

# 7 WAYS TO OVERCOME SEALING CHALLENGES IN ANALYTICAL INSTRUMENTATION



The key challenges of sealing solutions in the life science market are stringent regulatory requirements, the need for exceptional material performance in challenging conditions, and complex supply chain issues.

Life science applications—like medical devices, lab equipment, and pharmaceutical manufacturing—demand flawless performance where failure could have severe consequences for patient safety and product integrity.

## KEY CHALLENGES IN SEALING SOLUTIONS FOR ANALYTICAL INSTRUMENTATION

### Chemical Compatibility

Life sciences applications often involve exposure to aggressive chemicals, solvents, and cleaning agents. Seals must resist degradation to maintain performance and prevent contamination.



### Thermal Resistance

Equipment in the life sciences industry frequently operates under extreme temperatures, from cryogenic conditions to high-heat sterilization processes. Seals must maintain integrity and sealability across these temperature ranges.



### Quality Compliance

Sealing materials must maintain leak-free performance to ensure consistent flow control, pressure stability, reproducible separations, retention time accuracy, and stable baselines, while supporting calibration and method validation.



### Durability and Longevity

Frequent maintenance or replacement of seals can disrupt operations and increase costs. Seals must offer extended Mean Time Between Failures (MTBF) to minimize downtime and maintenance.



### Contamination Prevention

In sterile environments, even minor seal failures can lead to contamination, compromising product quality and safety. Seals must provide a reliable barrier to protect against leaks and impurities.



### Versatility Across Applications

From pumps and valves to reaction chambers and fluid transfer systems, seals must perform consistently across a wide range of equipment and processes, often requiring custom solutions.



### Complex Geometry

As equipment becomes more compact and precise, seals must be engineered to fit smaller, more intricate designs without compromising performance.



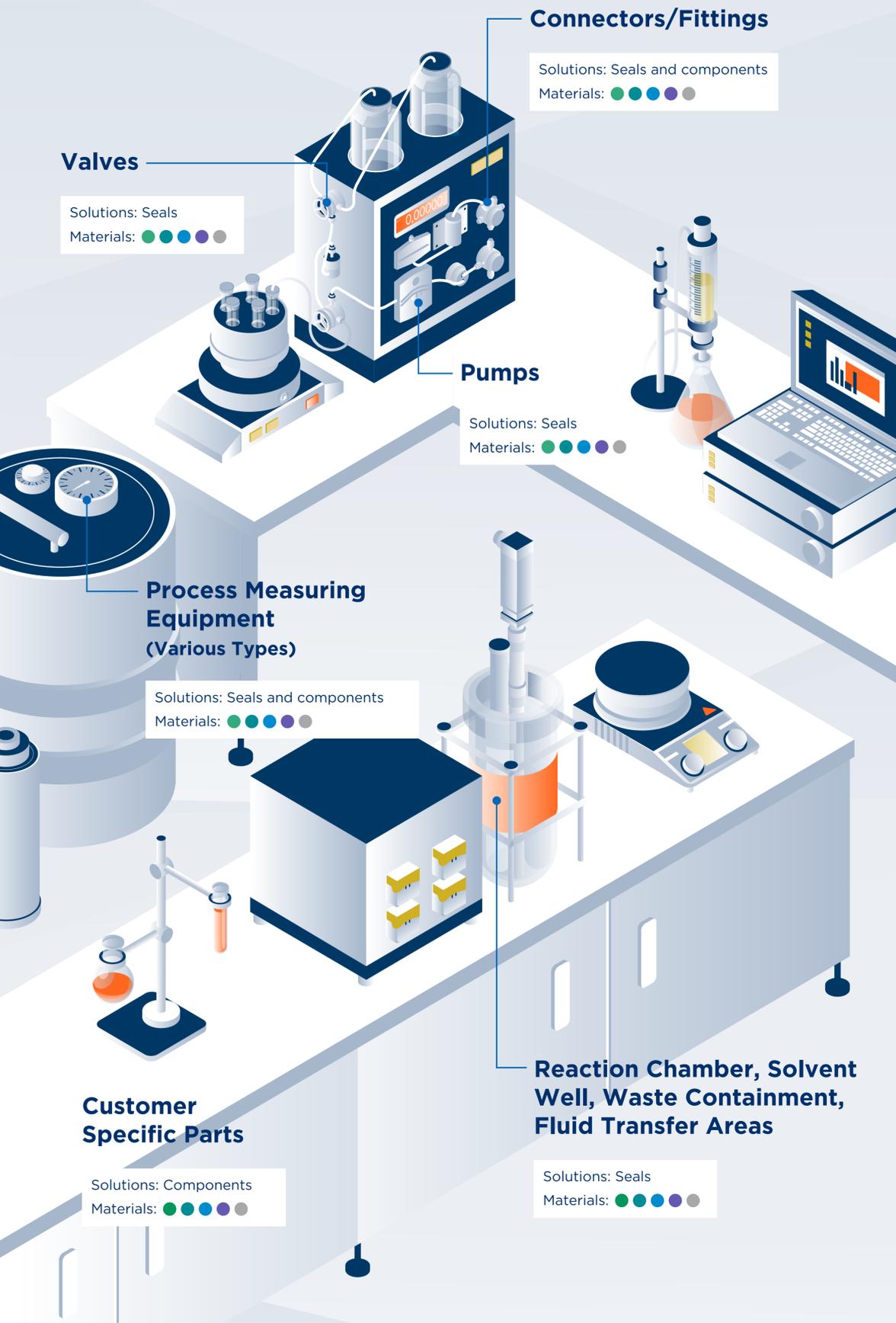
## YOUR SEAL OF CHOICE FOR ANALYTICAL AND LABORATORY EQUIPMENT

There is no one-size-fits-all solution. A seal that performs flawlessly in one context may fail in another. To maintain operational excellence and regulatory compliance, instrument makers must evaluate factors such as chemical compatibility, temperature range, and pressure requirements.

Greene Tweed experts recommend evaluating specific elastomeric groups to find the perfect match for your application's unique demands.

### Greene Tweed Materials:

- Standard Applications: EPDM
- Extreme Steam Resistance: FEPM (Fluoraz®)
- Acids and Reagents: FKM (Fusion®)
- The Ultimate Protection: FFKM (Chemraz®)
- Thermoplastics: PTFE, PEEK, MSE®



## PARTNERING FOR PRECISION AND RELIABILITY

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Selecting the incorrect seal material compromises more than just a single component; it jeopardises the integrity of the entire instrument. In an industry where precision is paramount and failure is not an option, relying on general-purpose solutions is a risk large enterprises cannot take.