through a series of tests to compare performance in suction efficiency as well as insertion force with multiple types of non-powered tools.

### Suction

Strong suction performance is important for a bronchoscope because it helps ensure airway patency, enhances visibility, and supports procedural safety—especially in situations involving copious secretions or active bleeding where rapid clearance is essential for maintaining a clear working field. It is a core performance attribute critical in both diagnostic and therapeutic procedures.

**Method:** Each scope was connected to a vacuum pump set at 100 mm Hg and 60 L/min. This suction setting was selected based on clinician research, which indicated that typical suction levels used during bronchoscopy cluster around 100 mm Hg based on tactile feedback and airway response rather than the maximum capability of hospital wall suction systems. The tip of the scope was articulated and placed in a beaker filled with 900 mL ± 50 mL of viscous test fluid. The suction button was fully depressed for 5 seconds, then released. Suction performance was determined by comparing the mass of material measured at the start and end of suction. Mean scores were then calculated for each scope. In this set of tests, a higher value indicates better suction performance.

**Result:** BFlex 2 provided superior suction compared to all other scopes tested—including 125% higher suction than aScope 5. BFlex 2 aspirated 40.79 mL of material while aScope 4 aspirated 33.61 mL and aScope 5 aspirated 18.13 mL. The reusable BF-1TH190 aspirated 36.13 mL of fluid.



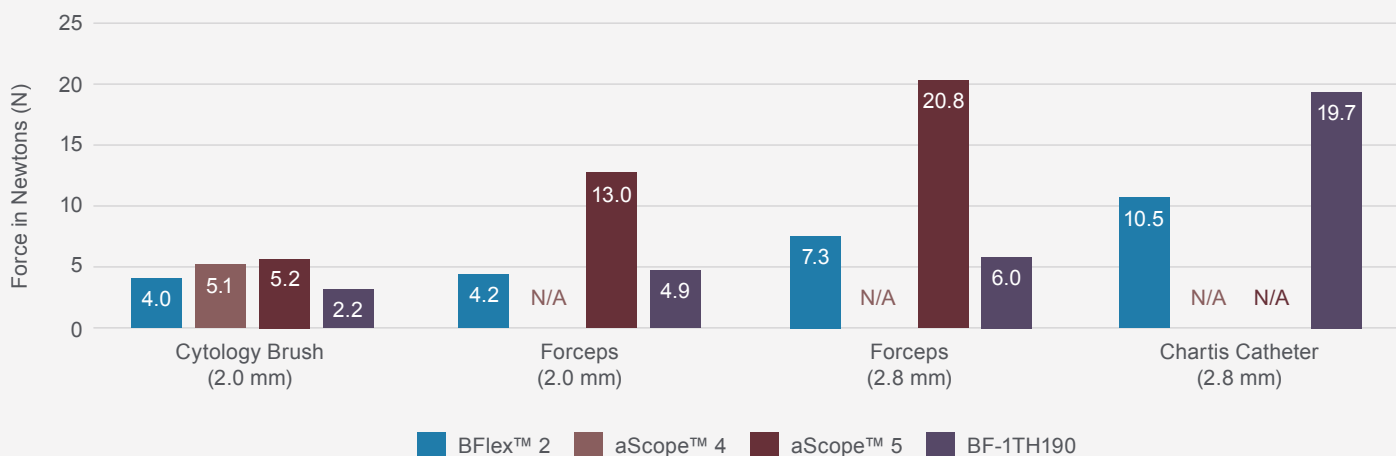
## Tool Insertion Force

Low tool insertion force is an important attribute of a bronchoscope because it can enhance patient safety, procedural precision, operator comfort, and allow the clinician to perform procedures in more difficult to reach areas. Low insertion forces enable the tool to move in a more predictable manner, allow accurate distal control and safer manipulation. High insertion forces can result in lag or delay in tool response<sup>2</sup> as well as result in the inability to deliver the tool to the desired location. When tools such as forceps or brushes can be advanced smoothly through the working channel with minimal resistance, clinicians can maintain better control and reduce the risk of airway trauma or tissue injury. This smooth operation allows for more precise maneuvers during delicate procedures like biopsies or cytology sampling.

**Method:** Tool insertion testing was performed using a fixture designed to simulate advancement into the right upper lobe, incorporating a 120-degree bend with the distal tip articulated. Testing under these conditions provides a clinically meaningful assessment of tool performance beyond idealized straight-channel configuration. Then various tools were connected to a force gauge and advanced through the accessory port and down the working channel of the scope. Peak force was then recorded for each test occurrence. Each scope was tested with the following tools: a Bronchoscope Cytology Brush (Cook Medical, 2.0 mm), Disposable Biopsy Forceps (Olympus Endo Jaw, 2.0 mm), Disposable Biopsy Forceps (Boston Scientific Radial Jaw, 2.8 mm) and the Chartis Catheter (Pulmonx). In this set of tests, a lower value indicates less resistance and therefore smoother tool passage.

**Result:** Compared to aScope 4 and aScope 5, BFlex™ 2 required lower insertion force values to pass all tools tested. Compared to the reusable BF-1TH190, BFlex 2 achieved comparable insertion force values for the cytology brush and both sets of biopsy forceps and lower insertion force value for the Chartis Catheter. For the 2.0 mm biopsy forceps, one of the most commonly used tools in the ICU, BFlex 2 encountered 68% lower resistance force than the aScope 5. BFlex 2 was the only single-use scope able to pass the Chartis Catheter through the distal tip.

## Tool Insertion Forces



## Discussion

In bronchoscopy, effective secretion clearance and reliable tool delivery are closely linked, particularly in ICU settings where procedures are often performed in the presence of thick secretions, blood, and complex airway anatomy. A bronchoscope must maintain suction performance under articulation while also allowing tools to pass smoothly to distal airway targets.

In this evaluation, BFlex™ 2 demonstrated superior suction performance across all test configurations, including the most clinically representative condition of viscous fluid with full articulation, where it achieved 125% higher suction than aScope™ 5. BFlex 2 also consistently required lower tool insertion forces than other single-use bronchoscopes, maintaining insertion forces below 10.5 N across all tools tested and requiring 68% less force than aScope 5 for a 2.0-mm biopsy forceps. Notably, BFlex 2 was the only single-use scope able to pass the Chartis Catheter through the distal tip. Together, these results indicate that BFlex 2 supports both effective airway clearance and smooth, controlled tool advancement under clinically realistic conditions.

## Conclusion

This study compared suction performance and tool passage across four commercially available bronchoscopes using clinically relevant benchtop test conditions designed to reflect routine ICU and procedural use. Across the conditions tested, BFlex 2 demonstrated a consistent performance advantage against competitive commercially available bronchoscopes, combining effective suction with smooth, reliable tool passage. Together, these findings show that BFlex 2 delivers a measurable performance advantage across critical attributes that matter in daily clinical practice compared to the other scopes tested.

1. Test results are based on data on file.
2. Khatait, J. P. (2013). Motion and force transmission of a flexible instrument inside a curved endoscope. (Doctoral dissertation, University of Twente). University of Twente.

**verathon**

verathon.com

Verathon Inc.  
20001 North Creek Parkway  
Bothell, WA 98011  
USA

Tel: +1 800 331 2313  
(USA & Canada only)

Tel: +1 425 867 1348  
Fax: +1 425 883 2896

EC REP

Verathon Medical (Europe) B.V.  
Willem Fenengastraat 13  
1096 BL Amsterdam  
The Netherlands

Tel: +31 (0) 20 210 30 91  
Fax: +31 (0) 20 210 30 92

Verathon Medical (Australia) Pty Limited  
Unit 9, 39 Herbert Street  
St Leonards NSW 2065  
Australia

Tel: 1800 613 603 (Within Australia)  
Fax: 1800 657 970

Tel: +61 2 9431 2000 (International)  
Fax: +61 2 9475 1201