

Sealing Solutions and Their Critical Part in Growing Life Sciences Analytical Markets

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Core life sciences systems such as Ultra High Performance Liquid Chromatography (UHPLC) or In Vitro Diagnostic (IVD) analytical equipment are comprised of many critical parts that must work together efficiently and accurately to perform their main functions of analysis and testing and eventually provide valuable input to better guide patient healthcare. Sealing, wear and friction control solutions are among these critical parts, regularly used in these market segments, which have been growing rapidly and demanding innovative technologies that focus on cost, speed and purity.

In the liquid chromatography space, the pharmaceutical and life science industries are becoming the biggest growth areas in need of this type of separation science testing for impurities and degradation. There has been extensive use of High Performance Liquid Chromatography (HPLC) and Ultra High Performance Liquid Chromatography (UHPLC) systems by research academics and biopharmaceutical companies as shown in global market research reports such as from Technavio.

At the center of the global life sciences laboratory industry, In Vitro Diagnostics (IVD) equipment is used in the diagnosis of infectious and chronic diseases, preventative care and drug therapy monitoring, and testing biological specimens such as blood, cells, urine, saliva and tissue. According to [EvaluateMedTech® “World Preview 2017” report](#), the IVD market is anticipated to remain the largest medical technology segment up to 2022 with annual sales of \$69 billion, ahead of other medical technology sales. It continues to advance systems and critical assay technologies that include automation, point-of-care diagnostics, and molecular solutions.

Liquid Chromatography Equipment Success: High-Pressure Sealing & Purity

Liquid chromatography equipment includes HPLC and UHPLC; however, UHPLC is growing in adoption due to its faster detection and analysis of chromatography samples, using new and improved analytical separation techniques that involve the use of extremely small sized particles under ultra-high pressure conditions to separate chromatographic compounds. Samples are inserted at high pressure, which leads to increased resolution, speed of the separation of molecules from samples, and the following benefits.

- Compatibility with abrasive saline solutions and a wide range of solvents
- Low friction and wear results for long life
- Consistent results under high pressure and flow rates

Liquid chromatography relies on reciprocating pumps to pass pressurized liquid solvents containing sample mixtures through a column filled with a solid adsorbent material. These positive displacement pumps use critical seals such as Saint-Gobain Seals' [OmniSeal® spring-energized seals](#) for optimized performance. Additionally, UHPLC equipment relies on high operational pressure of up to 1,300 bar or 18,000 psi and above. Because of this high pressure, critical sealing is necessary on the smooth surface plunger pump to ensure analysis accuracy.

For over 30 years, Saint-Gobain Seals has been partners with OEMs who supply these plunger pumps to key industry leaders in this market, supporting them with such challenges as friction and wear control as well as carryover. Carryover has always been a problem in liquid chromatography equipment, originating from poor equipment maintenance (wear on needle, needle seat or seal, and leakage), sample overloading or poor technique.

Their spring-energized seals are also well recognized for its precise fit and long lasting performance due to the materials developed for the application, starting with Fluoroloy® A09 to the most recent Fluoroloy® A92 polymer material. Their engineers who have many years of experience working with these systems have created seal designs that meet the very demanding high pressure and purity requirements in the current market but also for the next generation product lines, including low leakage and enhanced wear lifetime.

In Vitro Diagnostic Equipment Success: High Chemical Sealing Resistance & Compatibility

In vitro diagnostics remain extremely important for routine patient management especially with countries leaning towards early-stage intervention to reduce late-stage healthcare expenditure. Saint-Gobain Seals has been working with key OEMs in the United States and Japan and is now [focusing on China](#) where the ascent of their Food & Drug Administration agencies is helping them become a top player where the United States and Japan have previously been leading.

Today's IVD systems are required to run faster and longer than previous generations. OEMs are seeking sealing solutions that offer:

- Low friction
- Chemically resistant materials that handle the various reagents used or saline
- Proper alignment and precise fit for accurate flow rate
- High wear resistance for a million cycles or more

There has also been emerging trends for smaller, lighter weight, easier to use and longer lifetime equipment. This need prompted Saint-Gobain Seals to further develop and improve their OmniSeal® spring-energized seals. Their team from Japan worked closely with customers and conducted research on current solutions within the in vitro diagnostics market. Combining in-house knowledge of low friction, chemically inert plastics with engineering application expertise, a successful sealing control solution (see the [case study here](#)) was designed that is smaller, lighter weight and improved maintenance cycles to deliver on cost savings.

OEM Partner Success: Collaborative Design Solutions

Technical life sciences applications with critical requirements require a sealing partner who has strong design engineering expertise, [research and development capabilities](#),

and consistent testing process for lifetime performance. Saint-Gobain Seals has invested in both personnel and equipment to ensure these benefits:

- Supporting HPLC and UHPLC customers with testing needs including solution development - their research and development team offers a multi set-up test rig for lifetime, pressure and critical wear testing in a real life simulation environment
- Offering design and development of seals using Finite Element Analysis (FEA), which have been successful with commercial products on the market
- Developing recommended testing performance and failure criteria for final product solution.
- Formulating new materials, material characterization and processing with ongoing support for local to global manufacturing

As the liquid chromatography and in vitro diagnostics markets grow in the next decade, other market segments in analytical instrumentation will also see a need for innovative technologies. One such segment relates to syringe applications where Saint-Gobain Seals' sealing solutions are providing excellent wear resistance and granting long lifetime and wide chemical compatibility – from buffer solutions to salt water and blood.

Their OmniSeal® seals and Rulon® polymer bearings have also made THE difference in [chemical analyzers](#), improving maintenance intervals by 200% or more and resulting in servicing equipment one to two times per year in comparison to a typical six times per year with other systems. These application examples show that Saint-Gobain Seals' solutions can work with a variety of critical life sciences systems - no matter how small as in miniature motors for pumps and ventilation equipment or how fast as in high-speed drills. The end goal for their sealing solutions is ensuring that equipment produce reliable results to concentrate on taking care of what is most important – patient healthcare and quality of life. Want to know more on how to find the right life sciences sealing or material solution? Schedule an appointment to read this [life sciences post](#) from their blog, The Critical PARTner, soon!



This information has been sourced, reviewed and adapted from materials provided by

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Saint-Gobain Seals



Address

7301 Oranewood Avenue
Garden Grove
CA, 92841
United States

Phone: +1 (714) 893 0470

Fax: +1 (714) 688 2614

Email: sealsmarketing@saint-gobain.com



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We have more than 50 years of manufacturing experience and an established global presence with strategic sites in Garden Grove, California, USA; Kontich, Belgium; and Minhang, Shanghai, China. The majority of seals and polymer components manufactured are custom designed and matched with the best materials to provide precise fit and lifetime confidence in your application.

Saint-Gobain Seals strives to meet your needs -- from our fast and efficient customer service staff to our design engineers and R&D team who solve critical problems -- we want to be your industry expert when it comes to seals and polymer components.

Critical parts making THE difference

