THE BENEFITS OF PURCHASING ORIGINAL EQUIPMENT MANUFACTURED PARTS FROM WATERS

The quality differences between original equipment manufactured parts from Waters and third-party parts are significant. It is important to understand how these differences can affect your chromatographic system.
EXECUTIVE SUMMARY

When it comes to manufacturing replacement parts, Waters® Corporation operates under the enduring principle that optimum system performance can only be achieved when each component is designed to enhance the system’s standards for precision, accuracy, and reliability. To achieve this, Waters has put leading edge technology and unique processes in place to provide customers with the highest quality replacement parts, that is – Waters Quality Parts®.

In many cases, differences between Waters brand parts and third-party parts are visibly evident. These differences are significant and can degrade system performance and increase premature failures of parts in a system.

Using original equipment manufactured (OEM) parts from Waters provides numerous benefits including:

- Increased system uptime
- Fewer maintenance visits required
- Accurate and reproducible results
- Instrument warranty protection
- Continued system compliance

Using reverse-engineered third-party parts can:

- Increase downtime due to part or instrument failures – see Example 1 Autosampler needles
- Introduce system contamination issues – see Example 2 Plunger seals
- Cause system carryover problems – see Example 3 Teflon washer
- Produce inaccurate results – see Waters Critical Clean™ section

Understanding Quality Differences in Critical Parts

The quality differences between Waters parts and third-party parts are not always visible to the human eye, but in some cases, the differences are easy to recognize and it is important to understand how they can affect your chromatographic system. The following examples are critical components in a chromatographic system. The Waters parts and the third–party parts were compared and the quality differences seen were quite dramatic.

Example 1 Autosampler Needles

With autosampler needles, the surface finish has a significant effect on friction, wear, and sealing ability. Notice in Figure 1, the finish on the Waters needle is much smoother and polished in comparison to the third-party needle which has visible scratches. The Waters autosampler needle is made from surgical implant steel and is polished and processed in an environment free of contaminants.

Another dramatic difference is the bevel around the sample port. Waters uses a proprietary electrical discharge machining process to create a burr-free hole that is essential for overall system performance, as well as prolonging injector seal life. The Waters needle on the right also has a markedly sharper, more symmetrical tip. Because it is sharper, this needle will pierce the vial septum easier and reduce the risk of needle bending.

Figure 1. Third-party needle on the left, Waters needle on the right.
Example 2 Plunger Seals

Plunger seal performance can have a profound impact on instrument performance. Figure 2 shows two plunger seals that appear similar at first glance. On closer inspection you can see, the Waters seal (on the right) has a smooth finish which allows the plunger to slide through the seal more easily which will extend the life of the plunger seal. The third-party plunger seal has a rougher finish that could shred and cause blockages in the system.¹

![Third-party plunger seal on the left, Waters plunger seal on the right.](image)

In Figure 2, you can see differences in the seal springs. The third-party seal spring has more coils, inconsistent spacing between the coils, and in this example, there is a visible break in the spring at the top of the third-party seal.

Maintaining a constant spring force is important to seal performance. Waters seals use loaded springs specifically designed for the tolerances established for the Waters instrument to ensure that Waters seals will maintain a near constant spring force from start to finish, resulting in a better seal and, ultimately, more consistent results.

Example 3 Teflon Washer

The Teflon washer used in the 2695 Separations Module or 717Plus Autosampler seal pack was compared to a third-party Teflon washer (Figure 3). The third-party washer has jagged edges which could shred over time and if these particles enter the fluidic stream, they could be deposited into the sample vial, lodge in the needle sample port, or be flushed downstream into a valve or the column and cause a blockage.

Additionally, the rough and exposed fibers on the third-party washer could potentially harbor sample which could result in contamination or carryover from one sample to the other.

Another visible difference is the inner diameter of the washer. Further proof the washer was not made to the same specifications as the Waters washer.

![Third-party Teflon washer on the left, Waters Teflon washer on the right.](image)
Example 4 Deuterium Lamps

Waters deuterium lamps for detectors have been co-developed by Waters and Hamamatsu Photonics over the past 20 years. One noticeable difference is the cement used along the lamp window base. Many third-party vendors use epoxy cement in their lamps (Figure 4) while Waters uses inorganic ceramic bonding cement. When epoxy is used, over time, the heat generated from the lamp may cause outgassing. This leaves a coating of contaminants on the inner wall of the glass, the lamp housing window, and optics bench mirrors resulting in premature degradation of lamp intensity and potentially a very costly optics bench rebuild.

Notice in Figure 4, the Waters deuterium lamp on the right has a consistent and thick ceramic coating on the lamp electrodes and the third-party lamp on the left does not. This ceramic coating keeps the spacing between electrodes fixed to minimize thermal expansion that could otherwise cause movement in the arc emission point, leading to lamp-to-lamp variation in light output intensity. It also creates a uniform and optimum temperature distribution which is a key factor for stable operation.

Choosing the right detector lamp is critical and can make a significant difference in the overall performance of a chromatographic system.

HOW WATERS MAKES THE QUALITY DIFFERENCE IN PARTS

Now that you have seen some specific examples, let’s review the process Waters has in place to deliver the highest quality parts consistently. Waters starts with the goal that each Waters part is specifically designed to enhance system performance, and to deliver expected results through reliability, increased system uptime, and reproducibility.

Three important credentials separate a Waters part from a third-party part:

- **Original Design**
- **Lifetime Performance**
- **Manufacturing Excellence** – including the Waters Critical Clean process

Original Design

As part of the design process, Waters selects materials that meet the company’s exacting standards in the area of solvent compatibility, consistency in performance with varying temperature, and operating conditions. Selecting the proper material is a critical factor in ensuring the parts will not fail prematurely. A third-party component may look the same but it would not have been manufactured with the same specifications, tolerances, and materials that are part of the original design for a Waters instrument.

Many of Waters parts are unique and their design is protected by U.S. patents. Waters has 28 U.S. patents on its Alliance® product line alone. These patents cover the pump, autosampler, detectors, and other key system components. When you have a patented system component, the best way to maintain this component is to use original manufactured parts from Waters.
Lifetime Performance

At Waters, the Reliability Engineering group conducts risk analysis on system components and works closely with design engineers to define test protocols for critical performance parameters. Parts are then subjected to an accelerated testing regime that replicates and compresses years of normal operation. This testing stresses the components under specified operating conditions while Reliability engineers use precise equipment to monitor the performance of the parts, systems and the environmental conditions under which they are tested. The results of this testing provides invaluable input to Waters product development process.

Manufacturing Excellence

Since 1992, Waters has employed ISO 9001 quality management processes, ensuring a consistent approach to the design and manufacture of Waters parts on a worldwide basis.

Waters has invested heavily in its Machining Operations Center where leading edge machining and metrology technologies are employed to manufacture critical components. These technologies, along with highly skilled machinists, model makers, and quality technicians, ensure that Waters parts meet the strict design requirements for critical performance and reliability.

Waters Critical Clean Process

The Waters Critical Clean process is a structured manufacturing strategy that encompasses many areas in the design and manufacture of parts and systems. This strategy includes:

- Working with design engineers to identify which components could introduce contaminants and be detrimental to instrument performance or negatively impact chromatographic results
- Establishing and monitoring compliance with vendors who provide the raw materials or parts that are purchased by Waters
- Chemically cleaning critical clean parts to remove machining oils, particulates, and other contaminants that a part comes into contact with while being manufactured
- Analytical testing and auditing the cleanliness of parts and assemblies per internal procedures and specifications
- Establishing handling procedures to ensure Waters manufacturing technicians and service engineers keep these parts clean when being assembled or replaced in a system
- Packaging parts in a Class 10,000 cleanroom into special clean room plastic bags* to ensure the parts stay clean

*Non-cleanroom plastic bags frequently have antistatic, antioxidants or mold release agents which could leave a residue on the part and introduce contamination into the system and cause inaccurate results, such as, elevated baseline levels and contaminative peaks in the chromatogram that could overlap with the peaks from compounds of interest.
Waters Critical Clean Process Benefits

The investment that Waters made into its critical clean process provides you with some immediate benefits:

- **Streamlined installation process** – parts are ready to be installed and used immediately. No need to flush a system for a long period of time to clean new parts.
- **Reduced contamination issues** – using Waters replacement parts significantly reduces instances of contamination.
- **More uptime on the system** – eliminates downtime caused by premature part failures, and time spent troubleshooting on contamination issues.
- **Putting green initiatives to work** – reduces the amount of solvent used to flush a system.

Closing Summary

At Waters, quality is built into each and every part. Whether the part is for HPLC, UPLC®, or MS, the quality standards are the same in Waters manufacturing plants around the world.

Using Waters brand replacement parts is the best way you can:

- Ensure your system will run optimally now and in the future.
- Minimize unplanned maintenance visits.
- Protect your Waters instrument warranty.
- Meet regulatory compliance guidelines for your system.

When a part needs to be replaced, make the smart decision and choose the OEM replacement parts from Waters. While others offer replacement parts, Waters delivers design excellence, part integrity, and the guaranteed level of quality that is integral to the Waters name.

References