

# Ensuring Safe Seals for Potable Water Systems

Understanding NSF/ANSI 61 and material selection.

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In potable water systems, every component that encounters water, from the largest distribution pipes to the smallest gaskets, plays a direct role in ensuring public health. While seals are often viewed as routine hardware, their impact on water quality is anything but ordinary.

A leak-free joint that releases harmful contaminants into drinking water can pose serious health risks. For this reason, the National Sanitation Foundation/American National Standards Institute (NSF/ANSI) 61 standard, Drinking Water System Components – Health Effects, was established to regulate the materials used in products that convey or store drinking water.

For manufacturers, engineers and maintenance professionals working with pumps, valves and piping systems, understanding the intent and scope of this standard is essential, not only for compliance but for ensuring confidence in the safety of the water supply.

## The Purpose & Scope of NSF/ANSI 61

NSF/ANSI 61 sets strict limits on the number of chemical contaminants that materials and components can leach into potable water. It applies to nearly every wet part of a drinking water system, including pipes, fittings, coatings, valves, gaskets and packing materials.

The standard requires third-party evaluation by accredited testing organizations. Certification is not a one-time event. Manufacturing facilities are inspected annually, and materials must pass repeated testing to ensure

consistency and ongoing compliance.

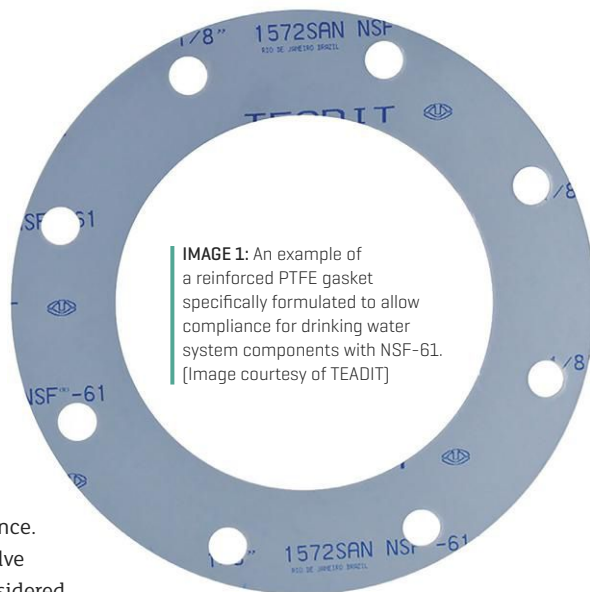
In practical terms, a gasket, valve packing or O-ring can only be considered safe for drinking water service if it has been independently tested and certified to NSF/ANSI 61 criteria. Products that merely “perform well in water service” are not necessarily compliant, and assuming otherwise can introduce risk for suppliers and end users alike.

## Sealing Components Under Scrutiny

Sealing elements face specific challenges under NSF/ANSI 61 due to their surface exposure and mechanical function. Even a small gasket can present a large, wetted area relative to system volume, amplifying the potential for extractable substances to enter the water.

Sealing components hurdles include:

1. **Surface area and leachability:** As seals often present large, wetted surfaces (especially in valves or large flanges), even low per-area leaching can accumulate. Many certified sealing materials must meet strict surface area-to-volume constraints in the NSF listing.
2. **Mechanical loading vs. extractable stability:** High gasket compression, dynamic movement in pumps or valves, thermal cycling and exposure to corrosive chemicals such as chlorine, present additional challenges to sealing materials. Materials may have acceptable extractables in static laboratory tests but degrade under mechanical or chemical stress, increasing leachable substances.



**IMAGE 1:** An example of a reinforced PTFE gasket specifically formulated to allow compliance for drinking water system components with NSF-61. [Image courtesy of TEADIT]

3. **Traceability and fabrication:** NSF/ANSI 61 certification applies to the product as supplied. If a facility purchases NSF-certified sheet material and fabricates finished gaskets, those gaskets can only be represented as NSF/ANSI 61 certified (and shipped with the NSF mark/certification documentation) when the fabricating facility itself is certified under an approved gasket cutting program and maintains required traceability controls.
4. **Misconceptions and procurement risk:** Some suppliers assume that materials promoted as “suitable for water service” are automatically NSF/ANSI 61 compliant. However, only products that are explicitly certified and documented are compliant.

Due to these challenges, selecting sealing products for use in potable water systems must be done with regulatory awareness and technical understanding.

## Material Matters: Choosing Safe, Compliant Sealing Solutions

Selecting the right sealing material for potable water service requires balancing mechanical performance with chemical safety. Materials must seal effectively under load while providing long-term resistance to leaching, degradation and creep relaxation. Common material classes include elastomers such as

ethylene propylene diene monomer (EPDM) and nitrile, compressed fiber sheets and fluoropolymers such as polytetrafluoroethylene (PTFE). PTFE-based materials are often preferred for critical potable water applications due to their chemical inertness, low extractables and broad temperature tolerance.

### Restructured PTFE: Engineered for Performance & Compliance

While PTFE is widely recognized for its chemical inertness and low extractables, traditional skived or molded PTFE materials present challenges in sealing performance. Creep relaxation can compromise long-term sealing reliability by decreasing the amount of gasket stress applied to the gasket.

To address this, restructured PTFE materials have been developed to provide additional benefits over conventional PTFE. Filled with glass microspheres, the engineered material allows the gasket to:

- Compress and effectively conform to irregular flange surfaces
- Resist gasket creep and cold flow
- Maintain gasket stress over extended service intervals
- Preserve chemical inertness and low extractable characteristics

### Best Practices for Engineers & Specifiers

1. **Verify certification:** Require NSF/ANSI 61 documentation for every wetted component, including seals, gaskets and packing materials.
2. **Confirm fabrication traceability:** Ensure that both material manufacturers and gasket fabricators maintain valid NSF certifications and documented traceability programs.
3. **Match materials to service conditions:** Select materials that balance compressibility, chemical resistance and mechanical strength for the intended service.

4. **Avoid over-torquing:** Excessive flange loads can deform PTFE-based gaskets and compromise long-term sealing performance, as well as potentially increase extractables.
5. **Maintain documentation:** Keep certification and traceability records for inspection and municipal compliance audits. ■

### References

1. NSF International. NSF/ANSI 61: Drinking Water System Components – Health Effects. NSF International, 2024.
2. Gasket Resources. “NSF-Certified Gaskets for Potable Water Projects.” Accessed October 2025.

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