

# Vial Finish and Torque Guide for Screw Caps

Achieving a secure and reliable seal with screw caps is essential in laboratory and pharmaceutical settings. Proper torque application, guided by detailed torque tables, not only prevents leaks and contamination but also maintains the integrity of the sample throughout storage and analysis. This guide covers the critical aspects of screw cap torque, including thread finishes, cap sizing, and best practices, to help you achieve consistent and dependable results.



## WHAT ARE VIAL THREAD FINISHES?

Vial thread finishes refer to the threading on the neck of a vial, which is designed to match the corresponding screw cap. These threads, standardized by the Glass Packaging Institute (GPI), are crucial for creating a tight seal and ensuring compatibility between the cap and vial. GPI thread finishes are identified by a numerical code that indicates the diameter and thread style. Understanding these specifications helps laboratories select the correct caps, reducing the risk of mismatched closures that could lead to leaks or compromised samples.

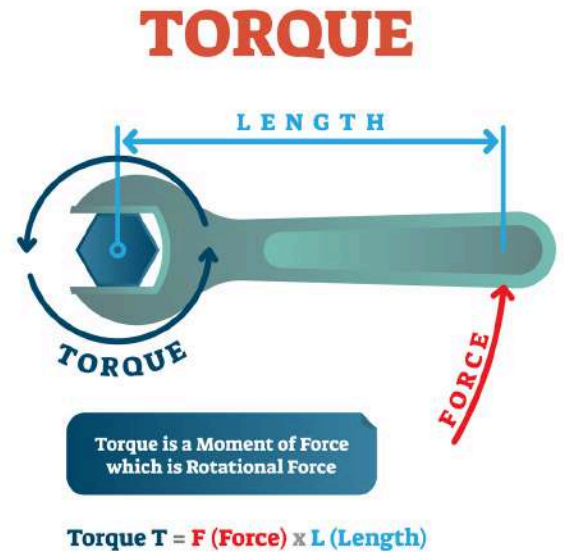


## HOW SCREW CAP SIZES ARE DESIGNATED

Screw cap sizes are designated using two key measurements: the diameter of the cap and the thread style. These measurements are often represented as two numbers separated by a dash, such as 13-425. The first number indicates the diameter of the cap in millimeters, while the second refers to the thread finish. This standardized designation simplifies the selection process, making it easier to match caps to their corresponding vials.

## HOW TO MATCH SCREW CAPS TO VIAL FINISHES

Matching screw caps to vial finishes is a key step in creating a reliable seal. Start by identifying the thread finish of the vial, which is typically indicated by a numerical code. Next, select a cap that corresponds to this code, ensuring compatibility in both diameter and threading. Pay attention to liner materials as well, as these play a significant role in sealing performance and chemical compatibility. Properly matched caps and vials reduce the risk of leaks and maintain the stability of the sample under various conditions.



## BEST PRACTICES FOR APPLYING TORQUE

Applying torque correctly is essential for achieving a consistent and secure seal. Here are some best practices to follow:

### USE THE RIGHT TOOLS

Invest in a quality torque wrench or automated capping system to apply consistent force.

### FOLLOW MANUFACTURER GUIDELINES

Refer to the torque specifications provided by the vial and cap manufacturer to determine the appropriate force for your application.

### INSPECT CAPS AND VIALS

Check for any visible damage or defects in the threads, liners, or vial neck before applying torque.

### APPLY TORQUE GRADUALLY

Avoid sudden or excessive force, which can lead to over-tightening and potential damage to the vial or cap.

By following these practices, laboratories can achieve a reliable seal and minimize the risk of sample degradation or contamination.

## WHY APPLICATION TORQUE IS IMPORTANT

Application torque refers to the amount of force used to apply a screw cap to a vial. Proper torque is critical for achieving a secure seal that prevents leaks, contamination, and evaporation. Insufficient torque can result in loose caps that compromise the sample, while excessive torque can damage the vial or liner, reducing the cap's effectiveness. Applying the correct torque balances the need for a tight seal with the physical limitations of the materials involved, ensuring sample integrity throughout storage and analysis.

## TORQUE TABLES FOR SCREW CAPS

| Cap Size (mm) | Inch-Pounds |
|---------------|-------------|
| 8             | 04-06       |
| 9             | 04-07       |
| 10            | 05-08       |
| 13            | 06-09       |
| 15            | 07-10       |
| 20            | 08-12       |
| 24            | 12-18       |
| 28            | 14-21       |
| 33            | 16-25       |

## COMMON MISTAKES TO AVOID

|  |   |
|--|---|
| <b>OVER-TIGHTENING CAPS</b>                  | Applying too much torque can damage the liner or crack the vial, compromising the seal.                         |
| <b>UNDER-TIGHTENING CAPS</b>                 | Loose caps may result in leaks or evaporation, leading to sample loss or contamination.                         |
| <b>USING MISMATCHED CAPS AND VIALS</b>       | Ensure that the cap diameter and thread finish match the vial specifications to avoid poor sealing performance. |
| <b>IGNORING LINER MATERIAL COMPATIBILITY</b> | Using liners that are not chemically compatible with the sample can lead to degradation or contamination.       |
| <b>NEGLECTING REGULAR TOOL CALIBRATION</b>   | Uncalibrated torque tools can lead to inconsistent application, affecting the quality of the seal.              |

**Avoiding these common mistakes enhances sealing reliability and promotes consistent results across laboratory workflows.**

## GETTING THE RIGHT SEAL EVERY TIME

A secure and consistent seal is vital for preserving the integrity of samples in laboratory and pharmaceutical applications. By understanding vial thread finishes, cap sizing, and the importance of proper torque application, laboratories can create reliable seals that protect samples from contamination and maintain their stability. Following best practices and avoiding common pitfalls ensures consistent results, promoting accuracy and reliability in every analysis.